Patrick Lennberg
Environmental Protection Specialist
Colorado Department of Natural Resources
Division of Reclamation, Mining and Safety
Office of Mined Land Reclamation
1313 Sherman Street, Room 215
Denver, Colorado 80203

March 25, 2025

Re: Permit No. M-1980-244; Cripple Creek & Victor Gold Mining Company; Cresson Project; Technical Revision 147 – Adequacy Review No. 1 Response

Dear Mr. Lennberg,

On March 10, 2025, the Cripple Creek and Victor Gold Mining Company (CC&V) received the Division of Reclamation, Mining and Safety (DRMS) Adequacy Review No. 1 of Technical Revision (TR) 147 to permit M-1980-244, regarding the ECOSA Pumpback System. Below are DRMS comments in **bold** and CC&V's response in *Italics*.

1. **Figure 1 of the Aquifer Testing Report incorrectly identifies GVMW-27B as a Point of Compliance. Please update the figure to accurately reflect the Points of Compliance.**

   Figure 1 within the Aquifer Testing Report has been revised and is included within Attachment 1.

2. **In Section 2.3, page 5, the discussion about the installation of GVMW-37A and B is not accurate. CC&V agreed to install these wells, during review of TR141, to address Division concerns about low resistivity areas identified in the Golder report (January 2023) at location PB23-01. Please update for accuracy.**

   The specified section has been revised to:

   > *"GVMW-37A and GVMW-37B were installed downgradient of GVMW-25 to address Division concerns about low resistivity areas identified in the 2023 Golder report at the PB23-01 location. Additionally, this location provides an observation point to monitor water quality downgradient of GVMW-25."*

   The revised section is included within Attachment 1.

3. **Please explain why GVMW-37A and 37B were not selected for additional pump testing beyond the slug tests.**

   GVMW-37A and GVMW-37B were not selected for additional pump testing because groundwater quality at these locations remains unaffected. Furthermore, these wells are situated on the opposite side of the thalweg and downgradient from the hypothesized seepage pathway. Given these conditions, the locations are not viable for pumpback operations, and additional aquifer testing would be of minimal value toward the overall objectives of the pumpback system.

4. **It is stated that the effectiveness of pumpback system will be evaluated through monitoring of GVMW-25 after the system is brought online and comparing the results to historical data to identify any changes to groundwater level and possible changes to contaminant concentration trends or a reduction in peak concentrations. During the constant rate pumping tests there were no changes detected in any of the observation wells for any of the tests. How will performance of the pumpback system be evaluated when there is no demonstration that any of the proposed pumping wells are interconnected?**

   The pumpback system is designed to intercept impacted groundwater upgradient of GVMW-25. If the system functions as intended, unimpacted water will be the sole source of water for GVMW-25, thereby leading to a reduction in contaminant concentrations and a potential effect on groundwater levels.

   While the constant rate pumping tests did not indicate measurable drawdown in observation wells, this does not preclude the potential for localized hydraulic influence under sustained operational conditions.

   The results of aquifer testing do not indicate an absence of hydraulic interconnection between wells. Rather, they suggest that the nature and extent of interconnection require further evaluation. Given its geographic position and existing water quality conditions, GVMW-25 remains the most appropriate location for assessing the effectiveness of the pumpback system in mitigating contaminant migration.

5. **If GVMW-25 is used as a pumpback well it would eliminate a long-term monitoring location specifically installed to monitor the impacts of seepage from the ECOSA to Grassy Valley. Please commit to installing a replacement monitoring well adjacent to GVMW-25 prior to bringing GVMW-25 online as a pumping well. The new well would act as an observation well for the pumping of GVMW-25. This new observation well which will replace the GVMW-25 monitoring point would be in addition to the two wells outlined in 17b. of the Stipulated Agreement which have been requested to be installed between GVMW-25 and GVMW-26A/B.**

   CC&V commits to installing a new observation well downgradient of GVMW-25, if GVMW-25 is converted into a pumpback well. The determination of whether GVMW-25 requires conversion will take time to ensure sufficient data can be collected. If it is decided that GVMW-25 is to be operated as a pumpback well, CC&V requests that the conversion be completed before installing a new observation well. This approach is intended to prevent further contaminant migration.

6. **The storage tanks that contain extracted groundwater will be periodically drained as needed using a water truck, which will then be offloaded in the lined Valley Leach Facilities. Please provide details and procedures on how pumping out of the storage tanks will be completed to contain spillage.**

   The extraction and transfer of groundwater from storage tanks to the lined Valley Leach Facilities will be conducted in accordance with established containment and spill prevention protocols to minimize the risk of spillage.

The following procedures will be implemented to ensure safe and controlled operations:

1. *Equipment and Containment Measures*
   - *Water Trucks: Water trucks will be inspected daily to ensure integrity of all components including piping, valves, seals, and connections.*
   - *Secondary Containment: The storage tanks are situated within secondary containment areas designed to capture any accidental spills or leaks. The secondary containment is designed to hold 110% of the tank capacity and precipitation from a 100-year 24-hour storm event.*
   - *Connection Points: Transfer hoses will be securely attached using cam-lock fittings or equivalent sealed connections to prevent leaks during loading and unloading operations.*
2. *Transfer Procedures*
   - *Pre-Extraction Inspection: Prior to extraction, all hoses, fittings, and connection points will be inspected for integrity and secure attachment.*

3. *Spill Prevention and Response Protocols*
    - *Deployable Secondary Containment: Deployable containment such as a mini-berm or duck pond will be staged at the storage tank area for rapid deployment in the event of a leak.*
    - *Incident Response Plan: In the unlikely event of a spill, CC&V's spill response procedures will be followed, including, containment, and proper disposal of any contaminated materials.*
4. *Documentation and Compliance*
    - *Transfer Logs: Each transfer event will be logged, including date, volume transferred, personnel involved, and any observations related to system integrity.*
    - *Routine Maintenance: Regular maintenance of tanks, hoses, and transfer equipment will be conducted to ensure continued safe operation.*

These measures collectively ensure that groundwater transfer operations are performed safely, effectively, and in compliance with regulatory requirements.

7. Please commit to providing an annual pumpback system operations report by the end of the first quarter of each year for the previous year of operations. The report should provide a summary of the amount of groundwater removed, operations and maintenance items, and any other miscellaneous items that occurred or happened to the system.

CC&V will commit to provide an annual Pumpback System Operation Report by March 31st following the reporting year.

8. Please provide the Reclamation Cost Estimate Table that was revised during the stipulated agreement negotiations for the 50-year operation of the system as outlined in Section 18. Of the Stipulated Agreement.

The requested cost estimate table is included as Attachment 2.

Should you require further information, please do not hesitate to contact Antonio Matarrese at 719-851-4185 or Antonio.Matarrese@ccvmining.com or myself at Katie.Blake@ccvmining.com.

Sincerely,

p.p. DocuSigned by:
Antonio Matarrese
FD42D9E12B1147D...

Katie Blake
Sustainability & External Relations Manager
Cripple Creek & Victor Gold Mining Co

Ec:
E. Russell - DRMS
P. Lennberg – DRMS
Z. Trujillo - DRMS
J. McBryde – Teller County
J. Gonzalez – CC&V
K. Blake – CC&V
N. Townley – CC&V
A. Matarrese – CC&V

Attachment 1

ECOSA - Cripple Creek and Victor Gold Mine, Teller County, Colorado

Aquifer Testing Report

East Cresson Overburden Storage Area (ECOSA) Seepage Mitigation Design
PO Number: 3002859211

Cripple Creek and Victor Gold Mine
Teller County, Colorado

Cripple Creek and Victor Gold Mining Company, LLC (Newmont)

February 19, 2025

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Table of Abbreviations and Acronyms

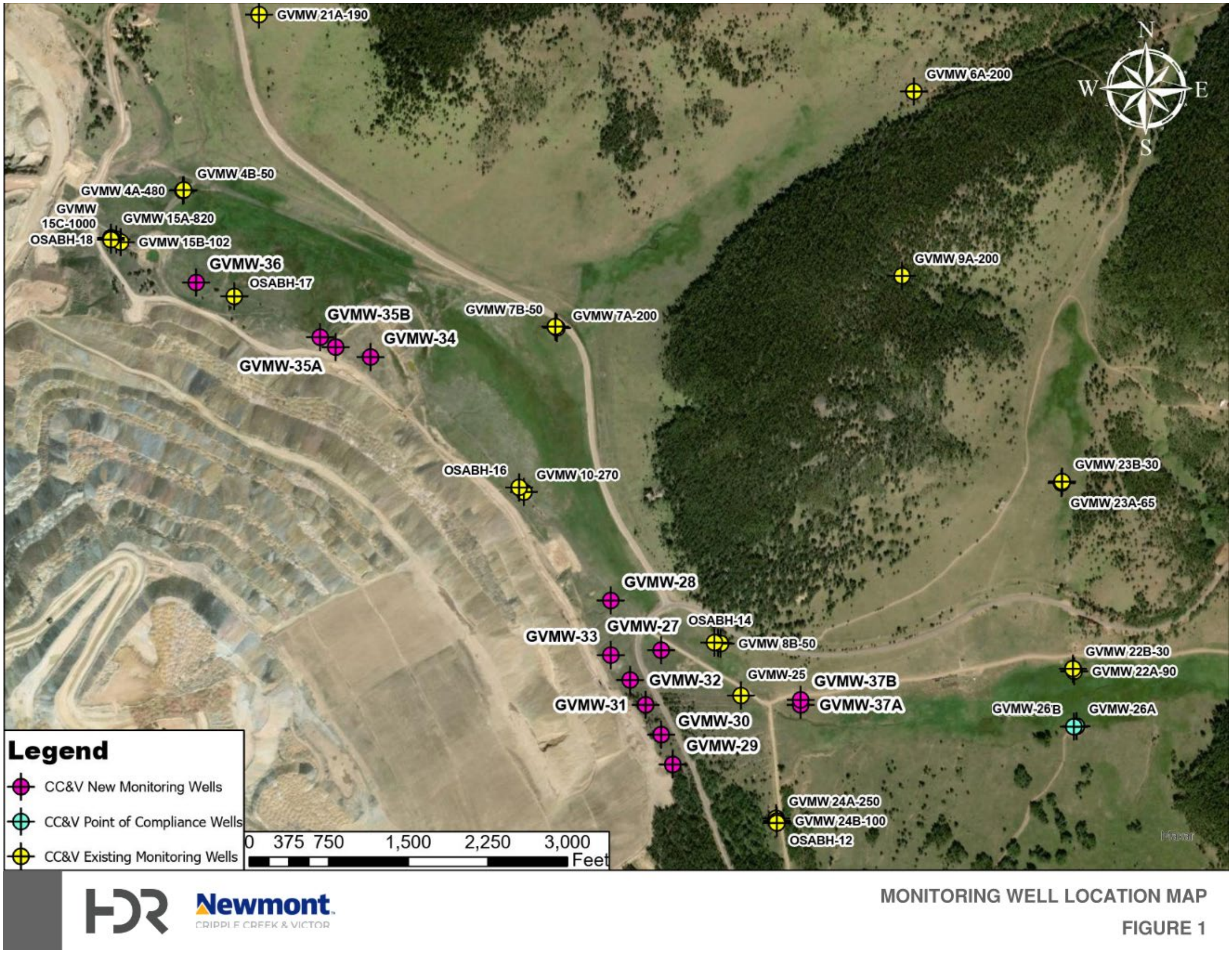
Authentic	Authentic Drilling, Inc.
bgs	below ground surface
btoc	below top of casing
cm/s	centimeters per second
CC&V	Cripple Creek and Victor Gold Mine
DRMS	Division of Reclamation, Mining, and Safety
ECOSA	East Cresson Overburden Storage Area
gpm	gallons per minute
HDR	HDR Engineering, Inc.
K	hydraulic conductivity
Newmont	Cripple Creek and Victor Gold Mining Company, LLC
T	transmissivity
TR	Technical Revision
USCS	Unified Soil Classification System
VLF2	Valley Leach Facility 2

1. Introduction

The purpose of this Aquifer Testing Report is to document slug tests and pump tests of recently installed groundwater monitoring wells at the Cripple Creek and Victor Gold Mine (CC&V) located in Teller County, Colorado. The groundwater monitoring system is intended to support the East Cresson Overburden Storage Area (ECOSA) Seepage Mitigation Design project. The ECOSA is an active overburden storage facility located approximately two miles north of Victor, CO and approximately two miles east of Cripple Creek.

HDR Engineering, Inc. (HDR) was contracted by the Cripple Creek and Victor Gold Mining Company, LCC (Newmont) to conduct slug testing and pump testing of newly installed groundwater monitoring wells at CC&V (HDR, 2024). HDR additionally retained Authentic Drilling, Inc. (Authentic) to provide on-site pump testing activities, while HDR conducted the slug tests, logged data from the pump tests, and oversaw all pump testing activities conducted by Authentic. All on-site personnel completed site-specific safety training and orientation. Additionally, daily safety meetings were conducted by the on-site project team prior to commencing work.

Figure 1. ECOSA/Grassy Valley Monitoring Well Location Map



2. Background Information

2.1 Site Description

The ECOSA is an active overburden storage facility located on the northeast edge of the CC&V mine site. The area known as Grassy Valley is located immediately to the north and east of the ECOSA facility (WSP Golder, 2023). Seepage has been observed at the toe of the facility near Grassy Valley (Collier Geophysics, 2023).

2.2 Geology and Hydrogeology

The Cripple Creek basin is a steep-walled volcanic subsidence basin surrounded by Precambrian granite. The basin is filled with fragmented rocks, of both volcanic and clastic origin, which are Miocene in age, and which are collectively referred to as "breccia" (Hamm, J.C., 1972). The hydrogeology of the Grassy Valley area is characterized in terms of three hydrogeological units: Diatreme, Granodiorite/Phonolite, and the Alluvium/Colluvium (Brown, 2001).

Grassy Valley is underlain by colluvium and granitic bedrock with groundwater present in both the bedrock and the colluvium (WSP Golder, 2023). Groundwater levels for wells screened within the colluvium ranged from 6 to 30 feet below ground surface (bgs), and flow rates ranged from 0.1 to 1.5 gallons per minute (gpm) (Piteau Associates, 2023a and 2023b). Recent water quality results from monitoring well GVMW-25 (**Figure 1**), indicate hydrologic connection between the ECOSA and Grassy Valley, although there have been no observed effects to surface or ground water outside of the CC&V permit boundary (Newmont, 2023).

The colluvium mainly consists of sandy unconsolidated gravel, fill sand, black sandy peat, overburden, and alluvium with a mix of breccia and moderate clay (Ligocki, 1998, White, 1997). A large portion of the subsurface bedrock structures in the ECOSA/Grassy Valley area are known to be the Cripple Creek Diatreme, which consists of igneous brecciated rock (Kelley et al., 1998) and phonolite. Most of the ECOSA and a large portion of Grassy Valley is located within the footprint of the diatreme, however, the northwest portion of Grassy Valley is situated on primarily Precambrian granodiorite.

Groundwater in the ECOSA area infiltrates through the surface mine operations towards and through the diatreme and has the potential to flow towards the historic Carlton Tunnel (Brown, 2001). The diatreme is a highly permeable hydrogeologic unit. Slug test data from ECOSA wells indicates a hydraulic conductivity (K) of 6 x 10^{-5} to 1 x 10^{-4} centimeters per second (cm/s). The K of the diatreme is likely dominated by many well-connected fractures (Brown, 2001), and historic mine workings. The granodiorite/phonolite has low K. The upper 30 feet of such rocks usually have slightly higher permeability because of weathering; however, weathering seldom extends below this depth (Brown, 2001). Slug test data from ECOSA wells indicates the K of the shallow, weathered granodiorite/phonolite is in the range of 1 x 10^{-6} to 1 x 10^{-5} cm/s. K in the deeper, unweathered granodiorite/phonolite is in the range of 6 x 10^{-7} to 51 x 10^{-6} cm/s. The K of this unit is likely to be dominated by fractures (Brown, 2001).

The northwest portion of Grassy Valley consists of sandy, unconsolidated gravel colluvium from 0 to 5 feet bgs, and black sandy peat to 5 to 15 feet bgs (White, 1997). According to geologic logs, bedrock in this area consists of pre-Cambrian biotite schist, which is weakly oxidized and has moderate fractures (White, 1997, Ward et al., 2001). Pump testing during drilling at GVMW-4A

(**Figure 1**) showed groundwater flows from 10 to 70 gpm. From 110 to 245 feet bgs, the groundwater flow ranged from 10 to 25 gpm. From 300 to 440 feet bgs, the groundwater flow ranged from 60 to 70 gpm (White, 1997).

The central portion of Grassy Valley consists of Valley Fill colluvial material from ground surface to 20 to 35 feet bgs (Ligocki, 1998). At GVMW-7A, bedrock consists of granodiorite, with medium-grained granite. Pump testing during drilling at GVMW-7A showed groundwater flow rates from 1 to 4 gpm. The GVMW-7A geologic log showed groundwater encountered at 205 feet bgs and groundwater flow rates ranging from 35 to 50 gpm. At 220 feet bgs, groundwater flow rates ranged from 45 to 50 gpm, and at 270 feet bgs, groundwater flow ranged from 35 to 40 gpm (Ligocki, 1998).

The southeast portion of Grassy Valley consists of Valley Fill colluvium and overburden material from 0 to 20 feet bgs (Ligocki, 1998). The underlying bedrock consists of porphyritic phonolite. At GVMW-8A (**Figure 1**), there was a medium- grained aphanitic dike from 20 to 30 feet bgs. From 85 to 140 feet bgs, the geologic logs show weak sericite and potassic alteration and 2 to 3% pyrite. From 105 to 110 feet bgs and 150 to 225 feet bgs, trace amounts of fluorite were found. From 205 to 250 feet bgs, the logs indicated groundwater occurring within the fractured bedrock. At 200 feet bgs, groundwater flow was 5 gpm (Ligocki, 1998).

2.3 Recent Monitoring Well Installations (2024)

Recent groundwater quality results from monitoring well GVMW-25, screened in alluvium and bedrock from 69 to 79 feet bgs, indicate a hydrologic connection between ECOSA and Grassy Valley. In August 2021, as part of CC&V's water quality monitoring program, CC&V collected a water sample from GVMW-25. Upon receipt of the analytical results, CC&V provided an exceedance notification to the Division of Reclamation, Mining and Safety (DRMS) specifying exceedances for several parameters in the sample collected. CC&V hypothesized that the seasonally influenced concentrations of constituents observed at monitoring well GVMW-25 were caused by stored porewater within the ECOSA facility being flushed into shallow groundwater towards the Grassy Valley during the monsoon rain events. In 2022 and 2023, CC&V observed increases in parameter concentrations with similar pattern to the increases observed in August 2021, post-monsoon season.

CC&V discussed a seepage mitigation plan with DRMS, which includes a phased approach. Phase I of the seepage mitigation plan included the installation of monitoring wells along the toe of ECOSA within Grassy Valley to increase CC&V's ability to monitor groundwater, characterize groundwater flow paths, and intercept and collect impacted shallow groundwater. CC&V ultimately proposed the installation of thirteen (13) groundwater monitoring wells within Grassy Valley in locations that correspond to low resistivity zones identified during a geophysical survey (Collier Geophysics, 2023).

In July and August 2024, 13 groundwater monitoring wells (GVMW-27, GVMW-28, GVMW-29, GVMW-30, GVMW-31, GVMW-32, GVMW-33, GVMW-34, GVMW-35A, GVMW-35B, GVMW-36, GVMW-37A, and GVMW-37B) were installed as part of Phase I of the ECOSA Seepage Mitigation Design Project (**Table 1** and **Figure 1**) (HDR, 2024). The colluvium encountered during installation of the new monitoring wells was found to be dry in some locations (GVMW-29, GVMW-31, GVMW-32), except where groundwater was identified directly above competent bedrock (GVMW-28, GVMW-30, GVMW-33, GVMW-34, GVMW-35B, GVMW-36). Groundwater was also identified in monitoring wells installed in the weathered bedrock (GVMW-27, GVMW-37B). GVMW-35A and GVMW-37A were installed as deep bedrock wells and were screened in fractured, competent bedrock (HDR, 2024).

GVMW-27 and GVMW-28 were installed closer to the thalweg of Grassy Valley to better characterize groundwater flow paths for the potential downgradient migration of seepage. GVMW-29, GVMW-30, GVMW-31, GVMW-32, and GVMW-33 were installed in a northwest-southeast trending line within the observed shallow low resistivity zone in the southeastern portion of the ECOSA. GVMW-34, GVMW-35A, and GVMW-35B were installed within the observed shallow low resistivity zone in the northwestern portion of the ECOSA. GVMW-35A and GVMW-35B were installed near one another to intersect both the shallow and deep low resistivity zones observed at that location. GVMW-36 was installed at an additional small, shallow resistivity zone. GVMW-37A and GVMW-37B were installed downgradient of GVMW-25 to address Division concerns about low resistivity areas identified in the 2023 Golder Report at the PB23-01 location. Additionally, this location provides an observation point to monitor water quality downgradient of GVMW-25. The monitoring wells were constructed in a manner that allows for pump installation and conversion to interception wells, if necessary.

Table 1. Monitoring Well Construction Details

Well ID	Well Diameter (inches)	Screen Interval (feet, btoc)	Static Depth to Water (feet, btoc)	Well Depth (feet, btoc)	Water Column (feet)	Screened Lithologic Unit[1]	Notes[2]
GVMW-27	4	64.42-74.42	53.45	74.42	20.97	Weathered schist	
GVMW-28	4	61.40-71.40	31.72	71.40	39.68	Lean clay	
GVMW-29	4	27.98-37.98	DRY	37.98	DRY	Lean clay	Dry
GVMW-30	4	40.25-50.25	39.90	50.25	10.35	Lean clay	
GVMW-31	4	42.71-62.71	61.65	62.71	1.06	Lean clay	Functionally dry
GVMW-32	4	56.93-66.93	65.82	66.93	1.11	Lean clay	Functionally dry
GVMW-33	4	74.05-84.05	60.82	84.05	23.23	Fat clay	
GVMW-34	4	75.06-85.06	58.75	85.06	26.31	Fat-to-lean clay	
GVMW-35A	4	322.02-342.02	268.55	342.02	73.47	Unweathered granodiorite	
GVMW-35B	4	62.71-72.71	32.5	72.71	40.21	Lean clay	
GVMW-36	4	27.43-37.43	14.35	37.43	23.08	Lean clay/Lean silt	
GVMW-37A	4	182.10-202.10	31.59	202.10	170.51	Unweathered granite and schist	
GVMW-37B	4	65.13-75.13	31.10	75.13	44.03	Weathered schist	

[1] Boring logs containing properties of screened lithologic units are included as **Appendix A**.

[2] Functionally dry wells are defined as those with water columns of <2 feet.

3. Field Methods

3.1 Slug Testing

Slug testing was performed for wells to estimate K. Wells that were dry or functionally dry (water column of <2 feet) could not be slug tested. GVMW-35A was not tested because the well had not yet been developed at the time slug tests were being performed. GVMW-35A was developed via air lifting prior to performing pump tests. Slug tests were conducted between September 16 and September 21, 2024, on the following monitoring wells: GVMW-27, GVMW-28, GVMW-30, GVMW-33, GVMW-34, GVMW-35B, GVMW-36, GVMW-37A, and GVMW-37B (**Table 2**).

