

BULKHEAD INSPECTION REPORT

Bonita Peak Mining District Silverton, Colorado

Schnabel Reference #22690010.000
December 15, 2022

**North Wind Site Services
Bonita Peak Mining District – Bulkhead Inspections 2022**

December 15, 2022

TO: Athena Jones – US EPA

CC: James Hou – US EPA
Craig Myers – US EPA
Eric Sandusky – US EPA
Steven Vaughn – North Wind
Kirstin Brown – DRMS
Julie Babcock – USACE
Danielle Bieber - USACE
Rory Cowie – Alpine Water Resources
Warren Rider – Rider Resources International
Melissa Smeins – US Bureau of Land Management
Mark Rudolph – CDPHE

**Subject: Bulkhead Inspection Report
Bonita Peak Mining District
Silverton, Colorado
(Schnabel Reference 22690010.000)**

Dear Mr. Vaughn:

SCHNABEL ENGINEERING, LLC is pleased to submit our bulkhead inspection report for the Bonita Peak Mining District. This study was performed in accordance with our proposal dated April 12, 2022, as authorized by our contract with North Wind Site Services dated July 22, 2022.

1.0 PROJECT DESCRIPTION

This report summarizes our observations and findings during our site visit to the Bonita Peak Mining District on August 30-31, 2022. Our team entered the Mogul Mine, Red & Bonita Mine, American Tunnel, Gold King Level 7, Terry Tunnel and Koehler Tunnel to collect photographs and observations of existing ground conditions and bulkheads. Observations and notes from all visited sites are included herein, with additional details for each site included in the appendices as discussed below. **Figure 1** shows the site vicinity, and **Figure 2** shows the approximate mapped extent of the major mine workings around Bonita Peak.

2.0 BACKGROUND INFORMATION

Concrete bulkheads have previously been constructed in various mine workings and adits within the Bonita Peak Mining District (BPMD), notably including Mogul Mine, Red & Bonita Mine, Terry Tunnel, Gold Prince, Ransom, and American Tunnel. The conceptual plan to seal the Sunnyside Mine (the central mine within Bonita Peak area) with concrete bulkheads dates back to at least 1987. The rationale behind this bulkheading process, and specifics of the bulkheading efforts in BPMD, are detailed in the “Red and

Bonita Bulkhead Test Final Report” issued by Deere & Ault (a Schnabel Engineering Company), dated March 10, 2021. A profile of the key mine workings, drainage tunnels, bulkheads and estimated groundwater elevations in the region is shown on **Figure 3**.

Regular inspection of each bulkhead is of critical importance for the long-term monitoring and stewardship of BPMD. Some seepage of impounded water through the rock around a bulkhead is not uncommon, and such seepage must be monitored to confirm each bulkhead is continuing to function as designed. Conditions in the adit between the portal and each bulkhead are also monitored to ensure safe access to the bulkhead is maintained.

Bulkhead inspections for BPMD were performed by a team including personnel from Schnabel Engineering (Schnabel), the Colorado Division of Mining, Reclamation and Safety (DRMS), Alpine Water Resources (Alpine), Rider Resources International (Rider), and Tetra Tech.

3.0 MINE ENTRY PROTOCOL

All mine entry activities were coordinated with onsite personnel from the team outlined above. A mine entry protocol was prepared in advance and is included in **Appendix A**. Personnel from Schnabel Engineering, DRMS and Rider Resources International served as portal attendant during each entry, and a mine entry safety briefing and checklist review was performed at each site. These mine entry checklists are included in the respective appendix of documentation for each site.

Personnel from Schnabel Engineering (Christoph Goss) entered each adit ahead of the rest of the team and performed air monitoring to confirm suitable entry conditions for the remaining mine entry personnel. Schnabel personnel also confirmed the safety of ground conditions for entry using both visual assessment and probing with a scaling bar. When conditions were deemed safe for further entry, the remaining team followed behind Dr. Goss. At the start and end of each mine entry, personnel from EPA and Schnabel were informed of team status via satellite text message.

The mine entry team for Mogul Mine, Red and Bonita, American Tunnel, and Gold King Level 7 consisted of Christoph Goss and Morley Beckman (Schnabel), Kirstin Brown and Ryan Olsen (DRMS), Rory Cowie (Alpine), and Warren Rider (Rider). The mine entry team for Terry Tunnel and Koehler Tunnel included the aforementioned group, as well as Nora Dwyer (Tetra Tech).

4.0 MOGUL MINE

Conditions in the Mogul Mine appeared consistent with the last mine entry by Schnabel personnel, which was conducted on September 28, 2021. The mine contains between 12 and 36 inches of accumulated iron precipitate, notably inby of about Station 2+10. The back and ribs of the adit vary from light to heavy dripping from Station 2+10 to the bulkhead at Station 3+