The tests were conducted by introducing a physical slug into the water column of the tested wells and monitoring the change in water level. For slug testing, a 3-inch diameter watertight slug, varying in length from 2 feet to 5 feet, was utilized. Slug-in tests were completed by dropping the slug into the water column as quickly as possible and measuring the falling water level that followed. Slug-out tests were completed after each slug-in test by removing the slug from the water column as quickly as possible and measuring the rising water level that followed. Water level measurements were recorded at 1-second intervals by a transducer suspended on a communications cable near the bottom of the well. Slug test data were downloaded at the end of each working day and saved locally to a laptop. All non-dedicated down-well equipment used during slug testing was decontaminated between sample locations by rinsing with an Alconox/distilled water solution followed by a potable water rinse and a final rinse with deionized water.

The change in water level in response to each slug-in and slug-out test was analyzed to estimate K. Slug test details are provided in **Table 2**, and slug test results are described in **Section 4.1**.

3.2 Pump Testing

Following a thorough review of wells after completion of slug testing and in consultation with CC&V, four wells were selected for pump testing. Of these four wells, two wells, GVMW-27 and GVMW-35A, were selected for step-drawdown testing and constant rate pump testing; and two wells, GVMW-28 and GVMW-36, were selected for step-drawdown testing only. The determining factors for selecting these wells are as follows:

- **GVMW-27 – Constant rate pump test and step-drawdown test.** This well was selected because of its high hydraulic conductivity based on slug test results, it has sufficient saturated thickness for sustained pumping, and it is spatially located southeast of the ECOSA towards the thalweg of Grassy Valley.
- **GVMW-28 – Step-drawdown test only.** This well was selected because of its moderately high hydraulic conductivity based on slug test results, it has sufficient saturated thickness for sustained pumping, and it is spatially located near the eastern midpoint of the ECOSA in an area being considered for mitigative measures.
- **GVMW-35A – Constant rate pump test and step-drawdown test.** This well was selected to determine the hydraulic properties of deep bedrock groundwater near the northeastern edge of the ECOSA, and it has sufficient saturated thickness for sustained pumping.
- **GVMW-36 – Step-drawdown test only.** This well was selected to determine the hydraulic properties of shallow groundwater near in the northeast edge of the ECOSA, and it has sufficient saturated thickness for sustained pumping.

HDR conducted these pump tests using a consistent methodology, incorporating guidance from ASTM D4050-91. The methodologies for the step-drawdown tests and constant rate aquifer pump tests are described in detail in **Section 3.2.1** and **Section 3.2.2**, respectively. The specific details of pump test implementation at GVMW-27, GVMW-28, GVMW-35A, and GVMW-36 are described in **Section 3.2.3**, **Section 3.2.4**, **Section 3.2.5**, and **Section 3.2.6**, respectively, and these details are summarized in **Table 3**.

Step-drawdown tests were completed at GVMW-27, GVMW-28, and GVMW-36. At GVMW-35A, a complete step-drawdown test was attempted but could not be completed because rapid drawdown of the water column was observed at the lowest achievable pumping rate, and it was decided in the field to forego the step-drawdown test and perform the constant rate pump test only.

An 18-hour constant rate pump test was completed at GVMW-27, followed by a full 72-hour constant rate pump test based on the constant rate drawdown capacity of the well. An 11-hour constant rate pump test was completed at GVMW-35A, followed by another 29-hour constant rate pump test based on the constant rate drawdown capacity of the well. Pump test results are described in **Section 4.2**.

3.2.1 Step-Drawdown Test Methodology

Step-drawdown tests were performed on the designated pumping wells to establish a pumping rate for long-term tests. Additional water level measurements were also recorded in the designated observation wells. Each of the designated pumping wells was intended to be pumped at four successively higher rates as determined by field conditions. Selection of the rates considered the depth to static water level, the depth to the top of the screen interval, the depth of pump intake (a safe distance to prevent the pump from cavitating), and the approximate specific capacity of the well from well development records.

Each test step was performed for a duration of approximately one hour (or more, in some cases) until water level stabilization was achieved (approximately four hours total). The hour-long duration of each step was intended to allow sufficient time for drawdown to stabilize or reach asymptotic conditions. Water levels were measured automatically throughout the step drawdown test with a pressure transducer installed in the pumping well and checked periodically with a water level meter. The pressure transducers utilized were capable of sustaining a head equal to the depth of pump intake plus a sufficient distance below the pump to avoid any pump turbulence. Manual water level measurements were made to the nearest 0.01 foot and recorded in a field logbook or log form.

Prior to commencement of the step drawdown test, the static water level was measured. This static water level was used for drawdown calculations. During each step, water level measurements were performed at equal time steps that were short enough to record drawdown during the first few minutes of each step. Rates of discharge were monitored throughout the test with the use of digital totalizing flow meter, and these rates were adjusted by Authentic to maintain the specified discharge rate as head decreased.

3.2.2 Pump Test (Constant Rate) Methodology

The wells that would receive a constant rate pump test, along with the pumping rates for constant rate pump tests, were selected based on the results of the step-drawdown tests. The selected rates were deemed sustainable for the duration of the drawdown phase of the test and attempted to avoid drawing water levels below the tops of well screens or too close to depths of pump intake (which would result in pump cavitation).

The aquifer pumping tests were intended to consist of a 72-hour drawdown pumping phase during which water levels were monitored at select observation wells and the pumping well, while the pumping well was purged at a constant rate for the duration of the test. The drawdown phase was then followed by a recovery phase (non-pumping), during which water levels were monitored after the pump was shut down. At least one observation well was located outside of the anticipated influence of the pumping well to monitor ambient water level fluctuations during the drawdown and recovery phases of the test.

Water levels were monitored with pressure transducers and manually with a water level meter. Pressure transducers were installed in the pumping well and designated observation wells. The pressure transducer installed in the pumping well was capable of sustaining head equal to the depth of the pump intake plus a sufficient distance below the pump to avoid any pump turbulence. The pressure transducers installed in the observation wells were capable of sustaining head greater than the anticipated drawdown. Prior to and after each test, transducers were checked by raising and lowering each transducer a measured distance in the well. Transducer readings were additionally verified with a manual water level meter throughout the drawdown and recovery phases of each test.

Water levels in the pumping wells were measured both manually and with a transducer set to record at linear time intervals. Critical early time drawdown data were obtained manually by frequently measuring the water level in the pumping well during the first 10 minutes of the test, and every minute with the transducer. Following the first 10 minutes of the test, pressure transducers continued to collect data in one-minute intervals. The frequency of manual water level measurements was decreased to one measurement per minute until one hour of pumping had elapsed, followed by one measurement every five minutes until two hours of pumping had elapsed, one measurement every 10 minutes until four hours of pumping had elapsed, and finally one measurement every hour until the test had completed. Water levels in designated observation wells were monitored throughout each test with pressure transducers at one-minute intervals for all phases of testing.

Water was withdrawn from the well at a regulated rate throughout each test. Short-term discharge was measured on an hourly basis and compared to the mean discharge to ensure a variation of no more than 10 percent. Long-term discharge variation (i.e., from the beginning of the test to completion) was attempted to be kept within 5 percent. Discharge was measured and recorded frequently during early stages of the test (approximately every five minutes) and adjusted if necessary. A digital totalizing flow meter and graduated measuring cup were used for measuring discharge flow rates and total volume of water discharged (flow meter does not measure rates <0.5 gpm). When discharge was determined to be stable, the discharge rate was checked at a frequency of once every hour. Care was taken to minimize rate fluctuations to those necessary to maintain a constant rate during the initial 10 to 20 minutes of the drawdown phase of the test, when time-drawdown data are critical to curve-matching methods of data analysis.

The recovery of water levels following the pumping phase was measured and recorded for the same amount of time as the duration of the pumping phase (e.g., a 72-hour pump test was immediately followed by a 72-hour recovery monitoring period). The linear frequency of measuring water levels was similar to the frequency employed during the pumping phase.

Discharge water was piped into a frac tank staged at the test location. Water stored in the frac tank was pumped out by Authentic or a CC&V-provided water truck on a regular basis to enable uninterrupted groundwater pumping of the well for the duration of each test. Pump test discharge water was transported by Authentic or CC&V to the Valley Leach Facility 2 (VLF2) for disposal.

Following the completion of pump testing, the tanks were cleaned out by Authentic and excess sediment was collected for disposal at VLF2.

3.2.3 Pump Test Implementation: GVMW-27

A step drawdown test was performed at GVMW-27 on October 24, 2024. The purpose was to evaluate drawdown in the well to determine a sufficient pumping rate for a 72-hour pump test. The initial pumping rate for the step drawdown test was set to 0.1 gpm and caused minimal drawdown. After 90 minutes of pumping at 0.1 gpm, the pumping rate was increased to 0.2 gpm. The water level in GVMW-27 decreased slightly over the course of this second step. After 60 minutes of pumping at 0.2 gpm, the pumping rate was again increased to approximately 2.5 gpm. The water level in GVMW-27 gradually decreased for after 5 minutes of pumping at 2.5 gpm, and the pumping rate was increased again to 3 gpm. After 60 minutes of pumping at 3 gpm, the pumping rate was increased again to 4.5 gpm. The water level in GVMW-27 experienced minimal drawdown after 5 minutes of pumping at 4.5 gpm, and the pumping rate was increased again to 5 gpm. The water level in GVMW-27 decreased significantly after 6 minutes; at that point, the pumping rate was decreased back to 4.5 gpm. One minute later, the water level in GVMW-27 was below the depth of the transducer. A rate of 1.5 gpm was selected for a 72-hour constant rate pump test. The well was allowed to recharge fully prior to initiating the constant rate pump test. Full recovery data were logged following the completion of this pump test.

The first intended 72-hour constant rate pump test at GVMW-27 was performed on October 25, 2024, with a selected pumping rate of 1.5 gpm. The selected observation wells for the constant rate pump test were GVMW-8B-50, GVMW-25, GVMW-28, and GVMW-30. The water level in GVMW-27 dropped approximately 2 feet during the first 10 minutes of the pump test, and then dropped approximately 1.5 feet more during the next 90 minutes of pumping. About 16.5 hours after commencing the pump test, the water level in GVMW-27 had experienced approximately 10 feet of drawdown. 18 hours after commencing the pump test, the water level in GVMW-27 had experienced approximately 15 feet of drawdown. At this point, there was approximately 0.3 feet of head above the pressure transducer, and the pump test was ended. Full recovery data were logged following the completion of this pump test.

A second pump test was conducted for 72 hours at GVMW-27 on October 26, 2024. The selected observation wells were the same as for the 18-hour constant rate pump test. To avoid purging the well dry during this pump test, a pumping rate of 0.75 gpm was selected. The water level in GVMW-27 dropped approximately 1.5 feet during the first 10 minutes of the pump test, and then dropped approximately 0.5 feet more during the next 90 minutes of pumping. After 18 hours of pumping, the water level in GVMW-27 had experienced approximately 4 feet of total drawdown. The pump test ran for a complete 72 hours and at the completion of the pump test, the water level in GVMW-27 had experienced approximately 6.5 feet of total drawdown. Full recovery data were logged following the completion of this pump test.

3.2.4 Pump Test Implementation: GVMW-28

A step drawdown test was performed at GVMW-28 on October 3, 2024. The purpose was to evaluate drawdown in the well to determine a sufficient pumping rate for a 72-hour pump test. The initial pumping rate for the step drawdown test was set to 0.1 gpm; 60 minutes of pumping at 0.1 gpm caused approximately 3 feet of drawdown. After 60 minutes of pumping at 0.1 gpm, the pumping rate was increased to 0.3 gpm. The water level in GVMW-28 decreased another 6 feet over the course of this second step. After 60 minutes of pumping at 0.3 gpm, the pumping rate was again increased to approximately 0.5 gpm. After 90 minutes of pumping at 0.5 gpm, the water level in GVMW-28 had decreased another 16 feet. The pumping rate was then increased again to 0.7 gpm. After 41 minutes of pumping at 0.7 gpm, the water level in GVMW-28 dropped another 8 feet, at which point it was below the depth of the pressure transducer. Full recovery data were logged following the completion of this pump test.

Ultimately, a constant rate pump test was not performed at GVMW-28.

3.2.5 Pump Test Implementation: GVMW-35A

A step drawdown test was not completed at GVMW-35A (justification provided in **Section 3.2**).

The first intended 72-hour constant rate pump test was performed at GVMW-35A on October 13, 2024, with a selected pumping rate 0.21 gpm. The selected observation wells for the constant rate pump test were GVMW-34, GVMW-35B, GVMW-7B-50, and OSABH-17. The water level in GVMW-35A dropped approximately 3 feet during the first 10 minutes of the pump test, and then dropped approximately 18 feet more during the next 90 minutes of pumping. After 8.5 hours of pumping, the water level in GVMW-35A had dropped a total of 31 feet. At this point, the pumping rate was adjusted to 0.24 gpm. Over the course of the next 2.5 hours (i.e., a total of 11 hours of pumping), the water level in GVMW-35A had dropped another 19 feet (i.e., a total of approximately 50 feet of drawdown). At this point, the pump test was ended as there was approximately 1 foot of head above the pressure transducer. Full recovery data were logged following the completion of this pump test.

The second intended 72-hour constant rate pump test was performed at GVMW-35A on October 14, 2024, following complete water level recovery. The selected observation wells were the same as for the 11-hour constant rate pump test. The selected pumping rate was 0.20 gpm, but the actual pumping rate during the test varied significantly. The water level in GVMW-35A dropped approximately 3.5 feet during the first 10 minutes of the pump test, and then dropped approximately 9.5 feet more during the next 90 minutes of pumping. After approximately 16.5 hours of pumping, water level had dropped a total of 33 feet. During these first 16.5 hours of pumping, the pumping rate was adjusted several times to account for rate drops, and ultimately ranged from 0.18 to 0.25 gpm. This led to variability in the rate of drawdown throughout the pump test. After 29 total hours of pumping, the water level in GVMW-35A had dropped a total of 43 feet. At this point, the pump test was ended as there was approximately 1 foot of head above the pressure transducer. Full recovery data were logged following the completion of this pump test.

3.2.6 Pump Test Implementation: GVMW-36

A step drawdown test was performed at GVMW-36 on October 2, 2024. The purpose was to evaluate drawdown in the well to determine a sufficient pumping rate for a 72-hour pump test. The initial pumping rate for the step drawdown test was set to 0.1 gpm, but in reality, this rate varied from 0.08 to 0.18 gpm which led to variability in the rate of drawdown. After 60 minutes of pumping at 0.1 gpm, the water level in GVMW-36 had dropped approximately 12 feet, and the pumping rate was then increased to 0.2 gpm. After 28 minutes, the water level in GVMW-36 had dropped approximately 18 feet in total, and the pump was lowered an additional 5 feet to a depth directly above the bottom of the well. After an additional 15 minutes, the water level in GVMW-36 had dropped approximately 22 feet in total, and the well was purged dry. After the well was dry, the pump was shut off and was kept in place for the duration of the recovery period. Full recovery data were logged following the completion of this pump test.

Ultimately, a constant rate pump test was not performed at GVMW-36.

Table 2. Slug Test Details

Well ID	Test Date	Slug Used In Test	Test Type	Number Of Tests	Initial Depth To Groundwater (feet, bgs)	Total Well Depth (feet, bgs)	Saturated Thickness (feet)
GVMW-27	9/19/2024	Slug #1 – Length 2’, Diameter 3” Slug #2 – Length 3.5’, Diameter 3”	Slug-In & Slug Out Slug-In & Slug Out	4	51.03	72	20.97
GVMW-28	9/18/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	28.82	68.5	39.68
GVMW-30	9/19/2024 9/21/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	37.65	48	10.35
GVMW-33	9/19/2024 9/21/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	57.77	81	23.23
GVMW-34	9/18/2024 9/20/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	55.69	82	26.31
GVMW-35B	9/17/2024 9/18/2024	Slug #1 – Length 3.5’, Diameter 3” Slug #2 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	29.79	70	40.21
GVMW-36	9/16/2024 9/17/2024	Slug #1 – Length 2’, Diameter 3” Slug #2 – Length 5’, Diameter 3”	Slug-In & Slug Out Slug-In & Slug Out	4	11.92	35	23.08
GVMW-37A	9/20/2024	Slug #1 – Length 3.5’, Diameter 3” Slug #2 – Length 5’, Diameter 3”	Slug-In & Slug Out Slug-In & Slug Out	4	29.49	200	170.51
GVMW-37B	9/20/2024	Slug #1 – Length 3.5’, Diameter 3”	Slug-In & Slug Out	4	28.97	73	44.03

Table 3. Pump Test Details

Well ID	Test Date	Test Type	Length of Test (hours)	Pumping Rate (gpm)	Notes
GVMW-27	10/24/2024	Step Drawdown Test	4	0.1, 0.2, 3, 5	
GVMW-27	10/25/2024	Constant Rate	18	1.5	Well nearly dry after 18 hours of pumping (0.3 feet of head above pressure transducer)
GVMW-27	10/26/2024	Constant Rate	72	0.75	
GVMW-28	10/3/2024	Step Drawdown Test	4	0.1, 0.3, 0.5, 0.7	
GVMW-35A	10/13/2024	Constant Rate	11	0.21, 0.24	Well nearly dry after 11 hours of pumping (1 foot of head above pressure transducer)
GVMW-35A	10/14/2024	Constant Rate	29	0.2, 0.22	Well nearly dry after 29 hours of pumping (1 foot of head above pressure transducer)
GVMW-36	10/2/2024	Step Drawdown Test	2	0.1, 0.2	Well dry after 2 hours of pumping

4. Aquifer Testing Results

4.1 Slug Testing

The resulting slug test data were analyzed using Aqtesolv® v4.5. Each of the four tests at each well were analyzed using two separate equation solutions, if appropriate: Bouwer and Rice (1976) and KGS (Hyder et al., 1994). Both solutions are appropriate for use in wells that are fully or partially submerged, as well as in confined and unconfined aquifers. The groundwater height in GVMW-30 during testing was below the top of screen and was classified as partially penetrating; therefore, corrections were applied to address vadose zone drainage, and early data representing filter pack drainage were not fitted during the slug test analyses. Additionally, initial spikes in observed displacement are attributed to logistical challenges of physical slug testing, and were filtered out as they do not represent formation response.

The saturated thickness of the aquifer at each location was assumed to extend from the static water table to the bottom of the well, and set to the values provided in **Table 2**. An anisotropy ratio of 1 (unitless) was assigned to the aquifer at each well location. Early 'noisy' data were not fitted during the analysis. The summary of slug test analyses is provided in **Table 4**.

4.1.1 Bouwer-Rice Solution (1976)

Bouwer and Rice (1976) developed a semi-analytical method for the analysis of an overdamped slug test in a fully or partially penetrating well in an unconfined of confined aquifers. The Bouwer-Rice method assumes that the aquifer being tested has an infinite areal extent, and that the aquifer is homogeneous, of uniform thickness, and unconfined. This method also assumes that the tested well is fully or partially penetrating, that groundwater flow to the well is quasi-steady state (i.e., storage is negligible), and that the volume of water being tested is injected into or discharged from the well instantaneously.

Table 4 shows slug test results using the Bouwer-Rice solution. The geometric mean K values for weathered bedrock ranged from 0.0092 to 7.62 feet per day. The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was 1.12 feet per day.

4.1.2 KGS Model (Hyder et al., 1994)

The KGS model is an estimation tool utilized for an overdamped slug test in an unconfined or confined aquifer. The KGS model assumes that the aquifer being tested has an infinite areal extent, is homogeneous and of uniform thickness, has an initially horizontal potentiometric surface, and is unconfined. The model also assumes that the tested well is fully or partially penetrating, that groundwater flow is unsteady, that groundwater is released instantaneously from storage with decline of hydraulic head, and that the volume of water being tested is injected into or discharged from the well instantaneously.

Table 4 shows slug test results using the KGS model. The geometric mean K values for weathered bedrock ranged from 0.0011 to 10.58 feet per day. The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was 0.25 feet per day.

4.2 Pump Testing

The resulting pump test data were analyzed using the Cooper and Jacob (1946) straight-line method and the Theis (1935) solution, if appropriate. The details of these methods are described in **Section 4.2.1** and **Section 4.2.2**, respectively. **Section 4.2.3** discusses data interpretation of the following pump tests:

- GVMW-27 – 72-hour Constant Rate Pump Test
- GVMW-27 – Step-Drawdown Test
- GVMW-28 – Step-Drawdown Test
- GVMW-35A – 11-hour Constant Rate Pump Test
- GVMW-36 – Step-Drawdown Test

The 18-hour constant rate pump test at GVMW-27 is not discussed further in this report as the test was deemed incomplete as a full 72-hour pump test was later completed on the same well, using a lower pumping rate. The dataset obtained from the 72-hour pump test is considered a more useful tool for assessing transmissivity (T) and K at GVMW-27. The 29-hour constant rate pump test at GVMW-35A is not discussed further in this report as the variability of pumping rates and drawdown rates makes it difficult to reach a conclusion regarding T and K values at that monitoring well. There was less variability of pumping rates and drawdown rates during the 11-hour constant rate pump test, and so data from that pump test will instead be used to assess aquifer hydraulic parameters at GVMW-35A.

4.2.1 Cooper and Jacob (1946) Straight-Line Method

The Cooper and Jacob (1946) straight-line method (also referred to as the modified non-equilibrium equation) was applied to drawdown data from pump test wells as well as the observation wells. The Cooper and Jacob method is a widely used graphical technique for the determination of aquifer hydraulic properties. Analysis with the Cooper and Jacob method involves matching a straight line to drawdown data plotted as a function of the logarithm of time since pumping began. The time drawdown curve for data collected during pumping and recovery periods becomes a straight line on a semi-log diagram. The slope of the line on the semi-log diagram is used to calculate T; this is a graphical method used to estimate the hydraulic parameters. The drawdown curves with straight-line fits for early-time, mid-time, and late-time pumping are shown in **Appendix B**.

The assumptions for applying the Cooper and Jacob method include the following:

- All layers are horizontal and extend infinitely in the radial direction
- The aquifer is homogeneous and isotropic
- Groundwater flow can be described by Darcy's Law
- Groundwater density and viscosity are constant
- Groundwater flow is horizontal and directed radially towards the well
- The pumping rate is constant
- The extraction well and observation wells are screened over 80% of the Surficial Aquifer thickness
- Drawdown is small compared to the aquifer saturated thickness (<25%)
- Head losses through the well screen and pump intake are negligible

4.2.2 Theis (1935) Solution

The drawdown curves were also analyzed using Aqtesolv® v4.5, the industry standard program for aquifer test analysis, and tested against multiple solutions. The Theis solution was applied to the drawdown data from the pump tests. The Theis solution involves matching a straight line to drawdown data collected during a pump test. The solution assumes a line source for the pumped well and therefore neglects wellbore storage. To allow for the used of the Theis solution in unconfined aquifers, C.E. Jacob developed a procedure (Jacob, 1944) that corrects drawdown data for the reduction in an unconfined aquifer's saturated thickness. **Appendix B** contains log-log plots of drawdown data versus time, fitted Theis curves, and the resulting T.

Assumptions for applying the Theis solution include the following:

- The aquifer has infinite areal extent
- The aquifer is homogeneous and of uniform thickness
- The control well is fully or partially penetrating
- The aquifer is unconfined
- Flow is unsteady
- Water is released instantaneously from storage with decline of hydraulic head
- The diameter of a pumping well is very small so that storage in the well can be neglected
- There is no delayed gravity response in the aquifer
- Low velocity is proportional to the tangent of the hydraulic gradient, instead of the sine
- Flow is horizontal and uniform in a vertical section through the axis of the well
- Drawdown is small relative to the saturated thickness of the aquifer

4.2.3 Interpretation of Pump Test Data

The resulting T and K for pump test data using both the Cooper and Jacob straight-line method and the Theis solution are shown in **Table 5**. Drawdown data with straight-line fits and fitted Theis curves, along with the resulting T, are shown in **Appendix B**.

GVMW-27 – 72-hour Constant Rate Pump Test

Using the Cooper and Jacob straight-line method to evaluate data from the 72-hour constant rate pump test at GVMW-27, T was determined to 22 feet^2/day and K was determined to be 1.15 feet/day for early-time pumping. Due to an increase in drawdown rate following 11.5 hours of pumping during this test, mid- and late-time pumping results using the Cooper and Jacob method are not discussed (see below).

Using the Theis solution for data from the same pump test, T was determined to be 57.64 feet^2/day and K was determined to be 3.01 feet/day.

There is an observable increased drawdown rate following the first 11.5 hours of the 72-hour pump test in GVMW-27. This change in rate indicates a lower permeable boundary condition a short distance from the well and this likely exists in multiple directions from the well. The lower permeability boundary condition is likely competent bedrock. Therefore, the measured T values are considered to be representative for a very limited radius around the well. The aquifer pumping appears to be limited more by the horizontal and vertical extent of the saturated weathered bedrock than by the T of the aquifer. Continued pumping in all tested wells, even with the low pumping rates, would likely result in the wells going dry.

GVMW-27 – Step-Drawdown Test

Using the Theis solution to evaluate data from the step-drawdown test at GVMW-27, T was determined to 29.51 feet^2/day and K was determined to be 1.55 feet/day. The Cooper and Jacob straight-line method was not applied to the GVMW-27 step-drawdown test data, as this solution was not developed for a step-drawdown test and does not consider all steps in the test as an aggregate.

GVMW-28 – Step-Drawdown Test

Using the Theis solution to evaluate data from the step-drawdown test at GVMW-28, T was determined to be 4.323 feet^2/day and K was determined to be 1.14 x 10^{-1} feet/day. The Cooper and Jacob straight-line method was not applied to the GVMW-28 step-drawdown test data, as this solution was not developed for a step-drawdown test and does not consider all steps in the test as an aggregate.

GVMW-35A – 11-hour Constant Rate Pump Test

Using the Cooper and Jacob straight-line method to evaluate data from the 11-hour constant rate pump test at GVMW-35A, T was determined to be 0.57 feet^2/day for early-time pumping and 0.37 feet^2/day for mid-time pumping. K was determined to be 7.41 x 10^{-3} feet/day for early-time pumping and 4.81 x 10^{-3} feet/day for mid-time pumping. As late-time pumping rates for GVMW-35A were around 0.24 gpm (whereas, early- and mid-time pumping rates were 0.21 gpm), the Cooper and Jacob results for late-time pumping are not discussed.

Using the Theis solution for data from the same pump test, T was determined to be 1.036 feet^2/day and K was determined to be 1.35 x 10^{-2} feet/day.

GVMW-36 – Step-Drawdown Test

Using the Theis solution to evaluate data from the step-drawdown test at GVMW-36, T was determined to be 0.5233 feet^2/day and K was determined to be 2.33 x 10^{-2} feet/day. The Cooper and Jacob straight-line method was not applied to the GVMW-36 step-drawdown test data, as this solution was not developed for a step-drawdown test and does not consider all steps in the test as an aggregate.

Table 4. Summary of Slug Test Results

Well ID	Test ID	Initial Displacement (H_0) (ft)	Calculation of K - Solution and K Value				Screened Lithology
			Bouwer-Rice (1976)	Geometric Mean of K Values (ft/day)	KGS (Hyder et al., 1994)	Geometric Mean of K Values (ft/day)	
GVMW-27	Slug In 1	1.45	6.89	7.62	11.98	10.58	Weathered schist
	Slug In 2	3.49	8.46		10.85		
	Slug Out 1	1.25	7.27		9.48		
	Slug Out 2	2.19	7.88		10.17		
GVMW-28	Slug In 1	1.15	0.73	0.65	0.55	0.77	Lean clay
	Slug In 2	1.28	0.83		0.85		
	Slug Out 1	1.35	0.52		0.57		
	Slug Out 2	1.36	0.57		1.29		
GVMW-30	Slug In 1	1.38	0.13	0.089	0.216	0.094	Lean clay
	Slug In 2	0.92	0.06		0.037		
	Slug Out 1	1.09	0.14		0.125		
	Slug Out 2	1.11	0.05		0.080		
GVMW-33*	Slug In 1	1.24	0.024	0.016	0.026	0.010	Fat clay
	Slug In 2	1.28	0.025		0.027		
	Slug Out 1	1.27	0.011		0.003		
	Slug Out 2	1.29	0.010		0.005		
GVMW-34*	Slug In 1	1.20	0.88	0.80	3.02	1.43	Fat-to-lean clay
	Slug In 2	1.16	0.86		2.23		
	Slug Out 1	1.28	0.66		0.71		
	Slug Out 2	1.27	0.80		0.87		
GVMW-35B*	Slug In 1	2.40	0.16	0.25	0.48	0.13	Lean Clay
	Slug In 2	1.19	0.41		0.47		
	Slug Out 1	2.50	0.16		0.06		

Well ID	Test ID	Initial Displacement (H_0) (ft)	Calculation of K - Solution and K Value				Screened Lithology
			Bouwer-Rice (1976)	Geometric Mean of K Values (ft/day)	KGS (Hyder et al., 1994)	Geometric Mean of K Values (ft/day)	
	Slug Out 2	1.28	0.38		0.02		
GVMW-36*	Slug In 1	1.22	0.018	0.0092	0.021	0.0011	Lean clay/lean silt
	Slug In 2	3.54	0.017		0.021		
	Slug Out 1	1.26	0.004		0.000		
	Slug Out 2	3.79	0.006		0.000		
GVMW-37A*	Slug In 1	3.15	1.198	1.12	0.108	0.25	Unweathered granite and schist
	Slug In 2	3.24	0.966		0.532		
	Slug Out 1	2.37	1.189		0.098		
	Slug Out 2	3.55	1.127		0.686		
GVMW-37B	Slug In 1	2.40	1.50	1.44	0.16	1.22	Weathered schist
	Slug In 2	3.55	1.28		1.98		
	Slug Out 1	2.52	1.59		2.48		
	Slug Out 2	3.76	1.40		2.92		

* Full recovery was not achieved between tests

Table 5. Summary of Pump Test Results

Well ID	Test	Pumping Rate (gpm)	Analytical Solution	Saturated Thickness (feet)	T (feet^2/day)	K (feet/day)	Approximate Total Drawdown (feet)	Screened Lithology
GVMW-27	72-hour Constant Rate	0.75	Theis with boundary	19.1	57.64	3.01	6.5	Weathered schist
GVMW-27	72-hour Constant Rate	0.75	Cooper Jacob Straight Line (early-time pumping)	19.1	22	1.15	6.5	Weathered schist
GVMW-27	Step Drawdown	0.1, 0.5, 3, 5	Theis Unconfined	19.1	29.51	1.55	15.5	Weathered schist
GVMW-28	Step Drawdown	0.1, 0.3, 0.5, 0.7	Theis Unconfined	37.75	4.323	1.14×10^{-1}	33.0	Lean clay
GVMW-35A	11-hour Constant Rate	0.21	Theis with boundary	76.93	1.036	1.35×10^{-2}	50.0	Unweathered granodiorite
GVMW-35A	11-hour Constant Rate	0.21	Cooper Jacob Straight Line (early-time pumping)	76.93	0.57	7.41×10^{-3}	50.0	Unweathered granodiorite
GVMW-35A	11-hour Constant Rate	0.21	Cooper Jacob Straight Line (mid-time pumping)	76.93	0.37	4.81×10^{-3}	50.0	Unweathered granodiorite
GVMW-36	Step Drawdown	0.1, 0.2	Theis Unconfined	22.47	0.5233	2.33×10^{-2}	22.0	Lean clay/lean silt

5. Summary and Recommendations

5.1 Slug Testing

- Using the Bouwer-Rice solution equation, the geometric mean K values for weathered bedrock were determined to range from 0.0092 to 7.62 feet per day (3.25 x 10^{-6} to 2.54 x 10^{-3} cm/s). These K values are representative of silt and loess (Domenico and Schwartz, 1990). The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was determined to be 1.12 feet per day (3.95 x 10^{-4} cm/s). This K value is representative of fractured igneous and metamorphic rock (Domenico and Schwartz, 1990).

- Using the KGS model solution equation, the geometric mean K values for weathered bedrock were determined to range from 0.0011 to 10.58 feet per day (3.88 x 10^{-7} to 3.73 x 10^{-3} cm/s). These K values are representative of silt and loess (Domenico and Schwartz, 1990). The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was determined to be 0.25 feet per day (8.82 x 10^{-5} cm/s). This K value is representative of fractured igneous and metamorphic rock (Domenico and Schwartz, 1990).

5.2 Pump Testing

5.2.1 GVMW-27

- The saturated thickness of the aquifer is 19.1 feet, and the lithology of the saturated zone is weathered schist.

- Hydraulic communication was not observed between GVMW-27 and the selected observation wells (GVMW-8B-50, GVMW-25, GVMW-28, and GVMW-30) during the 72-hour constant rate pump test.

- The highest pump rate was 1.5 gpm during the 18-hour pump test, but this resulted in the well almost purging dry. A pump rate of 0.75 gpm during the 72-hour pump test resulted in approximately 6.5 feet of total drawdown.

- The T value, based on the step drawdown and constant rate drawdown test results, ranged between 22 and 57.64 feet^2/day. This range of T values equates to a range of K values between 1.15 and 3.01 feet per day (4.06 x 10^{-4} to 1.06 x 10^{-3} cm/s). This range in K values is representative of weathered granite (Domenico and Schwartz, 1990).

- The change in rate observed after the first 11.5 hours of the 72-hour pump test indicates a lower permeable boundary condition a short distance from the well. This lower permeability boundary condition is likely competent bedrock. The measured T values are therefore representative for a very limited radius around the well. The aquifer pumping appears to be limited more by the horizontal and vertical extent of the saturated weathered bedrock than by the T of the aquifer. Continued pumping in this well, even with the low pumping rates, would likely result in the well going dry.

5.2.2 GVMW-28

- The saturated thickness of the aquifer is 37.75 feet, and the lithology of the saturated zone is lean clay.

- The T value, based on the step drawdown test results, was 4.323 feet^2/day which equates to a K value of 1.14 x 10^{-1} feet/day (4.02 x 10^{-5} cm/s). This K value is representative of silt and loess (Domenico and Schwartz, 1990).

- Continued pumping in this well, even with the low pumping rates, would likely result in the well going dry.

5.2.3 GVMW-35A

- The saturated thickness of the aquifer is 76.93 feet, and the lithology of the saturated zone is unweathered granodiorite.

- Hydraulic communication was not observed between GVMW-35A and the selected observation wells (GVMW-34, GVMW-35B, GVMW-7B-50, and OSABH-17) during the 72-hour constant rate pump test.

- The highest average pump rate was 0.24 gpm during the late-time pumping stage of the 11-hour pump test. The targeted pumping rate and the rate used for analyses was 0.21 gpm, which was achieve during early- and mid-time pumping. This pumping rate was still too fast to allow for the completion of a 72-hour pump test.

- The T value, based on the step drawdown and constant rate drawdown test results, ranged between 0.37 and 1.036 feet^2/day. This range of T values equates to a range of K values between 4.81 x 10^{-3} and 1.34 x 10^{-2} feet/day (1.70 x 10^{-6} to 4.73 x 10^{-6} cm/s). This range in K values is representative of fractured igneous and metamorphic rock (Domenico and Schwartz, 1990).

5.2.4 GVMW-36

- The saturated thickness of the aquifer is 22.47 feet, and the lithology of the saturated zone is lean clay/lean silt.

- The T value, based on the step drawdown test results, was 0.5233 feet^2/day which equates to a K value of 2.33 x 10^{-2} feet/day (8.22 x 10^{-6} cm/s). This K value is representative of silt and loess (Domenico and Schwartz, 1990).

5.3 Recommendations

It is recommended that any pumping associated with the ECOSA groundwater interception and collection system design considers the saturated thicknesses of the wells tested and presented in this report. Wells with greater saturated thicknesses will have larger groundwater volumes available to remove and will therefore pump the longest. The design should also consider anticipating the pumping wells may need to cycle on and off to allow for the possibility for wells to purge dry (i.e., design should incorporate submersible pumps with float controls and tanks at the wellhead to accumulate low pumping discharge over time).

Based on the results of this report, it is further recommended that monitoring wells GVMW-25, GVMW-27, GVMW-28, GVMW-34, and GVMW-35B be included in groundwater interception and collection system design. GVMW-25 is a pre-existing monitoring well (i.e., installed prior to 2024) and should be included in the design per recommendation of CC&V. GVMW-27 and GVMW-28 both have the sufficient saturated thicknesses and reasonable T and K values, based on slug and pump testing, to be considered for long term pumping as described in the preceding paragraph. GVMW-34 and GVMW-35B were also added to the design per recommendation of CC&V. GVMW-35A, GVMW-37A, and GVMW-37B can also be considered for groundwater interception and collection system design based on their saturated thicknesses, T values, and K values. GVMW-30, GVMW-33, and GVMW-36 should not be considered for system design; although they have sufficient saturated thicknesses, their T and K values determined by slug and pump testing are too low to be appropriate for long term pumping.

6. References

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Appendix A

Boring Logs and Well Construction Diagrams

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369 Inverness Pkwy, Ste 325
Englewood, CO 80112

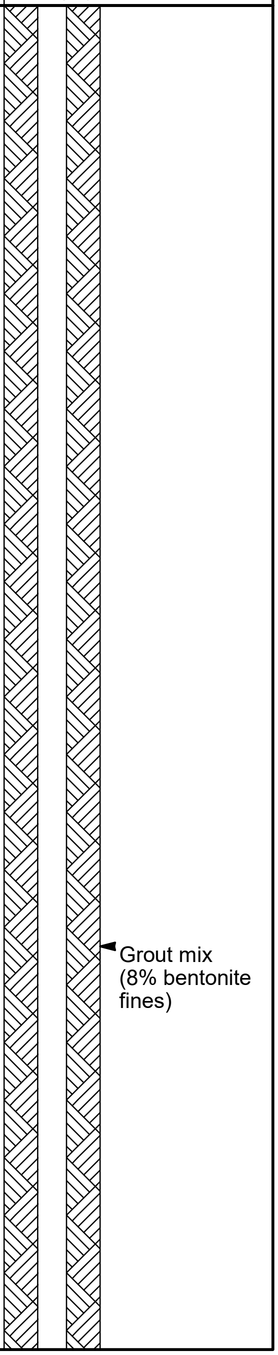
GVMW-27

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/17/24 17:15 **COMPLETED** 08/22/24 10:00
WELL LOCATION -105.1217 N 38.7412 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9894.36 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▼ **AFTER DRILLING** 51.03 ft / Elev 9843.33 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		OL	1.0	ORGANIC SOIL (OL), black, soft, low plasticity, wet, subrounded, homogeneous, low toughness, low dry strength, trace fine to coarse sand, and roots, no staining
5				CL	10.0	LEAN CLAY (CL), brown, medium stiff to very stiff, low plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little fine to coarse sand, trace fine gravel, rock fragments, trace oxidation staining, intermittent layers of breccia/phonolite (weathered bedrock)
10 15	SONIC 2	100		CL	19.5	GRAVELLY LEAN CLAY (CL), dark brown to very dark grayish brown, soft to very stiff, medium plasticity, moist to wet, subangular, mottled, medium toughness, medium dry strength, some fine to coarse sand, little cobbles, rock fragments, iron oxide staining, trace sulphur fines, green mineral inclusions (porphyritic), intermittent layers of breccia/phonolite (weathered bedrock)
20	SONIC 3	100		CL	22.5	GRAVELLY LEAN CLAY (CL), reddish brown to brown, soft to medium stiff, medium plasticity, wet, angular, mottled, medium toughness, medium dry strength, some cobbles, and rock fragments, iron oxide staining, intermittent layers of breccia (weathered bedrock)
25				CL	28.0	GRAVELLY LEAN CLAY (CL), light yellowish brown to brown, soft to medium stiff, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some fine sand, and rock fragments, iron oxide staining, forms in clods/clumps, fissile, friable, intermittent layers of breccia (weathered bedrock)
				CL	30.0	GRAVELLY LEAN CLAY (CL), yellowish gray to brownish gray, stiff to very stiff, low plasticity, dry, angular, mottled, medium toughness, medium dry strength, some fine sand, and rock fragments, iron oxide staining, fissile, intermittent layers of breccia/phonolite (weathered bedrock)
30 35	SONIC 4 SONIC 5	100 100		CL	37.5	GRAVELLY LEAN CLAY WITH SAND (CL), light yellowish brown to olive, stiff to very stiff, low plasticity, dry to moist, subangular, fine to coarse grained, mottled, high toughness, high dry strength, some cobbles, and rock fragments, iron oxide staining, intermittent layers of breccia/sandstone (weathered bedrock)
40					40.0	SILTY SANDSTONE, highly weathered, laminated, pale yellow to yellowish brown, coarse, quartz and feldspar, hard to very hard, dry, iron oxide staining, trace red/green

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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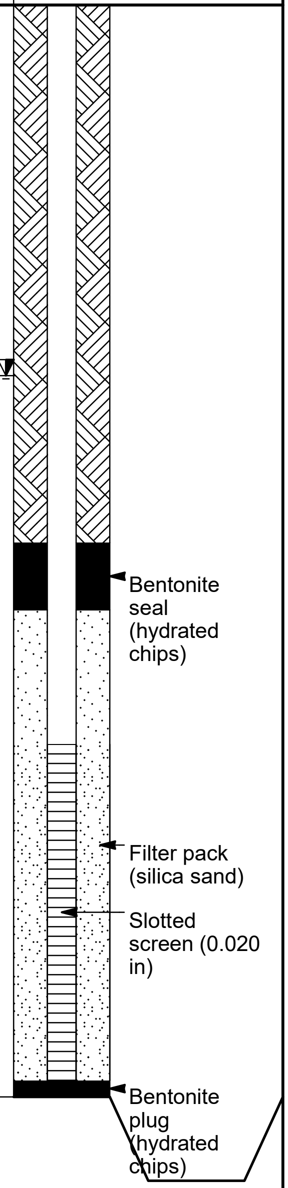
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SONIC 6	100				mineral inclusions (porphyritic), intermittent layers of breccia/phonolite SILTY SANDSTONE, moderately weathered to slightly weathered, laminated, light brownish gray to dark yellowish brown, coarse, quartz and feldspar, medium hard to very hard, dry to damp, iron oxide staining, trace red/green mineral inclusions (porphyritic), intermittent layers of breccia/phonolite
45	SONIC 7	100				
50	SONIC 8	100			50.0	CLAYEY SCHIST, highly weathered to slightly weathered, foliated, light brownish gray to dark yellowish brown, finely crystalline, biotite/feldspar/amphibole/pyroxene, hard to very hard, damp to wet, iron oxide staining, trace red/green mineral inclusions (porphyritic) - BRECCIA/PHONOLITE
55						
60	SONIC 9	100				
65	SONIC 10	100				
	SONIC 11	100				
70	SONIC 12	100			70.0	SCHIST, unweathered, foliated, light brownish gray to dark yellowish brown, finely crystalline, biotite/feldspar/amphibole/pyroxene, hard, dry, no staining, trace red/green mineral inclusions (porphyritic) - BRECCIA/PHONOLITE (competent bedrock)
					72.5	Bottom of borehole at 72.5 feet.

WELL DIAGRAM



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Englewood, CO 80112

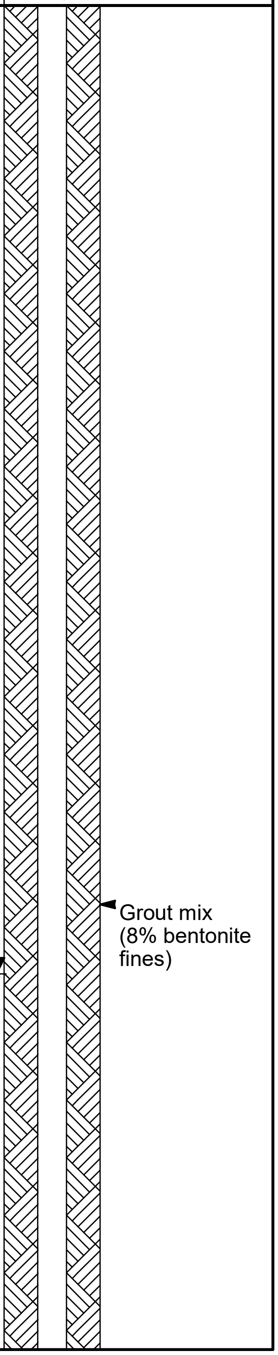
GVMW-28

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/02/24 08:05 **COMPLETED** 08/04/24 13:30
WELL LOCATION -105.123 N 38.7422 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9908.19 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 28.82 ft / Elev 9879.37 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		OL		COBBLES ORGANIC SOIL (OL), very dark brown (10YR 2/2), loose, non plastic, dry to moist, subangular, fine to medium grained, homogeneous, low toughness, low dry strength, trace roots, some cobbles, no staining, cobbles are primarily volcaniclastic material (phonolite)
				CL	3.0	COBBLES GRAVELLY LEAN CLAY (CL), dark yellowish brown to yellowish brown (10YR 5/6), medium stiff, low plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some silt, iron oxide staining, cobbles are primarily volcaniclastic material (phonolite)
5				CH	6.0	COBBLES FAT CLAY (CH), reddish brown (5YR 4/4), stiff, high plasticity, wet, subangular, fine to medium grained, mottled, high toughness, high dry strength, some sand, some silt, iron oxide staining, cobbles are primarily granodiorite and show preferential weathering of plag phenocrysts
10	SONIC 2	100				
				CL	13.0	LEAN CLAY (CL), reddish brown (5YR 4/4) to yellowish brown (10YR 5/6), medium stiff, low plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some silt, trace cobbles, iron oxide staining, one extremely massive, unaltered granodiorite boulder from 22-26 feet bgs
15						
20	SONIC 3	100				
25	SONIC 4	100				
				CL	29.0 ▽	LEAN CLAY (CL), dark yellowish brown to light olive brown (2.5Y 5/6), loose, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, some sand, some silt, trace cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
30	SONIC 5	100				
				CL	32.0	LEAN CLAY (CL), dusky red to very dark dusky red (2.5YR 2.5/4), loose, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, some sand, some silt, trace cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
35						
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-28

CLIENT Cripple Creek and Victor Gold Mining Company, LLC

PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling

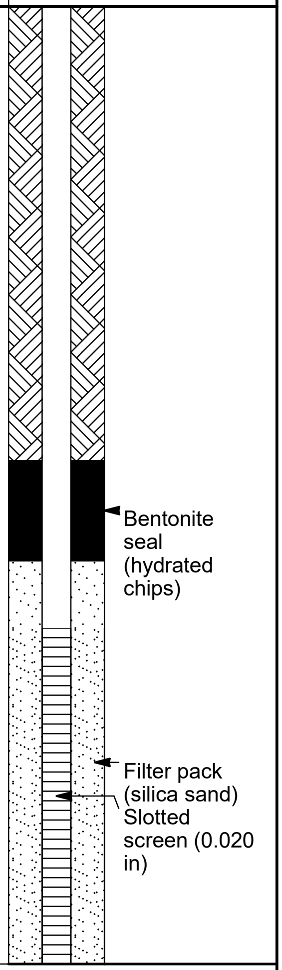
PROJECT NUMBER 10399263

PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40 – 48.0	SONIC 6	100		CL		
48.0 – 56.0	SONIC 7	100		CL		FAT CLAY (CL), very dark grayish brown (10YR 3/2) to brown (10YR 4/3), stiff, high plasticity, wet to moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
56.0 – 58.0				CL		LEAN CLAY (CL), very dark grayish brown (10YR 3/2) to brown (10YR 4/3), medium stiff, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
58.0 – 68.0	SONIC 8	100		CL		LEAN CLAY (CL), dark yellowish brown to light olive brown (2.5Y 5/6), stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
	SONIC 9	100				
68.0 – 68.5						PORPHYRITIC PHONOLITE, unweathered, massive, pale grayish brown, finely crystalline, plagioclase, kspar, hard to very hard, dry, no staining

Bottom of borehole at 68.5 feet.

WELL DIAGRAM



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GVMW-29

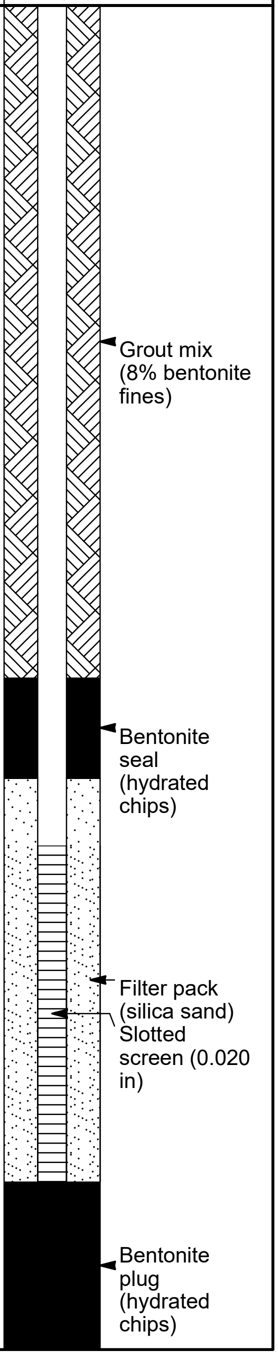
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/10/24 10:40 **COMPLETED** 07/10/24 14:40
WELL LOCATION -105.1214 N 38.7389 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9999.59 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
AFTER DRILLING --- Dry
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION
0 – 4.0	SONIC 1	100		CL	LEAN CLAY (CL), yellowish brown to light brown, stiff, low plasticity, moist, fine to medium grained, mottled, medium toughness, medium dry strength, some silt, and sand, iron oxide staining, cohesive fines
4.0 – 5.0				CL	LEAN CLAY (CL), dark grayish brown to dark yellowish brown, stiff, low plasticity, wet, fine to medium grained, mottled, medium toughness, medium dry strength, little silt, and sand, iron oxide staining, cohesive fines
5.0 – 10.0				CL	LEAN CLAY (CL), yellowish red to reddish brown, stiff, low plasticity, saturated, fine to medium grained, mottled, medium toughness, medium dry strength, little silt, and sand, iron oxide staining, cohesive fines
10.0 – 14.0	SONIC 2	100		GW	WELL GRADED GRAVEL (GW), pale brown to pale orange, dense, non plastic, dry, subangular, mottled, high toughness, high dry strength, some fine to medium sand, clay, and cobbles, no staining, non-cohesive fines (weathered bedrock)
14.0 – 18.0				GW	WELL GRADED GRAVEL (GW), pale brown to yellowish brown, dense, non plastic, dry, subangular, mottled, high toughness, high dry strength, some fine to medium sand, clay, and cobbles, trace oxidation staining, non-cohesive fines (weathered bedrock)
18.0 – 20.0				CL	LEAN CLAY (CL), light olive brown, very stiff, low plasticity, moist, fine grained, laminated, high toughness, high dry strength, trace sand, iron oxide staining, cohesive fines (weathered bedrock)
20.0 – 24.0	SONIC 3	100		CL	LEAN CLAY (CL), pale brown to pale orange, very stiff, low plasticity, moist, subangular, fine grained, laminated, high toughness, high dry strength, some sand, trace cobbles, and rock fragments, iron oxide staining, cohesive fines (weathered bedrock)
24.0 – 34.0				CL	LEAN CLAY (CL), pale brown to olive, very stiff, low plasticity, moist, subangular, fine grained, laminated, high toughness, high dry strength, some sand, trace cobbles, and rock fragments, iron oxide staining, cohesive fines, some black mottling (weathered bedrock)
34.0 – 35.0	SONIC 4	100		CL	GRAVELLY LEAN CLAY (CL), yellowish red to light brown, very stiff, low plasticity, moist, subangular, fine grained, laminated, high toughness, high dry strength, some sand, cobbles, and rock fragments, iron oxide staining, cohesive fines (weathered bedrock)
35.0 – 40.0					BRECCIA, unweathered, massive, brownish yellow to dark yellowish orange, fine, very hard, dry, no staining, (competent bedrock)

Bottom of borehole at 40.0 feet.

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-30

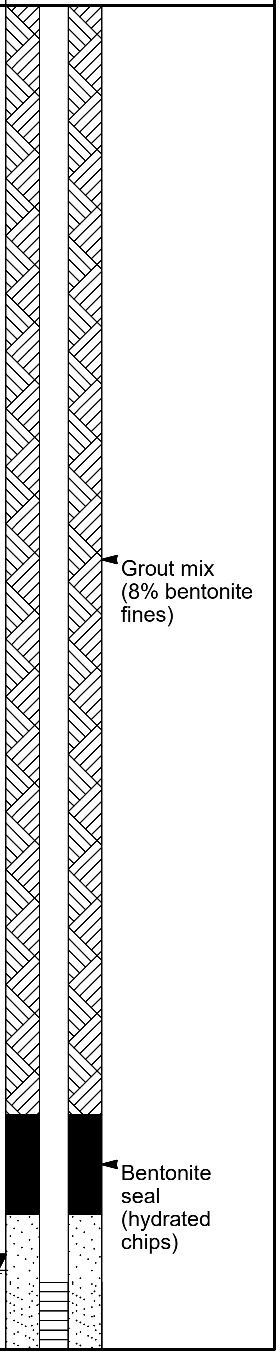
PAGE 1 OF 2

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/12/24 15:30 **COMPLETED** 07/17/24 14:00
WELL LOCATION -105.1217 N 38.7395 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9983.69 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 37.65 ft / Elev 9946.04 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION
0 – 2.0	SONIC 1	100		SP	POORLY GRADED SAND (SP), brownish yellow to dark yellowish orange (10YR 6/6), loose, non plastic, moist, subangular, fine grained, homogeneous, low toughness, low dry strength, trace silt, no staining
2.0 – 4.0				CL	SANDY LEAN CLAY (CL), reddish brown to yellowish brown (5YR4/4), medium stiff, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, no staining
4.0 – 16.0	SONIC 2	100		CH	SANDY FAT CLAY (CH), reddish brown to yellowish brown (5YR4/4), stiff, high plasticity, moist to dry, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, trace gravel, no staining
16.0 – 18.0				SC	CLAYEY SAND (SC), yellowish brown to light yellowish brown (10YR 5/4), loose, non plastic, dry, subangular, fine to coarse grained, homogeneous, low toughness, low dry strength, some cobbles, some gravel, no staining
18.0 – 20.0				CH	FAT CLAY (CH), yellowish red to light brown (5YR 5/6), stiff to very stiff, high plasticity, moist to wet, subangular, medium to coarse grained, mottled, high toughness, high dry strength, some sand, iron oxide staining
20.0 – 28.0	SONIC 3	100		CH	FAT CLAY (CH), yellowish brown to light yellowish brown (10YR 5/4), stiff to very stiff, high plasticity, moist to wet, subangular, medium to coarse grained, mottled, high toughness, high dry strength, some sand, some gravel, iron oxide staining, evaporites present
28.0 – 30.0				CL	SANDY LEAN CLAY (CL), yellowish brown to light yellowish brown (10YR 5/4), stiff, low plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, iron oxide staining
30.0 – 40	SONIC 4	100		CL	SANDY LEAN CLAY (CL), yellowish brown to light yellowish brown (10YR 5/4), stiff, low plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, some gravel, iron oxide staining

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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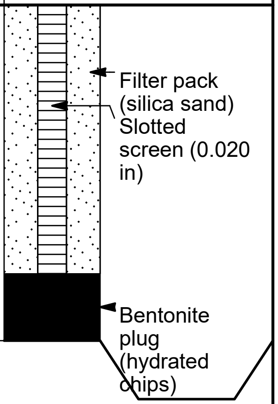
GVMW-30

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	WELL DIAGRAM
40	SONIC 5	100		CL	▨	44.0		
45				CL	▨	48.0	LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), medium stiff, low plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some gravel, some cobbles, some sand	
50					▨	50.0	SANDSTONE, unweathered, massive, pale yellow to pale grayish yellow, finely crystalline, quartz, plagioclase, mica, very hard, dry	
							Bottom of borehole at 50.0 feet.	

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369 Inverness Pkwy, Ste 325
Englewood, CO 80112

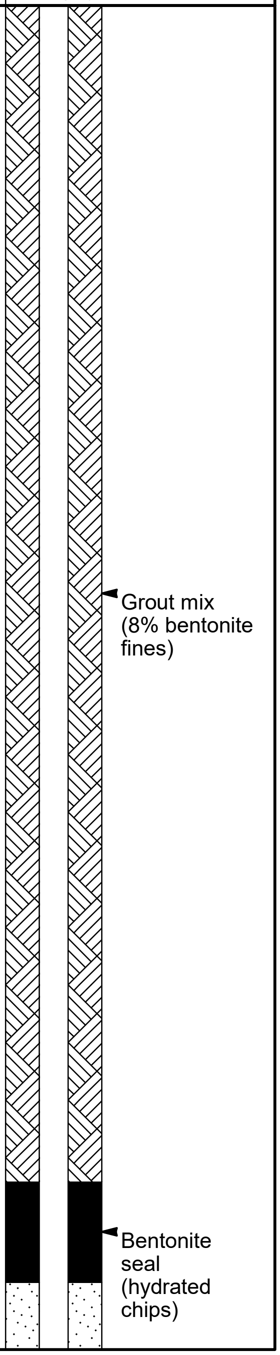
GVMW-31

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/14/24 07:30 **COMPLETED** 07/15/24 09:30
WELL LOCATION -105.1221 N 38.7401 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9962.48 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 58.94 ft / Elev 9903.54 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
1.0	SONIC 1	100		ML		SANDY SILT (ML), pale brown to pale orange (10YR 8/2), soft, low plasticity, moist to dry, subangular, fine grained, homogeneous, low toughness, low dry strength, no staining
6.0				CL		LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), stiff to very stiff, low plasticity, moist to dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some sand, some gravel, no staining
10.0				CL		LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), stiff to very stiff, medium plasticity, moist, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, trace cobbles, no staining
26.0	SONIC 2 SONIC 3	100 100		CH		FAT CLAY (CH), pale brown to pale orange (10YR 8/2), stiff to very stiff, high plasticity, moist to wet, subangular, fine to coarse grained, mottled, high toughness, medium dry strength, some sand, some gravel, trace cobbles, no staining
30.0				SC		CLAYEY SAND (SC), dark grayish brown to dark yellowish brown (10YR 4/2), loose, non plastic, dry, subangular, coarse grained, homogeneous, low toughness, low dry strength, some clay, some gravel, no staining, evaporites
32.0	SONIC 4	100		CL		LEAN CLAY (CL), reddish brown moderate brown (5YR 4/4), medium stiff, medium plasticity, moist, subangular, medium to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, no staining
33.0				CH		FAT CLAY (CH), reddish brown moderate brown (5YR 4/4), medium stiff, high plasticity, moist to wet, subangular, medium to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, no staining
36.0				CL		LEAN CLAY (CL), reddish brown moderate brown (5YR 4/4), medium stiff, low plasticity, moist, subangular, medium to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, no
40.0				SC		

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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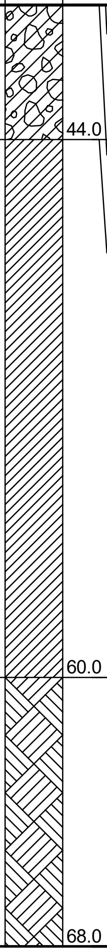
369 Inverness Pkwy, Ste 325
Englewood, CO 80112

GVMW-31

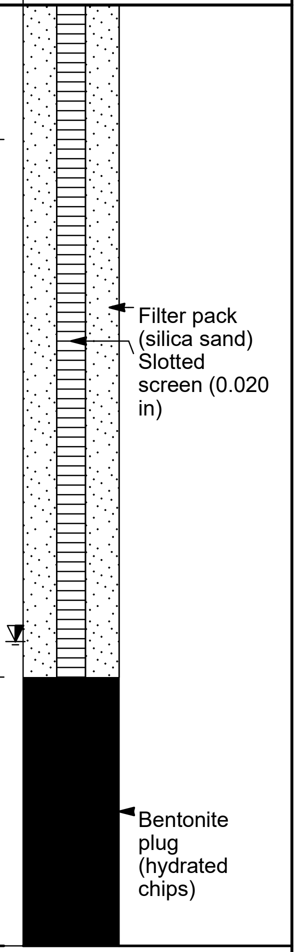
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION
40	SONIC 5	100		GC	staining CLAYEY SAND (SC), yellowish brown to dark yellowish brown (10YR 5/4), loose, non plastic, dry, subangular, coarse grained, homogeneous, low toughness, low dry strength, some gravel, some cobbles, no staining, evaporites CLAYEY GRAVEL (GC), pale brown to pale orange (10YR 8/2), loose, non plastic, dry, subangular, fine to medium grained, low toughness, low dry strength, some sand, some clay, no staining
44.0				CL	LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some gravel, some sand, no staining
50	SONIC 6	100			
60.0	SONIC 7	100			SANDSTONE, unweathered, pale yellow grayish yellow, finely crystalline, quartz, plagioclase, mica, very hard to hard, dry, iron oxide staining
68.0					Bottom of borehole at 68.0 feet.

GRAPHIC LOG



WELL DIAGRAM



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GVMW-32

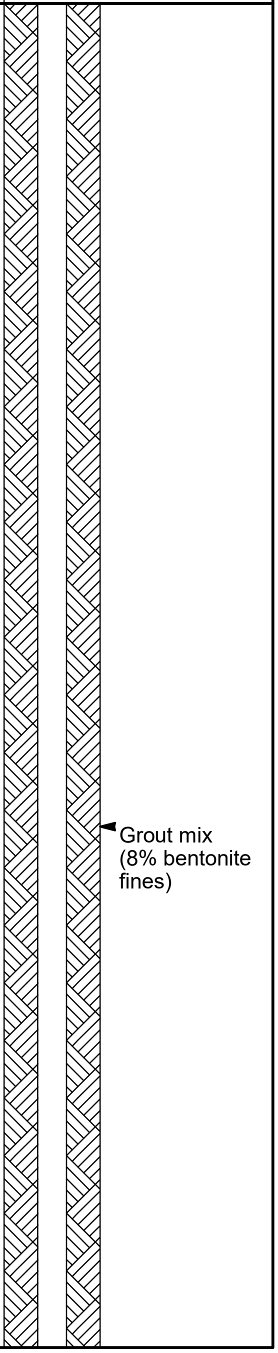
PAGE 1 OF 2

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/18/24 08:00 **COMPLETED** 07/20/24 10:40
WELL LOCATION -105.1225 N 38.7406 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9951.82 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
▼ **AFTER DRILLING** 62.89 ft / Elev 9888.93 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						FAT CLAY (CH), pale reddish brown to yellowish brown (10YR 5/4), medium stiff, medium plasticity, moist to wet, fine to medium grained, mottled, high toughness, high dry strength, some sand, trace cobbles, some gravel, no staining, calcification
5	SONIC 1	100				
10						
15	SONIC 2	100		CH		
20						
25	SONIC 3	100				
					27.0	SANDY LEAN CLAY (CL), pale reddish brown to pale orange (10YR 8/2), stiff to very stiff, medium plasticity, moist, fine grained, mottled, medium toughness, medium dry strength, some gravel, no staining, calcification
30						
35	SONIC 4	100		CL		
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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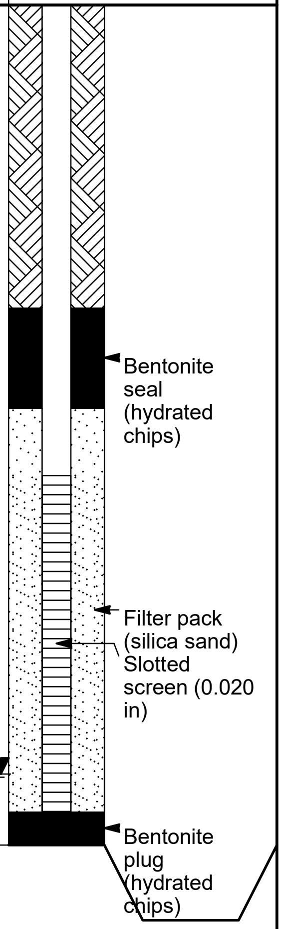
GVMW-32

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40						
45	SONIC 5	100		CL		
50					50.0	LEAN CLAY (CL), pale reddish brown to yellowish brown (10YR 5/4), loose to medium stiff, low plasticity, moist, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some gravel, some cobbles, iron oxide staining, calcification
55	SONIC 6	100		CL		
60						
	SONIC 7	100			64.0	
65					65.0	SANDSTONE, unweathered, massive, brownish yellow to dark yellowish orange, finely crystalline, quartz, plagioclase, hard, dry, no staining, some siltstone cobbles, laminated

Bottom of borehole at 65.0 feet.

WELL DIAGRAM



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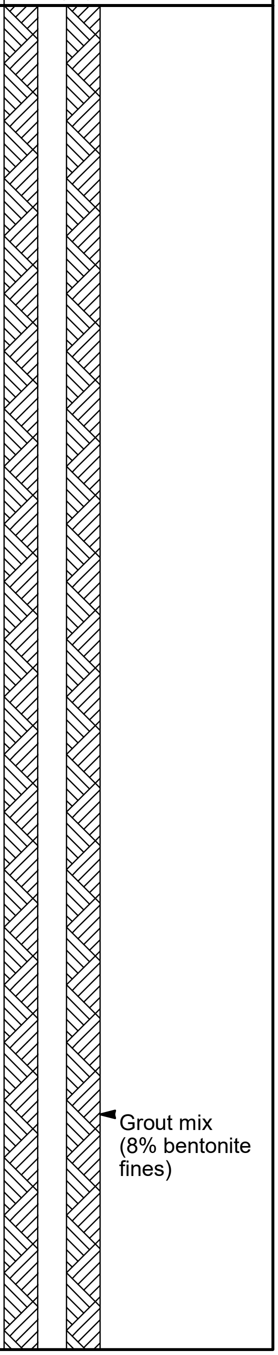
GVMW-33

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/20/24 14:10 **COMPLETED** 08/01/24 14:05
WELL LOCATION -105.123 N 38.7411 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9946.16 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 57.77 ft / Elev 9888.39 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		SW	4.0	POORLY GRADED SAND (SW), yellowish brown to brown (10YR 5/4), loose, non plastic, dry, subangular, fine grained, homogeneous, low toughness, low dry strength, some cobbles, trace gravel, no staining
5				CL	11.0	LEAN CLAY (CL), yellowish brown to pink (5YR 7/3), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some gravel, trace cobbles, no staining
10	SONIC 2	100				
				CL	29.0	GRAVELLY LEAN CLAY (CL), yellowish brown to brown (10YR 5/4), very dense, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, no staining
15						
20	SONIC 3	100				
25						
				CH	32.0	FAT CLAY (CH), dark reddish brown to grayish brown (5YR 3/2), stiff, high plasticity, moist to wet, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, some cobbles, some sand, no staining
30	SONIC 4	100				
				CL	40.0	GRAVELLY LEAN CLAY (CL), yellowish brown to brown (10YR 5/4), very dense, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, no staining
35						
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-33

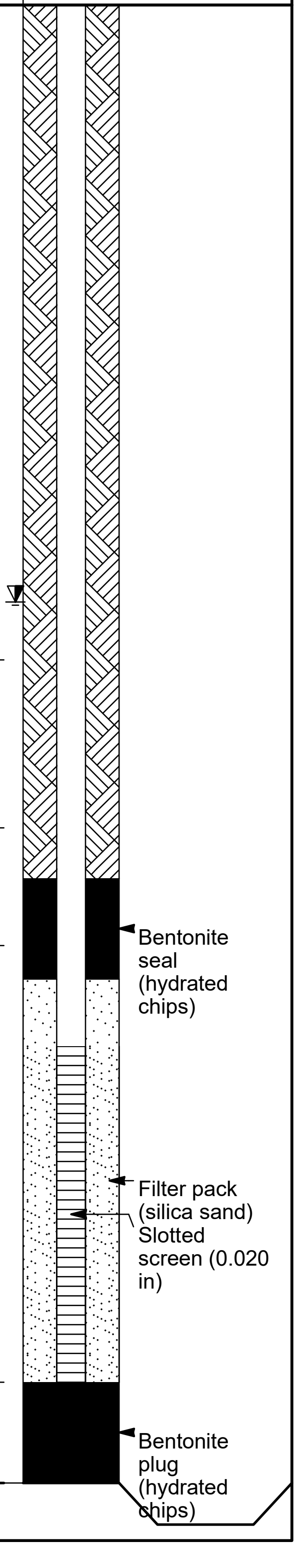
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
40 45	SONIC 5	100	
50	SONIC 6	100	
55	SONIC 7	100	
	SONIC 8	100	
60	SONIC 9	100	
65	SONIC 10	100	
70	SONIC 11	100	
75	SONIC 12	100	
80	SONIC 13	100	

U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
CL	59.5	LEAN CLAY (CL), reddish brown to yellowish brown (2.5YR 4/3), medium stiff, medium plasticity, moist, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, some cobbles, some sand, some gravel, iron oxide staining, cobbles are primarily volcaniclastic material
CH	64.5	FAT CLAY (CH), dark yellowish brown to red (10 YR 4/6), stiff, high plasticity, moist to wet, subangular, fine to medium grained, mottled, high toughness, high dry strength, some gravel, some sand, trace cobbles, iron oxide staining
CL	68.0	LEAN CLAY (CL), yellow to light gray (10YR 7/6), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, with cobbles, trace sand, trace silt, iron oxide staining, cobbles are primarily volcaniclastic and are coarse-grained, have phenocrysts of pyroxene, feldspar, amphibole
CH	81.0	FAT CLAY (CH), dark reddish brown (5YR 3/4) to light gray (10YR 7/6), stiff, high plasticity, moist to wet, subangular, fine to medium grained, mottled, medium toughness, high dry strength, with cobbles, iron oxide staining, large phenocrysts of plagioclase and pyroxene (1-1.5 cm in diameter)
	84.0	BRECCIA, unweathered, massive, dark reddish brown, finely crystalline, plagioclase xenocrysts, very hard, dry, no staining

Bottom of borehole at 84.0 feet.

WELL DIAGRAM



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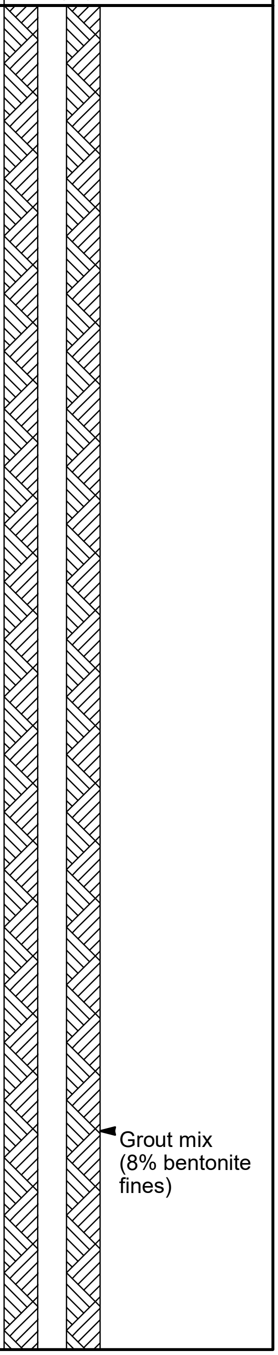
GVMW-34

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/05/24 07:45 **COMPLETED** 08/09/24 11:30
WELL LOCATION -105.1292 N 38.7471 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10009.52 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 55.69 ft / Elev 9953.83 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				CL	1.0	LEAN CLAY (CL), dark yellowish brown (10YR 4/4), loose, non plastic, dry, subangular, fine to medium grained, homogeneous, low toughness, low dry strength, with cobbles, some sand, some silt, no staining, fill fill
5	SONIC	100		CL	6.0	LEAN CLAY (CL), brown to dark yellowish brown (10YR 4/6), medium stiff, low plasticity, moist to dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some cobbles, trace gravel, trace sand, no staining, cobbles are granodiorite and phonolite
10 15	SONIC	100		CH	20.0	FAT CLAY (CH), brown to dark yellowish brown (10YR 4/6), stiff, high plasticity, moist to wet, subangular, fine grained, mottled, medium toughness, high dry strength, some cobbles, trace gravel, trace sand, no staining, cobbles are granodiorite and phonolite
20 25	SONIC	100		CL	30.0	LEAN CLAY (CL), greenish gray to light brownish gray (10YR 6/1), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some gravel, iron oxide staining
30 35	SONIC	100		CL	36.0	SANDY LEAN CLAY (CL), greenish gray to light brownish gray (10YR 6/1), loose, low plasticity, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some gravel, trace cobbles, iron oxide staining, some weathered phenocrysts of plagioclase, pyroxene, amphibole
40				CL		

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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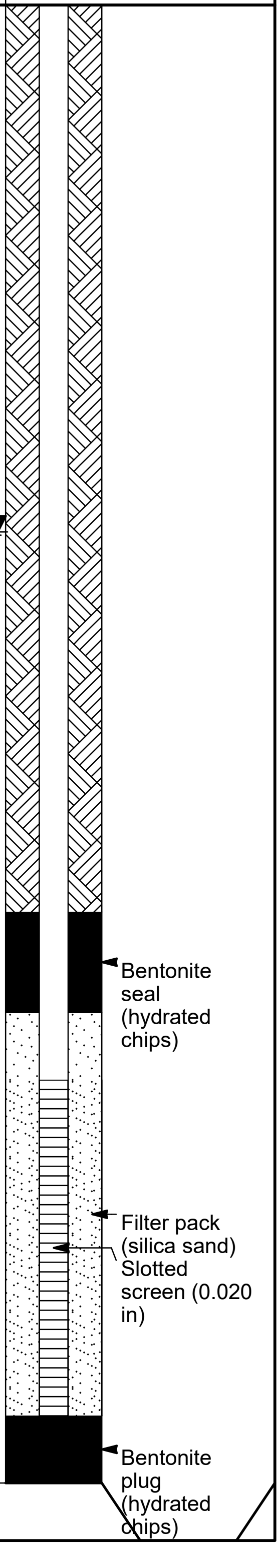
GVMW-34

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SONIC	100		CL		LEAN CLAY (CL), light brownish gray to yellowish red (5YR 4/6), loose to medium stiff, low plasticity, dry to moist, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some gravel, trace cobbles, iron oxide staining, some weathered phenocrysts of plagioclase, pyroxene, amphibole *(continued)*
	SONIC	100				
	SONIC	100				
61.0	SONIC	100		CL		LEAN CLAY (CL), dark yellowish brown to dark red (2.5YR 4/6), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some silt, iron oxide staining
66.0				CL		LEAN CLAY (CL), dark yellowish brown to yellowish brown (10YR 5/4), stiff, medium plasticity, moist, subangular, fine to coarse grained, mottled, low toughness, medium dry strength, some silt, some sand, trace cobbles, iron oxide staining, cobbles are primarily phonolite
	SONIC	100				
75.0				CH		FAT CLAY (CH), dark yellowish brown to yellowish brown (10YR 5/4), stiff, high plasticity, wet to moist, subangular, fine to medium grained, mottled, medium toughness, high dry strength, some silt, some sand, some cobbles, iron oxide staining, cobbles are primarily phonolite
	SONIC	100				
82.0	SONIC	100				PORPHYRITIC PHONOLITE, unweathered, massive, pale brownish gray to light gray, finely crystalline, plagioclase, pyroxene, amphibole, hard to very hard, dry, no staining
84.0						Bottom of borehole at 84.0 feet.

WELL DIAGRAM



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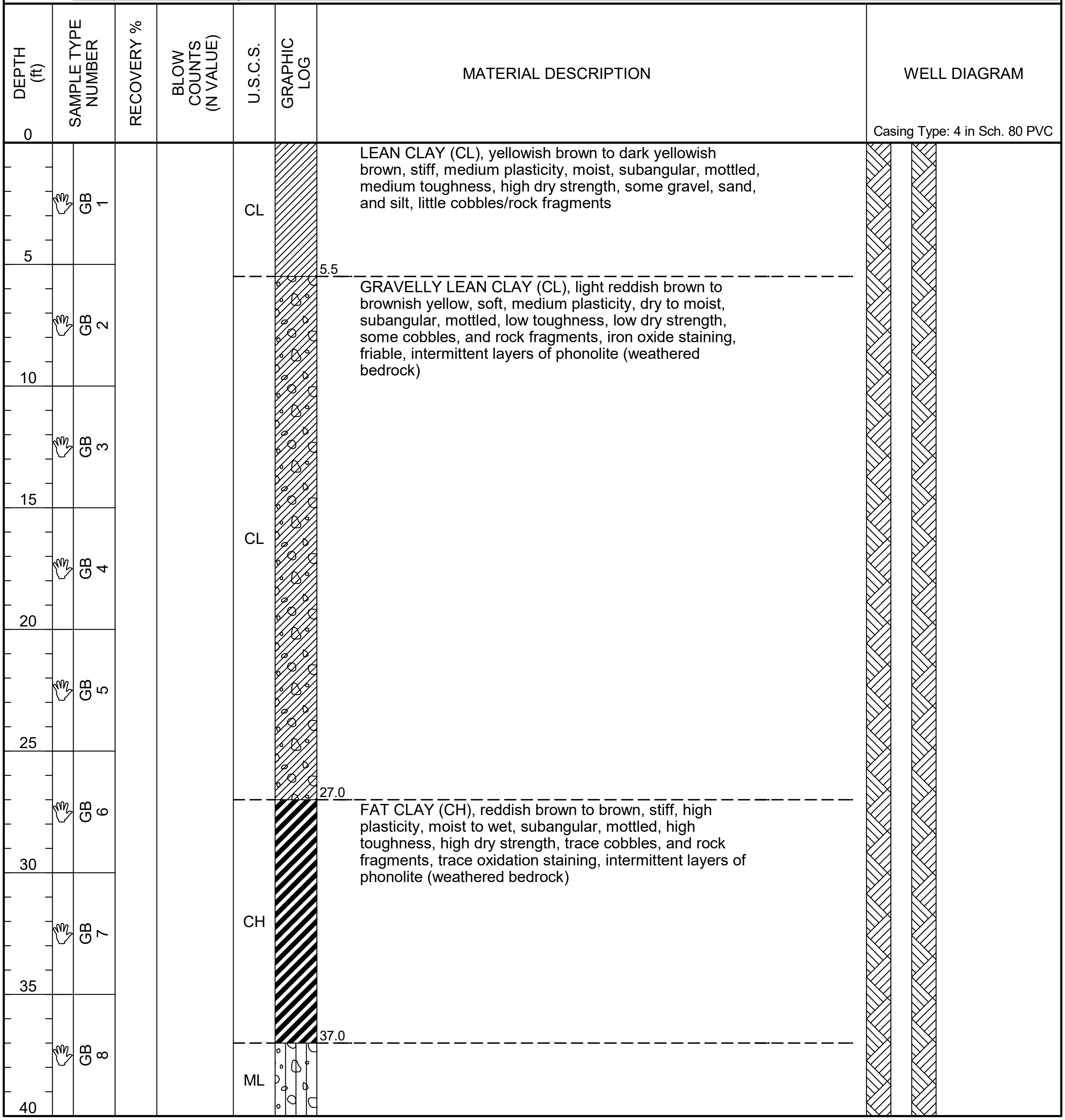
369 Inverness Pkwy, Ste 325
Englewood, CO 80112

GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/15/24 12:00 **COMPLETED** 07/31/24 10:00
WELL LOCATION -105.1301 N 38.7473 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10021.6 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Reverse Circulation
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▼ **AFTER DRILLING** 266.53 ft / Elev 9755.07 ft
NOTES Samples passed through a #343 sieve



DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM Casing Type: 4 in Sch. 80 PVC
0–5	GB 1			CL		LEAN CLAY (CL), yellowish brown to dark yellowish brown, stiff, medium plasticity, moist, subangular, mottled, medium toughness, high dry strength, some gravel, sand, and silt, little cobbles/rock fragments	
5–10	GB 2			CL	5.5	GRAVELLY LEAN CLAY (CL), light reddish brown to brownish yellow, soft, medium plasticity, dry to moist, subangular, mottled, low toughness, low dry strength, some cobbles, and rock fragments, iron oxide staining, friable, intermittent layers of phonolite (weathered bedrock)	
10–15	GB 3						
15–20	GB 4						
20–25	GB 5						
25–30	GB 6			CH	27.0	FAT CLAY (CH), reddish brown to brown, stiff, high plasticity, moist to wet, subangular, mottled, high toughness, high dry strength, trace cobbles, and rock fragments, trace oxidation staining, intermittent layers of phonolite (weathered bedrock)	
30–35	GB 7						
35–40	GB 8			ML	37.0		

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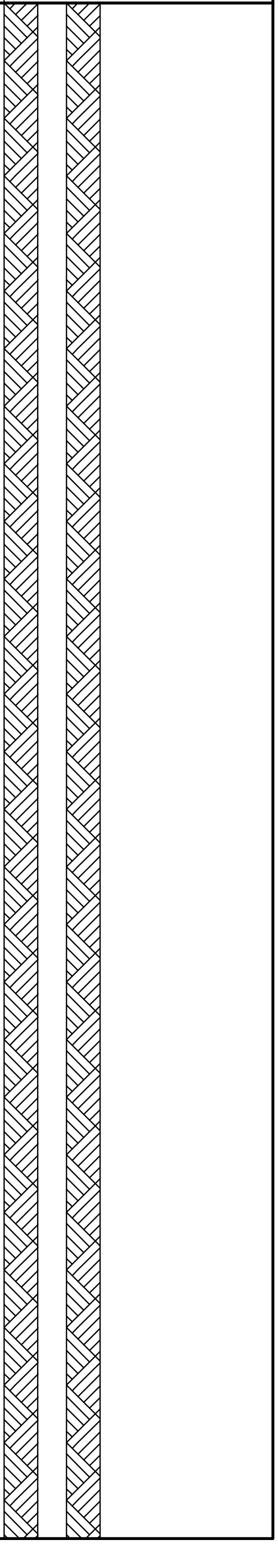
GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	✋ GB 9			ML		GRAVELLY SILT (ML), reddish yellow to brownish yellow, soft, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, and rock fragments, iron oxide staining, friable, intermittent layers of granodiorite (weathered bedrock)
45	✋ GB 10					
50	✋ GB 11					
54.0				CL		GRAVELLY LEAN CLAY (CL), light brownish gray to light yellowish brown, stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, little cobbles, and rock fragments, iron oxide staining, friable, intermittent layers of phonolite (weathered bedrock)
55	✋ GB 12					
60	✋ GB 13					
65	✋ GB 14					
70.0	✋ GB 15					SCHIST, highly weathered to moderately weathered, foliated, light blueish gray to pale brown, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to hard, damp to wet, iron oxide staining, brittle, trace clayey fines, multi-compositional mineral inclusions (porphyritic) - BRECCIA/PHONOLITE
75	✋ GB 16					
80	✋ GB 17					
85	✋					

WELL DIAGRAM



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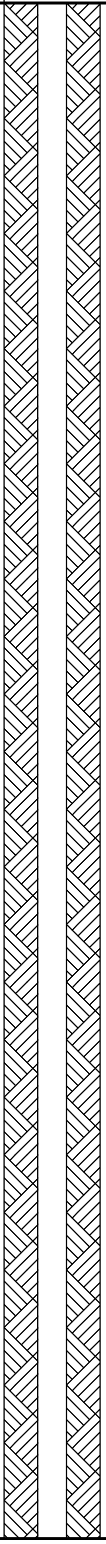
DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	✋ GB 18						
90	✋ GB 19						
95	✋ GB 20						
100	✋ GB 21						
105	✋ GB 22						
110	✋ GB 23						
115	✋ GB 24					115.0 GRANITE, slightly weathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, iron oxide staining, trace green/yellow mineral inclusions (porphyritic), intermittent layers of phonolite - GRANODIORITE	
120	✋ GB 25						
125	✋ GB 26						
130	✋						



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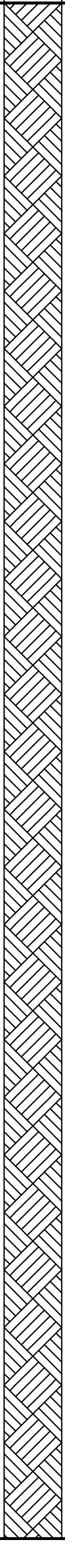
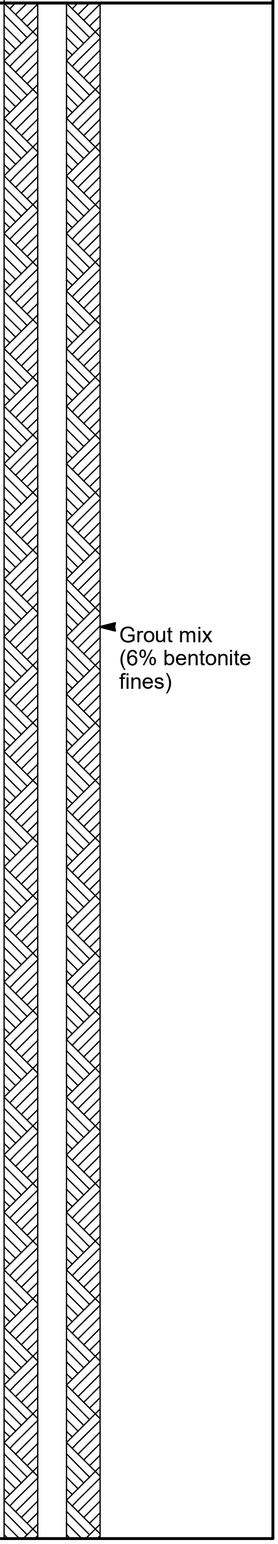
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE	NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
135	✋	GB 27						
140	✋	GB 28						
145	✋	GB 29						
150	✋	GB 30						
155	✋	GB 31						Grout mix (6% bentonite fines)
160	✋	GB 32						
165	✋	GB 33						
170	✋	GB 34						
175	✋	GB 35						
	✋							





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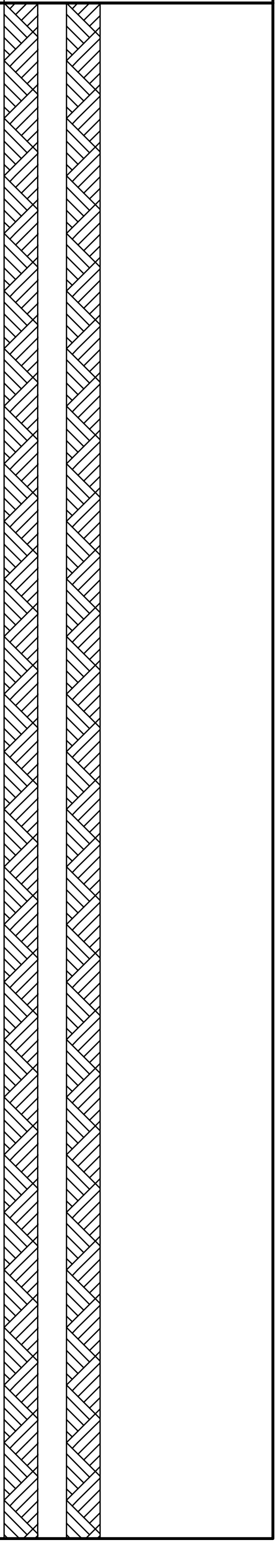
Englewood, CO 80112

GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
180	✋ GB 36						
185	✋ GB 37						
190	✋ GB 38						
195	✋ GB 39						
200	✋ GB 40						
205	✋ GB 41					205.0	
210	✋ GB 42					GRANITE, unweathered, massive, light blueish gray to dark gray, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, trace white/green/yellow mineral inclusions (porphyritic) - GRANODIORITE	
215	✋ GB 43						
220	✋ GB 44						
	✋ GB 45						



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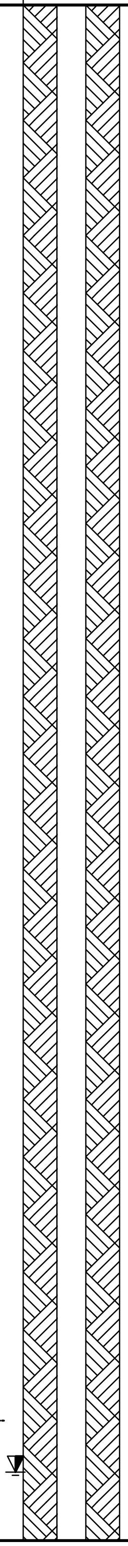
GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
225	✋				▨	
230	✋ GB 46				▨	
235	✋ GB 47				▨	
240	✋ GB 48				▨	
245	✋ GB 49				▨	
250	✋ GB 50				▨	
255	✋ GB 51				▨	
260	✋ GB 52				▨	
265	✋ GB 53				▨	265.0
	✋ GB 54				▨	

WELL DIAGRAM



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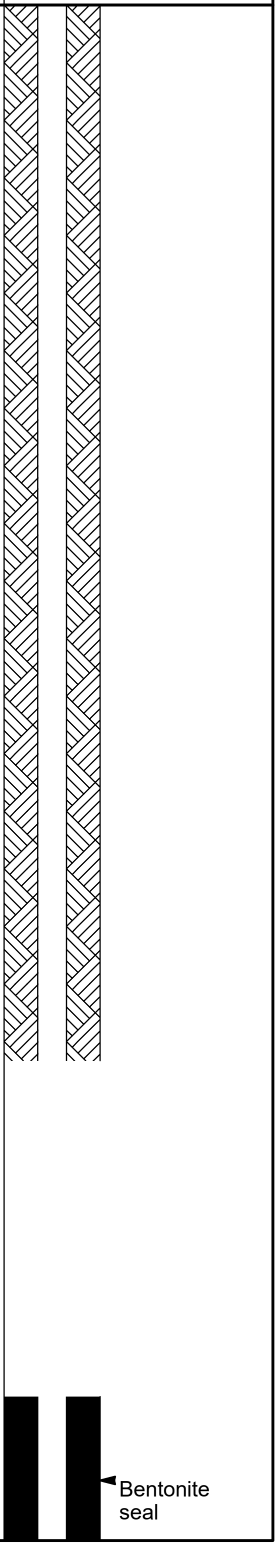
GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
270						DIORITE, unweathered, massive, dark greenish gray to black, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, trace green mineral inclusions (porphyritic), hydrothermal alteration veins - GRANODIORITE
	GB 55					
275						
	GB 56					
280						
	GB 57					
285						
	GB 58					
290						290.0 GRANITE, unweathered, massive, light blueish gray to black, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, trace green/yellow mineral inclusions (porphyritic) - GRANODIORITE
	GB 59					
295						
	GB 60					
300						
	GB 61					
305						
	GB 62					
310						
	GB 63					

WELL DIAGRAM



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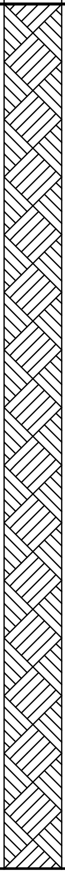
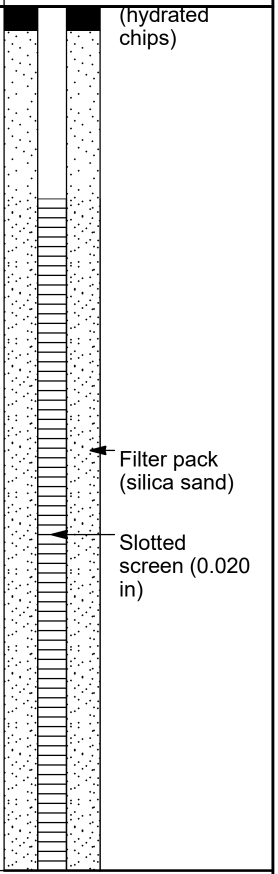
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE	NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
315	✋							(hydrated chips)
	✋	GB 64						
320								
	✋	GB 65						
325								
	✋	GB 66						Filter pack (silica sand)
330								Slotted screen (0.020 in)
	✋	GB 67						
335								
	✋	GB 68						
340							340.0	





Bottom of borehole at 340.0 feet.

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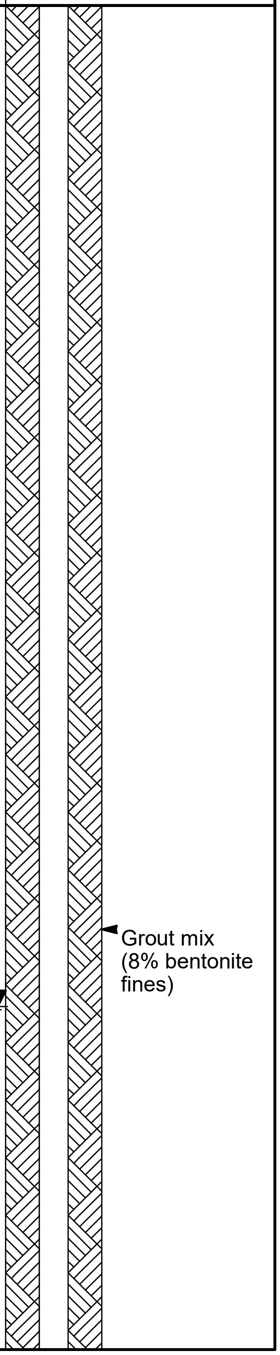
GVMW-35B

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/10/24 08:10 **COMPLETED** 08/11/24 16:05
WELL LOCATION -105.1305 N 38.7475 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10018.51 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 29.79 ft / Elev 9988.72 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		CL		LEAN CLAY (CL), dark yellowish brown to yellowish brown (10YR 5/4), stiff, medium plasticity, moist, subangular, mottled, medium toughness, high dry strength, some cobbles, some sand, some silt, no staining, cobbles are primarily volcaniclastic material
5.5				CL		LEAN CLAY (CL), red to reddish gray (5YR 6/4), loose to medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material
10	SONIC 2	100				
20.0	SONIC 3	100		CL		LEAN CLAY (CL), reddish yellow to brownish red (10YR 6/8), loose to medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material
	SONIC 4	100				
27.0	SONIC 5	100		CH		FAT CLAY (CH), reddish brown to brown (7.5YR 5/2), stiff, high plasticity, moist to wet, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material, and have slightly oxidized rims
	SONIC 6	100				
	SONIC 7	100				
37.0				ML		
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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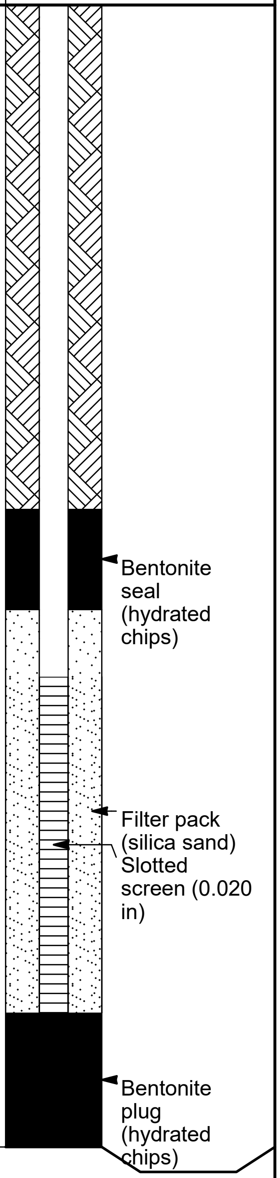
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SONIC 8	100		ML		SILT (ML), brownish yellow to reddish yellow (7.5YR 7/8), loose, non plastic, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some cobbles, trace sand, some clay, iron oxide staining, cobbles are highly weathered granodiorite and ranges from 3 to 7 cm in diameter
45	SONIC 9	100				
50	SONIC 10	100			54.0	
55	SONIC 11	100		CL		LEAN CLAY (CL), pale yellowish brown to brownish yellow (10YR 6/8), medium stiff to stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material, and have slightly oxidized rims
60 65	SONIC 12	100				
70	SONIC 13	100			70.0	
	SONIC 14	100			74.0	SCHIST, unweathered, massive, greenish black to dark olive gray, finely crystalline, phenocrysts of garnet, hard to very hard, dry, no staining, slickenlines visible

Bottom of borehole at 74.0 feet.

WELL DIAGRAM



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GVMW-36

PAGE 1 OF 2

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/12/24 11:15 **COMPLETED** 08/15/24 10:30
WELL LOCATION -105.1337 N 38.7486 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10025.62 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 11.92 ft / Elev 10013.70 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0–10	SONIC	100	
10–18	SONIC	100	
18–22	SONIC	100	
22–26	SONIC	100	
26–30	SONIC	100	
30–35	SONIC	100	
35–40	SONIC	100	

DEPTH (ft)	U.S.C.S.
0–1.0	OL
1.0–7.0	CL
7.0–22.0	ML
22.0–25.0	CL
25.0–27.0	CL
27.0–29.0	CL
29.0–30.0	CL
30.0–34.0	CL
34.0–35.0	CL-ML
35.0–40.0	

MATERIAL DESCRIPTION

1.0 ORGANIC SOIL (OL), very dark brown, soft, low plasticity, dry to moist, subangular, homogeneous, low toughness, low dry strength, trace roots, and cobbles, iron oxide staining, non-cohesive fines, intermittent layers of breccia/phonolite

LEAN CLAY WITH GRAVEL (CL), yellowish brown to dark yellowish brown, medium stiff, medium plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little sand, trace silt, some cobbles, trace oxidation staining, intermittent layers of breccia/phonolite (weathered bedrock)

7.0 SILT WITH SAND (ML), light reddish brown to yellowish brown, soft, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

22.0 SILTY GRAVELLY LEAN CLAY WITH SAND (CL), brownish yellow to dark yellowish orange, soft, low plasticity, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, trace mica, some cobbles, and rock fragments, iron oxide staining, trace red mineral inclusions (porphyritic), intermittent layes of granodiorite (weathered bedrock)

25.0 GRAVELLY LEAN CLAY (CL), yellowish brown to brown, medium stiff to stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, trace fine to coarse sand, some cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

27.0 SILTY GRAVELLY LEAN CLAY WITH SAND (CL), light yellowish brown to pale brown, soft, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

29.0 GRAVELLY LEAN CLAY (CL), yellowish brown to brown, soft, medium plasticity, moist to wet, subangular, mottled, low toughness, low dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

30.0

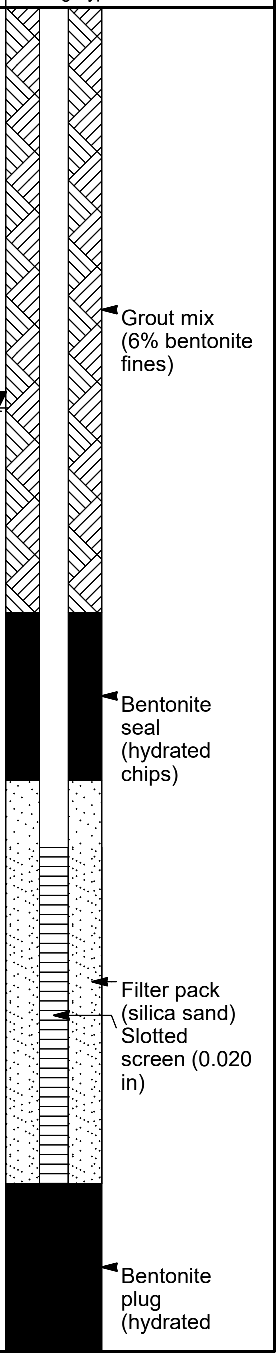
34.0

35.0

40.0 GRAVELLY LEAN CLAY WITH SAND (CL), yellowish

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-36

CLIENT Cripple Creek and Victor Gold Mining Company, LLC

PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling

PROJECT NUMBER 10399263

PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
						brown to brown, soft to stiff, medium plasticity, moist to wet, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, trace cobbles, and rock fragments, iron oxide staining, micaceous, intermittent layers of granodiorite (weathered bedrock)	chips)
						SILTY GRAVELLY LEAN CLAY (CL-ML), yellowish red to light brown, stiff to hard, low plasticity, moist to wet, subangular, mottled, high toughness, high dry strength, trace fine sand, some cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)	
						SCHIST, slightly weathered to unweathered, foliated, light blueish gray to dark blueish gray, finely crystalline, biotite/muscovite/chlorite/talc, hard to very hard, dry, trace oxidation staining, red/green mineral inclusions (porphyritic), pulverized fines - PHONOLITE (competent bedrock)	

Bottom of borehole at 40.0 feet.

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GVMW-37A

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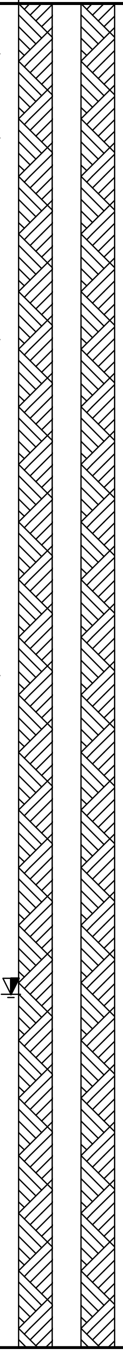
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/01/24 08:45 **COMPLETED** 08/04/24 09:30
WELL LOCATION -105.1181 N 38.7401 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9842.81 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Reverse Circulation
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▼ **AFTER DRILLING** 29.49 ft / Elev 9813.32 ft
NOTES Samples passed through a #343 sieve

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0 – 1.5				CL-ML		ORGANIC SOIL (CL-ML), dark brown to very dark grayish brown, soft, low plasticity, wet, mottled, low toughness, low dry strength, trace fine sand, and roots, micaceous, trace oxidation staining
1.5 – 4.0	GB 1			CL		GRAVELLY LEAN CLAY (CL), yellowish brown to brown, soft to medium stiff, low plasticity, dry, subangular, mottled, low toughness, low dry strength, little fine to medium sand, trace roots, and rock fragments, iron oxide staining, micaceous
4.0 – 10.0	GB 2			CL		GRAVELLY LEAN CLAY (CL), brown, stiff to very stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, some rock fragments, iron oxide staining, intermittent layers of breccia/sandstone (weathered bedrock)
10.0 – 20.0	GB 3 GB 4			CL		GRAVELLY LEAN CLAY (CL), yellowish brown to dark brown, soft to very stiff, medium plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little fine to coarse sand, and rock fragments, trace oxidation staining, green mineral inclusions, intermittent layers of granodiorite (weathered bedrock)
20.0 – 40	GB 5 GB 6 GB 7 GB 8			CL		GRAVELLY LEAN CLAY (CL), dark yellowish brown to light brownish gray, soft to very stiff, low plasticity, moist to wet, subangular, laminated, medium toughness, medium dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, mottled, forms in clods/clumps, fissile, friable, intermittent layers of breccia/sandstone (weathered bedrock)

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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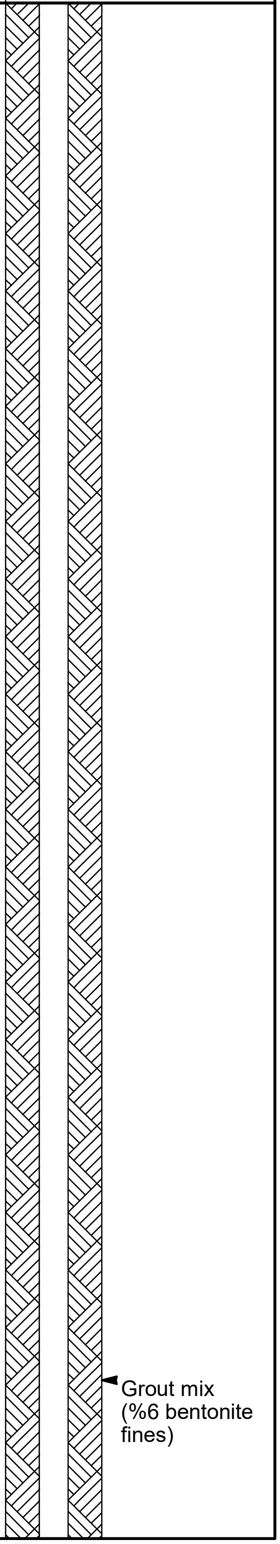
GVMW-37A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	GB 9					
45	GB 10			CL		
50	GB 11					50.0 CLAYEY SANDSTONE, highly weathered to moderately weathered, laminated, dark yellowish brown to brown, coarse, quartz and feldspar, medium hard to hard, damp to wet, iron oxide staining, intermittent layers of granodiorite
55	GB 12					
60	GB 13					
65	GB 14					
70	GB 15					
75	GB 16					
80	GB 17					
85						85.0

WELL DIAGRAM



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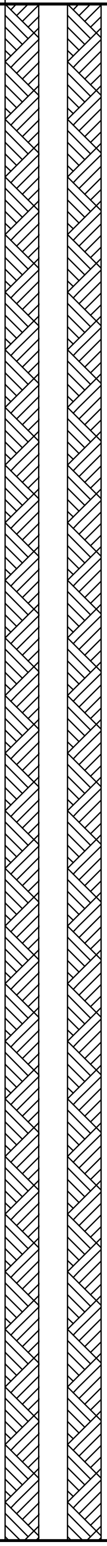
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER		RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
90	✋	GB 18				△ △	SCHIST, slightly weathered, foliated, light blueish gray to dark gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to medium hard, damp to wet, iron oxide staining, intermittent layers of granodiorite - BRECCIA/PHONOLIT*E*	
95	✋	GB 19				△ △		
100	✋	GB 20				△ △		
105	✋	GB 21				△ △		
110	✋	GB 22				△ △		
115	✋	GB 23				△ △		
120	✋	GB 24				△ △		
125	✋	GB 25				△ △		
130	✋	GB 26				△ △		
	✋					△ △		

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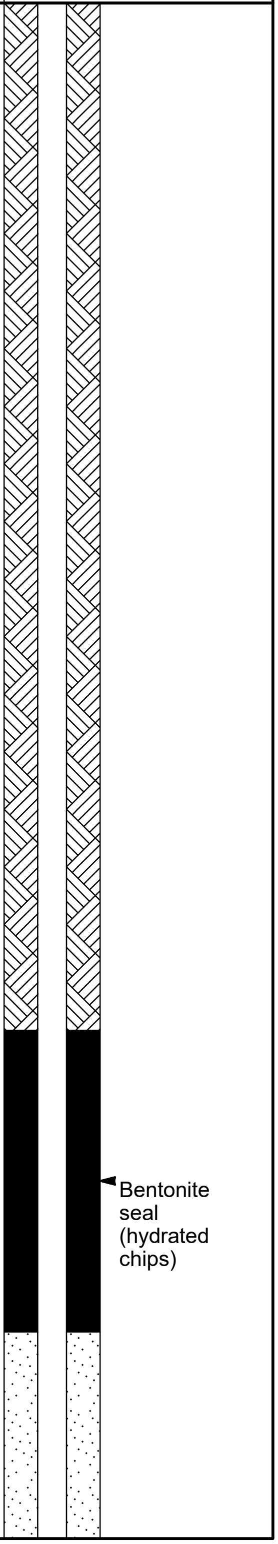
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
135	GB 27					
140	GB 28					140.0
145	GB 29					GRANITE, slightly weathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, little oxidation staining, intermittent layers of phonolite
150	GB 30					150.0
155	GB 31					DIORITE, slightly weathered, massive, dark greenish gray to black, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, trace oxidation staining - GRANDODIORITE 155.0
160	GB 32					GRANITE, unweathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, iron oxide staining, - GRANODIORITE
165	GB 33					
170	GB 34					
175	GB 35					

WELL DIAGRAM



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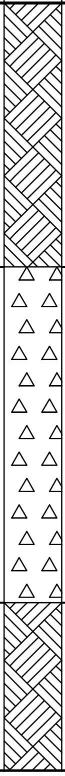
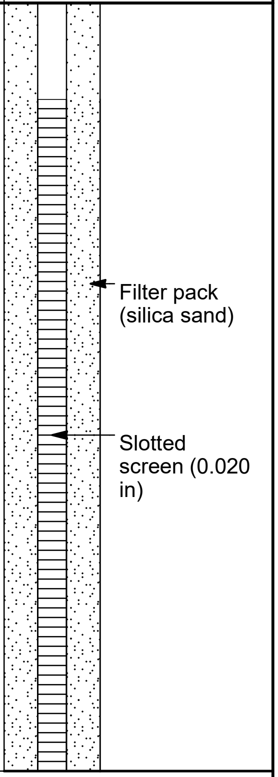
GVMW-37A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO



DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
180	✋ GB 36					
185	✋ GB 37				185.0	
190	✋ GB 38					SCHIST, slightly weathered, foliated, light blueish gray to dark greenish gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, hard to very hard, damp to wet, iron oxide staining, intermittent layers of granodiorite - PHONOLITE
195	✋ GB 39				195.0	
200	✋ GB 40				200.0	GRANITE, unweathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, - GRANODIORITE

Bottom of borehole at 200.0 feet.



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GVMW-37B

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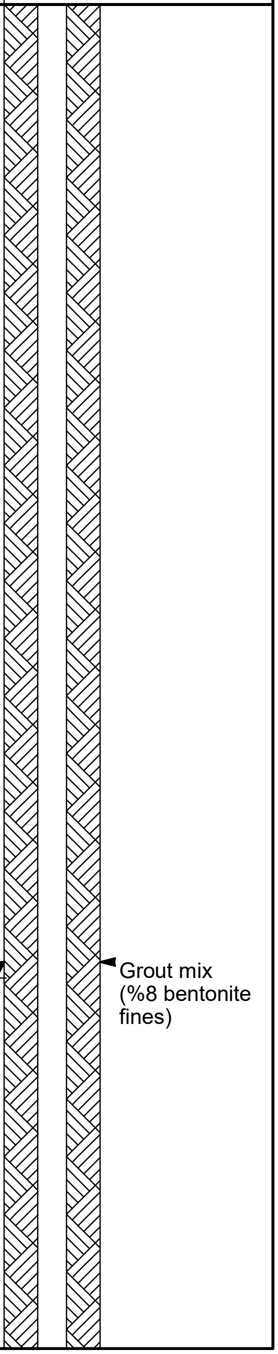
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/16/24 10:30 **COMPLETED** 08/17/24 15:30
WELL LOCATION -105.1181 N 38.7402 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9842.84 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 28.97 ft / Elev 9813.87 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		OL		ORGANIC SOIL (OL), dark brown to very dark grayish brown, soft, low plasticity, wet, mottled, low toughness, low dry strength, trace fine sand, and roots, micaceous, trace oxidation staining (drill added water)
1.5				CL		GRAVELLY LEAN CLAY (CL), yellowish brown to brown, soft to medium stiff, low plasticity, dry, subangular, mottled, low toughness, low dry strength, little fine to medium sand, trace roots, and rock fragments, iron oxide staining, micaceous
4.0				CL		GRAVELLY LEAN CLAY (CL), brown, stiff to very stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, some rock fragments, iron oxide staining, intermittent layers of breccia/sandstone (weathered bedrock)
10.0	SONIC 2	100		CL		GRAVELLY LEAN CLAY (CL), yellowish brown to dark brown, soft to very stiff, medium plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little fine to coarse sand, and rock fragments, trace oxidation staining, green mineral inclusions, intermittent layers of granodiorite (weathered bedrock)
20.0	SONIC 3	100		CL		GRAVELLY LEAN CLAY (CL), dark yellowish brown to light brownish gray, soft to very stiff, low plasticity, moist to wet, subangular, laminated, medium toughness, medium dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, mottled, forms in clods/clumps, fissile, friable, intermittent layers of breccia/sandstone (weathered bedrock)
25	SONIC 4	100				
30	SONIC 5	100				
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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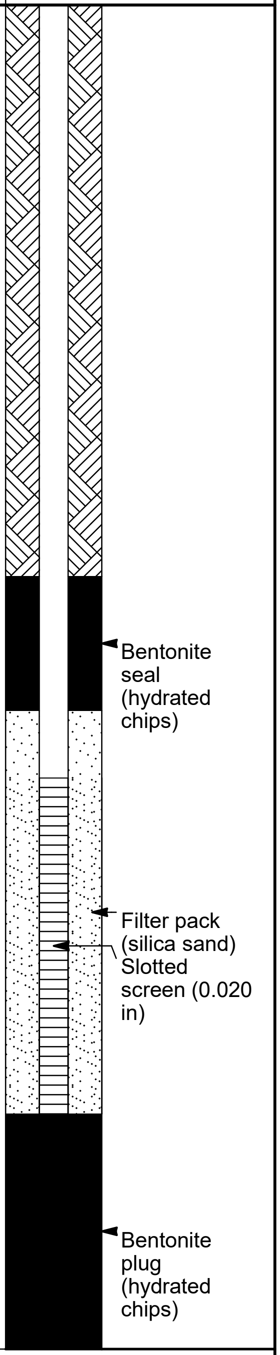
GVMW-37B

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION
40	SONIC 6 SONIC 7	100 100		CL	
50.0	SONIC 8 SONIC 9	100 100		CL	GRAVELLY LEAN CLAY (CL), dark yellowish brown to light brownish gray, soft to very stiff, low plasticity, dry to moist, subangular, laminated, medium toughness, medium dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, mottled, forms in clods/clumps, fissile, friable, intermittent layers of sandstone (weathered bedrock)
60.0	SONIC 10	100		CL	LEAN CLAY WITH GRAVEL (CL), dark yellowish brown to brown, very stiff to hard, low plasticity, moist to wet, subangular, mottled, high toughness, high dry strength, some rock fragments, trace oxidation staining, intermittent layers of sandstone (weathered bedrock)
62.0	SONIC 11	100			CLAYEY SCHIST, highly weathered to moderately weathered, foliated, brownish yellow to dark brownish gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to hard, damp to wet, iron oxide staining, friable, fissile, red/black/white mineral inclusions (porphyritic), intermittent layers of sandstone - BRECCIA/PHONOLITE
73.0	SONIC 12	100			SCHIST, slightly weathered to unweathered, foliated, light yellowish brown to gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to hard, dry, few clayey zones, trace oxidation staining, intermittent layers of sandstone - BRECCIA/PHONOLITE (competent bedrock)
80.0					

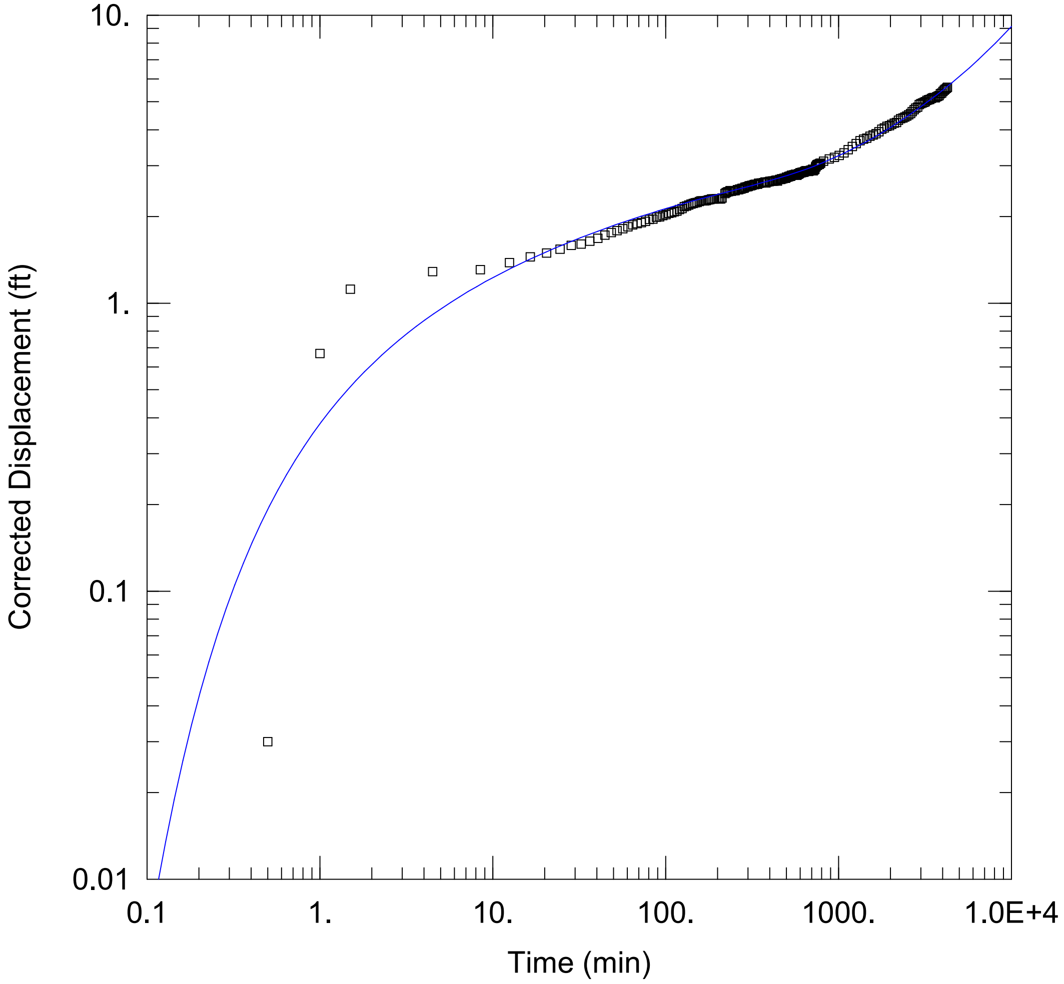
WELL DIAGRAM



Bottom of borehole at 80.0 feet.

Appendix B

Drawdown data with straight-line fits and fitted Theis curves



NEWMONT MINE

Data Set: C:\...\GVMW27_72H_Test_Boundary_Theis.aqt
Date: 12/11/24 Time: 15:10:08

PROJECT INFORMATION

Company: HDR
Client: ECOSA
Location: Cripple Creek, CO
Test Well: GVMW-27

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-27 - 72H	0	0

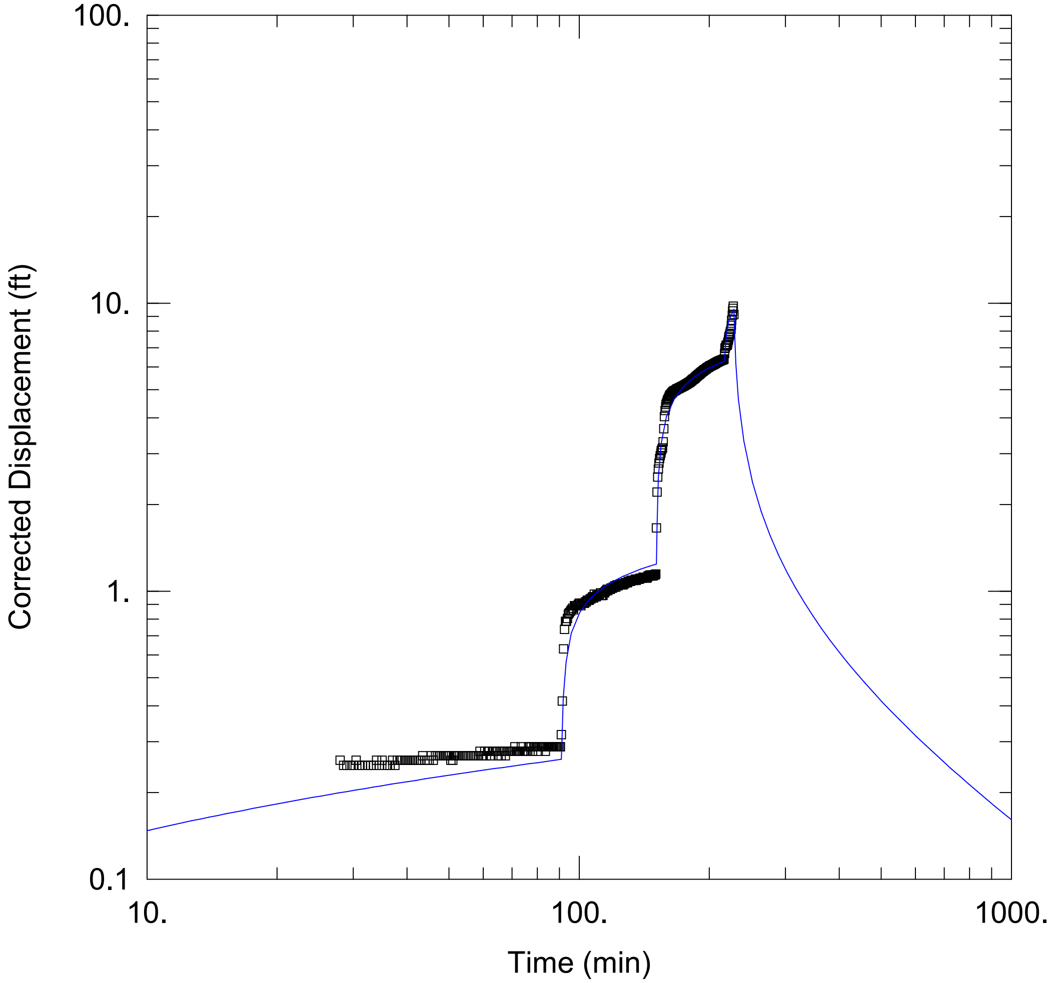
Observation Wells

Well Name	X (ft)	Y (ft)
□ GVMW-27 - 72H	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 57.64 ft^2/day
S = 1.695
Kz/Kr = 1.
b = 21. ft



WELL TEST ANALYSIS

Data Set: C:\...\GVMW-27_Step test_Theis.aqt
Date: 11/25/24 Time: 11:48:10

PROJECT INFORMATION

Company: HDR
Client: ECOSA
Location: Cripple Creek, CO
Test Well: GVMW-27 SDD

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-27 SDD	0	0

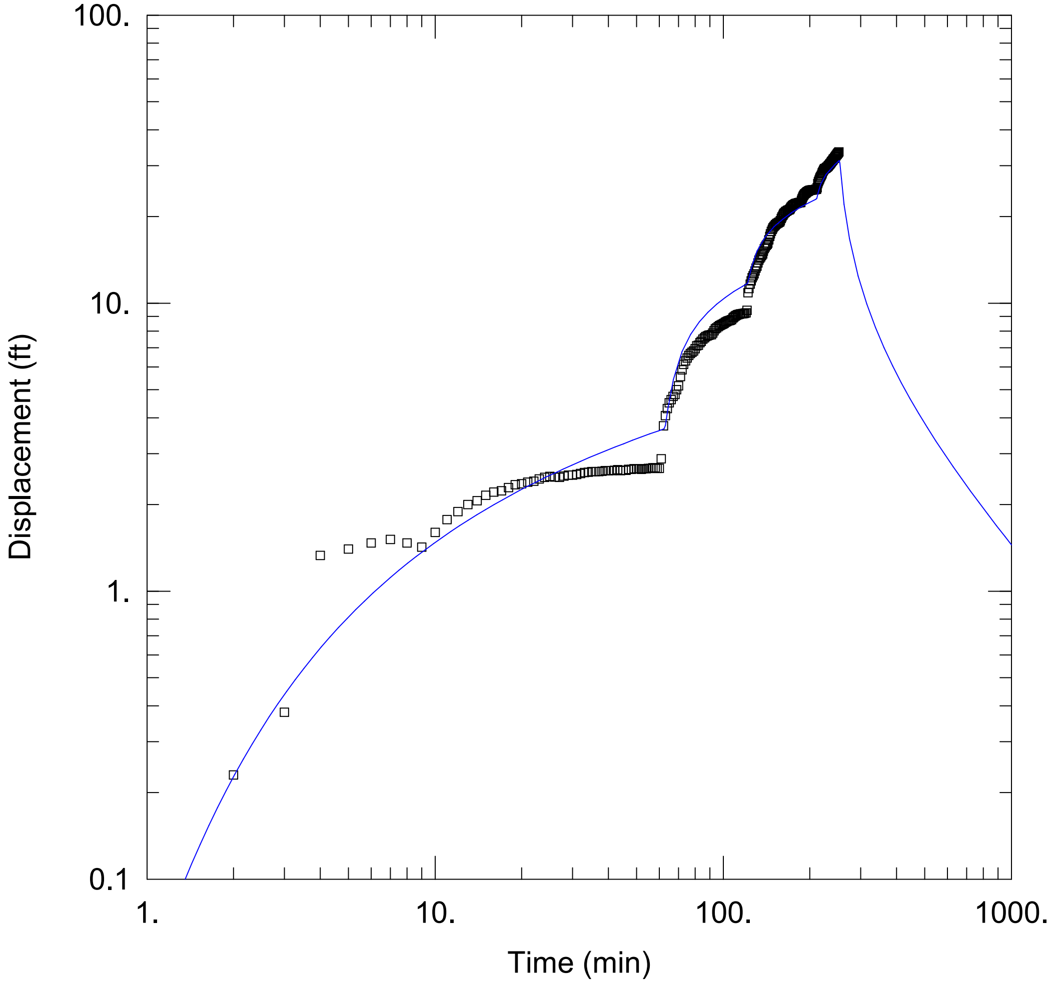
Observation Wells

Well Name	X (ft)	Y (ft)
□ GVMW-27 SDD	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 29.51 ft^2/day
S = 1.
Kz/Kr = 5.135E+4
b = 21. ft



WELL TEST ANALYSIS

Data Set: C:\Users\mreeves\Downloads\GVMW28_SD_Test_norecovery.aqt
Date: 12/11/24 Time: 15:14:17

PROJECT INFORMATION

Company: HDR
Client: Newmont
Location: CC
Test Well: MW-28
Test Date: 10/24

AQUIFER DATA

Saturated Thickness: 38. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

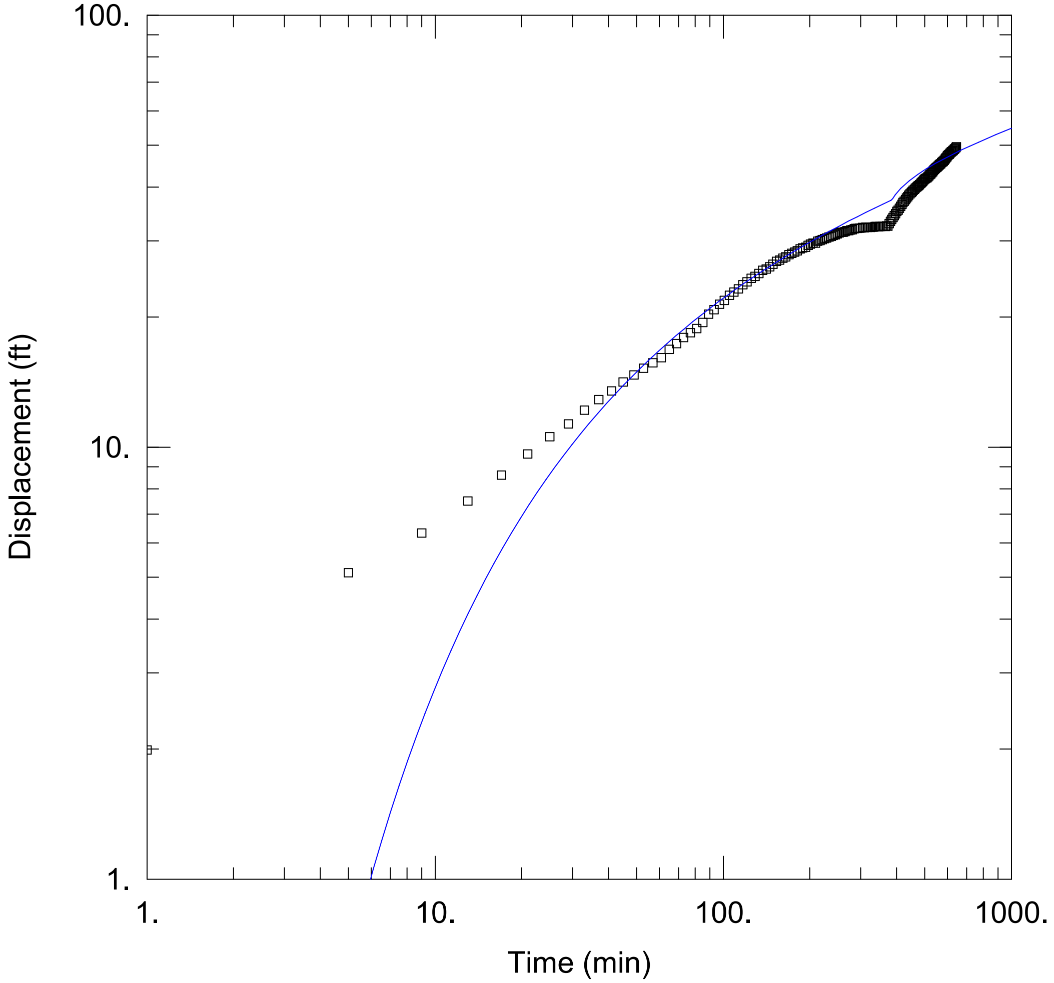
Pumping Wells		
Well Name	X (ft)	Y (ft)
MW-28	0	0

Observation Wells		
Well Name	X (ft)	Y (ft)
□ MW-28	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Step Test)

T = 4.323 ft^2/day
S = 1.
Sw = 0.
C = 1. min^2/ft^5
P = 1.528



WELL TEST ANALYSIS

Data Set: C:\...\GVMW-35A 11hrTest_Theis_boundary.aqt
Date: 11/25/24 Time: 10:31:00

PROJECT INFORMATION

Company: HDR
Client: Newmont
Location: CC
Test Well: MW-35A
Test Date: 10/24

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-35A	0	0

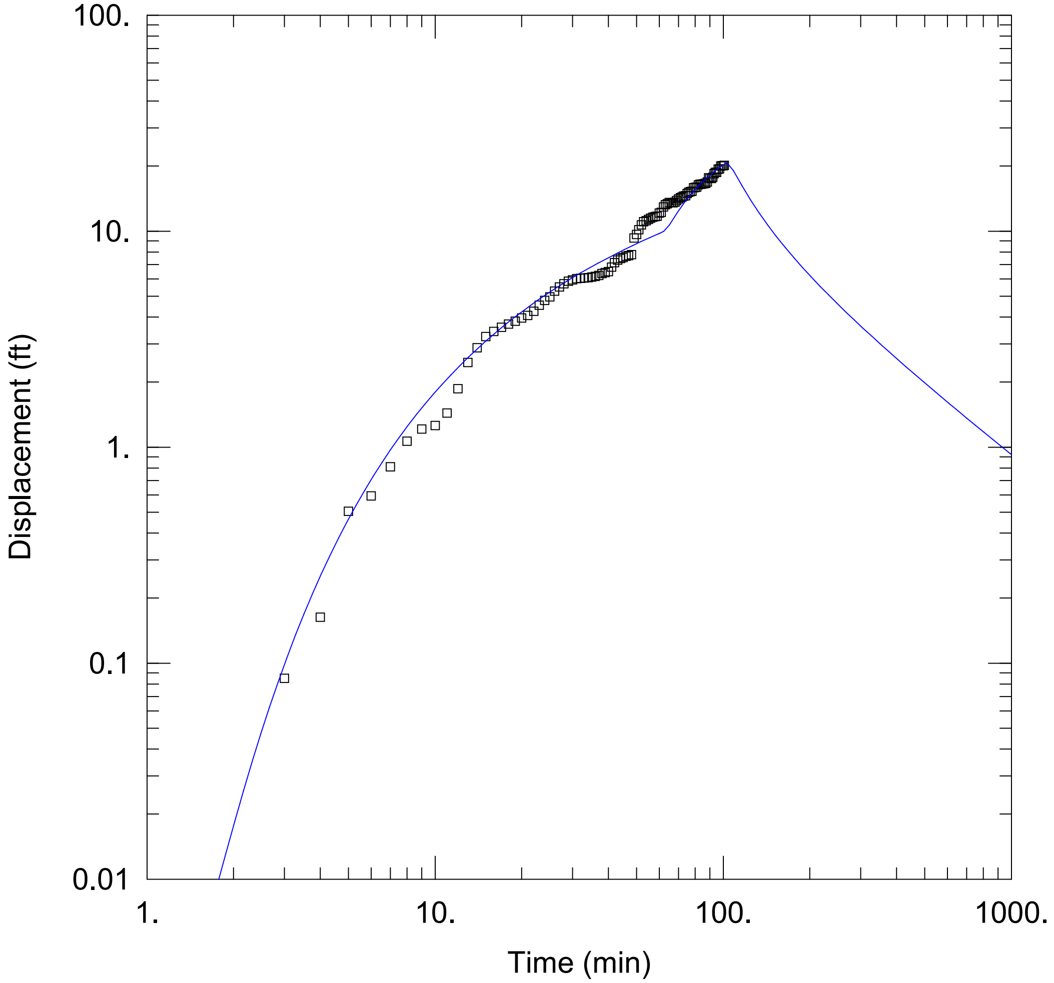
Observation Wells

Well Name	X (ft)	Y (ft)
□ GVMW-35A	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1.036 ft^2/day
Kz/Kr = 0.001
S = 1.
b = 76.93 ft



WELL TEST ANALYSIS

Data Set: C:\...\GVMW-36 Step test_Theis.aqt
Date: 11/25/24 Time: 11:27:09

PROJECT INFORMATION

Company: HDR
Client: Newmont
Location: CC
Test Well: MW-36
Test Date: 10/24

AQUIFER DATA

Saturated Thickness: 22.47 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-36	0	0

Observation Wells

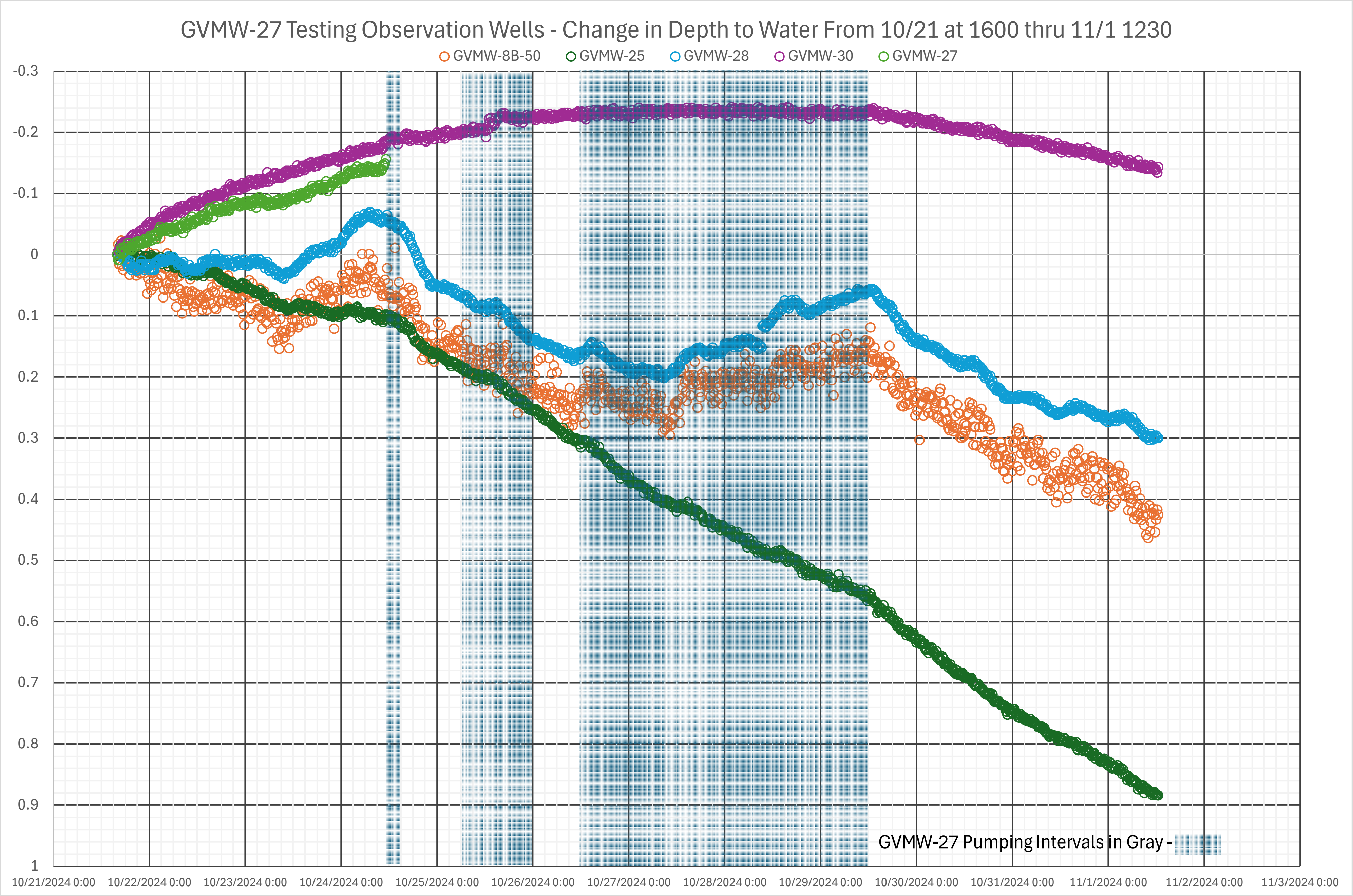
Well Name	X (ft)	Y (ft)
□ GVMW-36	0	0

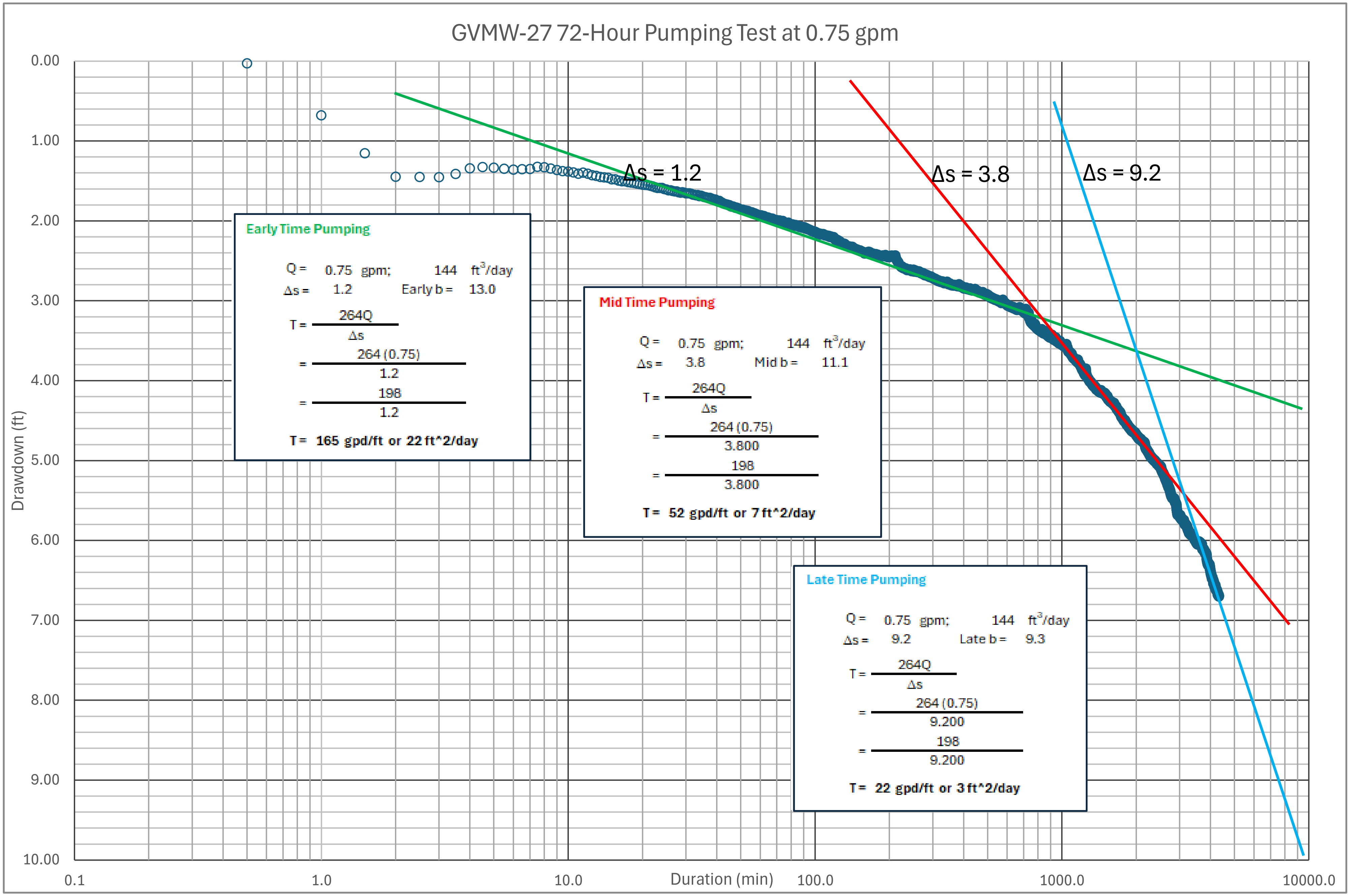
SOLUTION

Aquifer Model: Confined Solution Method: Theis (Step Test)

T = 0.5233 ft^2/day
Sw = 0.
P = 1.5

S = 0.4552
C = 1. min^2/ft^5


GVMW-27 Testing Observation Wells - Change in Depth to Water From 10/21 at 1600 thru 11/1 1230
GVMW-8B-50
GVMW-25
GVMW-28
GVMW-30
GVMW-27
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
10/21/2024 0:00
10/22/2024 0:00
10/23/2024 0:00
10/24/2024 0:00
10/25/2024 0:00
10/26/2024 0:00
10/27/2024 0:00
10/28/2024 0:00
10/29/2024 0:00
10/30/2024 0:00
10/31/2024 0:00
11/1/2024 0:00
11/2/2024 0:00
11/3/2024 0:00
GVMW-27 Pumping Intervals in Gray -



Early Time Pumping

Q = 0.75 gpm; 144 ft^3/day

Δs = 1.2 Early b = 13.0

$$T = \frac{264Q}{\Delta s}$$

$$= \frac{264\,(0.75)}{1.2}$$

$$= \frac{198}{1.2}$$

T = 165 gpd/ft or 22 ft^2/day

Mid Time Pumping

Q = 0.75 gpm; 144 ft^3/day

Δs = 3.8 Mid b = 11.1

$$T = \frac{264Q}{\Delta s}$$

$$= \frac{264\,(0.75)}{3.800}$$

$$= \frac{198}{3.800}$$

T = 52 gpd/ft or 7 ft^2/day

Late Time Pumping

Q = 0.75 gpm; 144 ft^3/day

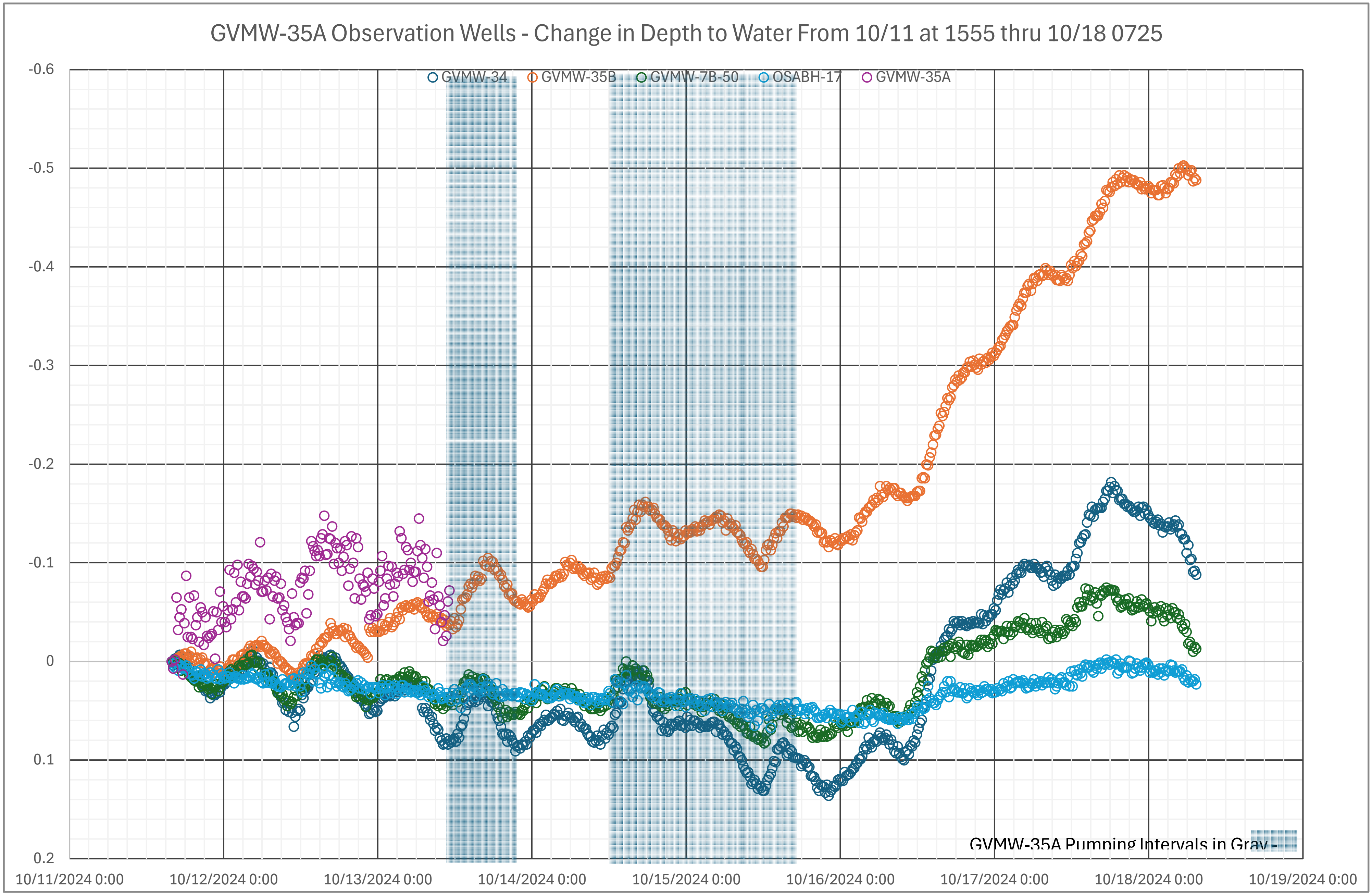
Δs = 9.2 Late b = 9.3

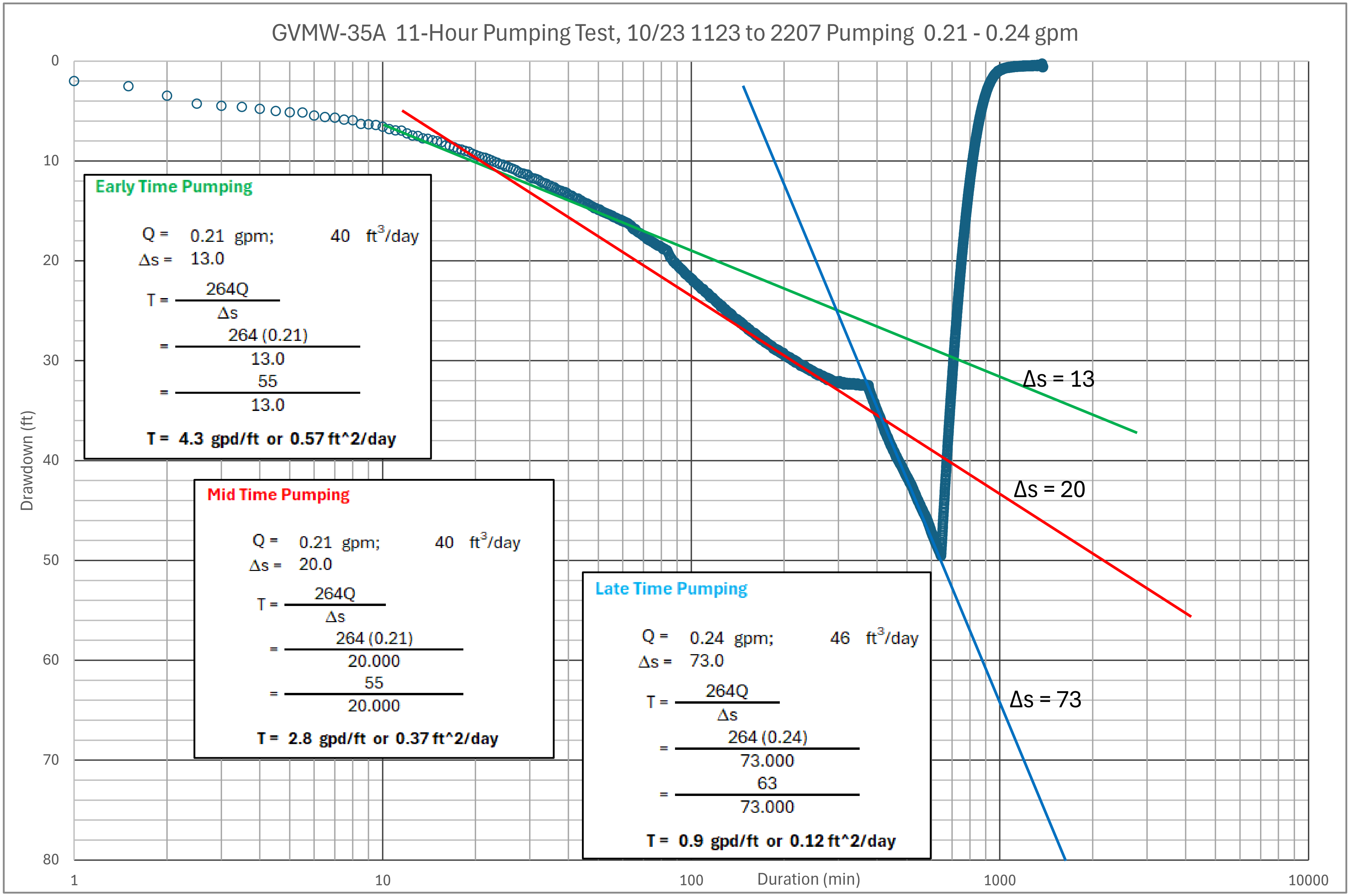
$$T = \frac{264Q}{\Delta s}$$

$$= \frac{264\,(0.75)}{9.200}$$

$$= \frac{198}{9.200}$$

T = 22 gpd/ft or 3 ft^2/day


GVMW-35A Observation Wells - Change in Depth to Water From 10/11 at 1555 thru 10/18 0725
○ GVMW-34
○ GVMW-35B
○ GVMW-7B-50
○ OSABH-17
○ GVMW-35A
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
10/11/2024 0:00
10/12/2024 0:00
10/13/2024 0:00
10/14/2024 0:00
10/15/2024 0:00
10/16/2024 0:00
10/17/2024 0:00
10/18/2024 0:00
10/19/2024 0:00
GVMW-35A Pumping Intervals in Gray -



GVMW-35A 11-Hour Pumping Test, 10/23 1123 to 2207 Pumping 0.21 - 0.24 gpm

Early Time Pumping

Q = 0.21 gpm; 40 ft^3/day

Δs = 13.0

$$T = \frac{264Q}{\Delta s} = \frac{264\,(0.21)}{13.0} = \frac{55}{13.0}$$

T = 4.3 gpd/ft or 0.57 ft^2/day

Mid Time Pumping

Q = 0.21 gpm; 40 ft^3/day

Δs = 20.0

$$T = \frac{264Q}{\Delta s} = \frac{264\,(0.21)}{20.000} = \frac{55}{20.000}$$

T = 2.8 gpd/ft or 0.37 ft^2/day

Late Time Pumping

Q = 0.24 gpm; 46 ft^3/day

Δs = 73.0

$$T = \frac{264Q}{\Delta s} = \frac{264\,(0.24)}{73.000} = \frac{63}{73.000}$$

T = 0.9 gpd/ft or 0.12 ft^2/day

Attachment 2

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Inflation Rate	2.81%	5.62%	8.43%	11.24%	14.05%	16.86%	19.67%	22.48%	25.29%	28.10%
Capital - Pipeline Engineering & Installation (ECOSA -> VLF)						$ 250,000	$ 1,214,458			
Capital - Surface Seepage Collection EPF Installation	$ 500,000									
Capital - Pumpback System Installation	$ 1,500,000									
O&M Water Management (Trucking)	$ 422,025	$ 422,025	$ 422,025	$ 422,025	$ 422,025	$ 422,025	$ 422,025			
O&M Costs - Pumpback Pump & Transducer Replacement			$ 33,600			$ 33,600			$ 33,600	
O&M - Pumpback Maintenance		$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600
O&M Costs - Pump/Piping to VLF electric/maintainence/labor							$ 39,771	$ 39,771	$ 39,771	$ 39,771
O&M ECOSA/VLF Pump Replacement									$ 35,000	
O&M Collection Area Geomembrane Maintenance		$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976
Escalation with 2.81% inflation	$ 68,058.90	$ 26,447.77	$ 42,504.13	$ 52,895.54	$ 66,119.42	$ 127,158.26	$ 339,273.92	$ 19,860.28	$ 39,691.76	$ 24,825.35
Indirects/Contingency (28.5%)	$ 690,277	$ 134,121	$ 143,697	$ 134,121	$ 134,121	$ 214,947	$ 491,576	$ 25,179	$ 44,730	$ 25,179
Total Annual Cost	$ 3,112,302	$ 604,722	$ 647,898	$ 604,722	$ 604,722	$ 969,148	$ 2,216,406	$ 113,525	$ 201,676	$ 113,525
Total with inflation	$ 3,199,758	$ 638,707	$ 702,516	$ 672,693	$ 689,686	$ 1,132,546	$ 2,652,373	$ 139,046	$ 252,680	$ 145,426

	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Inflation Rate	30.91%	33.72%	36.53%	39.34%	42.15%	44.96%	47.77%	50.58%	53.39%	56.20%
Capital - Pipeline Engineering & Installation (ECOSA -> VLF)										
Capital - Surface Seepage Collection EPF Installation										
Capital - Pumpback System Installation										
O&M Water Management (Trucking)										
O&M Costs - Pumpback Pump & Transducer Replacement		$ 33,600			$ 33,600			$ 33,600		
O&M - Pumpback Maintenance	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600
O&M Costs - Pump/Piping to VLF electric/maintainence/labor	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771
O&M ECOSA/VLF Pump Replacement	$ 35,000		$ 35,000		$ 35,000		$ 35,000		$ 35,000	
O&M Collection Area Geomembrane Maintenance	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976
Escalation with 2.81% inflation	$ 38,126.39	$ 41,120.34	$ 45,058.46	$ 34,755.49	$ 66,152.93	$ 39,720.57	$ 58,922.60	$ 61,680.52	$ 65,854.67	$ 49,650.71
Indirects/Contingency (28.5%)	$ 35,154	$ 34,755	$ 35,154	$ 25,179	$ 44,730	$ 25,179	$ 35,154	$ 34,755	$ 35,154	$ 25,179
Total Annual Cost	$ 158,500	$ 156,701	$ 158,500	$ 113,525	$ 201,676	$ 113,525	$ 158,500	$ 156,701	$ 158,500	$ 113,525
Total with inflation	$ 207,493	$ 209,541	$ 216,400	$ 158,186	$ 286,683	$ 164,566	$ 234,216	$ 235,961	$ 243,123	$ 177,326

	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Inflation Rate	59.01%	61.82%	64.63%	67.44%	70.25%	73.06%	75.87%	78.68%	81.49%	84.30%
Capital - Pipeline Engineering & Installation (ECOSA -> VLF)		$ 1,214,458								
Capital - Surface Seepage Collection EPF Installation										
Capital - Pumpback System Installation										
O&M Water Management (Trucking)										
O&M Costs - Pumpback Pump & Transducer Replacement	$ 33,600			$ 33,600			$ 33,600			$ 33,600
O&M - Pumpback Maintenance	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600
O&M Costs - Pump/Piping to VLF electric/maintainence/labor	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771
O&M ECOSA/VLF Pump Replacement	$ 35,000		$ 35,000		$ 35,000		$ 35,000		$ 35,000	
O&M Collection Area Geomembrane Maintenance	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976
Escalation with 2.81% inflation	$ 92,614.10	$ 805,393.62	$ 79,718.81	$ 82,240.69	$ 86,650.88	$ 64,545.92	$ 119,075.27	$ 69,510.99	$ 100,515.02	$ 102,800.86
Indirects/Contingency (28.5%)	$ 44,730	$ 25,179	$ 35,154	$ 34,755	$ 35,154	$ 25,179	$ 44,730	$ 25,179	$ 35,154	$ 34,755
Total Annual Cost	$ 201,676	$ 113,525	$ 158,500	$ 156,701	$ 158,500	$ 113,525	$ 201,676	$ 113,525	$ 158,500	$ 156,701
Total with inflation	$ 320,685	$ 2,709,034	$ 260,939	$ 262,380	$ 269,847	$ 196,467	$ 354,688	$ 202,847	$ 287,662	$ 288,800

	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064
Inflation Rate	87.11%	89.92%	92.73%	95.54%	98.35%	101.16%	103.97%	106.78%	109.59%	112.40%
Capital - Pipeline Engineering & Installation (ECOSA -> VLF)							$ 1,214,458			
Capital - Surface Seepage Collection EPF Installation										
Capital - Pumpback System Installation										
O&M Water Management (Trucking)										
O&M Costs - Pumpback Pump & Transducer Replacement			$ 33,600			$ 33,600			$ 33,600	
O&M - Pumpback Maintenance	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600
O&M Costs - Pump/Piping to VLF electric/maintainence/labor	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771
O&M ECOSA/VLF Pump Replacement	$ 35,000		$ 35,000		$ 35,000		$ 35,000		$ 35,000	
O&M Collection Area Geomembrane Maintenance	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976
Escalation with 2.81% inflation	$ 107,447.10	$ 79,441.13	$ 145,536.45	$ 84,406.20	$ 121,311.24	$ 123,361.03	$ 1,390,915.13	$ 94,336.34	$ 171,997.62	$ 99,301.41
Indirects/Contingency (28.5%)	$ 35,154	$ 25,179	$ 44,730	$ 25,179	$ 35,154	$ 34,755	$ 35,154	$ 25,179	$ 44,730	$ 25,179
Total Annual Cost	$ 158,500	$ 113,525	$ 201,676	$ 113,525	$ 158,500	$ 156,701	$ 158,500	$ 113,525	$ 201,676	$ 113,525
Total with inflation	$ 296,570	$ 215,607	$ 388,691	$ 221,987	$ 314,385	$ 315,220	$ 3,506,404	$ 234,747	$ 422,693	$ 241,128

	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074
Inflation Rate	115.21%	118.02%	120.83%	123.64%	126.45%	129.26%	132.07%	134.88%	137.69%	140.50%
Capital - Pipeline Engineering & Installation (ECOSA -> VLF)										
Capital - Surface Seepage Collection EPF Installation										
Capital - Pumpback System Installation										
O&M Water Management (Trucking)										
O&M Costs - Pumpback Pump & Transducer Replacement		$ 33,600			$ 33,600			$ 33,600		
O&M - Pumpback Maintenance	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600	$ 25,600
O&M Costs - Pump/Piping to VLF electric/maintainence/labor	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771	$ 39,771
O&M ECOSA/VLF Pump Replacement	$ 35,000		$ 35,000		$ 35,000		$ 35,000		$ 35,000	
O&M Collection Area Geomembrane Maintenance	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976	$ 22,976
Escalation with 2.81% inflation	$ 142,107.45	$ 143,921.20	$ 149,039.52	$ 109,231.56	$ 198,458.79	$ 114,196.63	$ 162,903.66	$ 164,481.38	$ 169,835.73	$ 124,126.77
Indirects/Contingency (28.5%)	$ 35,154	$ 34,755	$ 35,154	$ 25,179	$ 44,730	$ 25,179	$ 35,154	$ 34,755	$ 35,154	$ 25,179
Total Annual Cost	$ 158,500	$ 156,701	$ 158,500	$ 113,525	$ 201,676	$ 113,525	$ 158,500	$ 156,701	$ 158,500	$ 113,525
Total with inflation	$ 341,108	$ 341,640	$ 350,016	$ 253,888	$ 456,696	$ 260,268	$ 367,831	$ 368,060	$ 376,739	$ 273,028

Total Cost - 10 years	$ 9,188,647	**$ 10,225,430.22**
Total Cost - 50 years	$ 15,190,443	**$ 27,058,980**

Assumptions

- Assumes operations cease 2025
- Water management via trucking assumed until 2031 installation of pipeline
- Water will be conveyed via pipeline from ECOSA to VLF assumed installation in 2031
- Assumes 8 operational pumpback wells
- Replacement pumpback pumps & transducers for all 8 wells every 3 years
- Quarterly maintenance on pumpback well infrastructure
- Assumes large pump replacement for conveyance from ECOSA to VLF every 2 years
- Assumes 28.5% contingency, based on DRMS standard indirect/contingency percentage

Apply Avg inflation 2014-2023: 2.81% per year
https://data.bls.gov/timeseries/CUUR0000SA0L1E?output_view=pct_12mths
2.81%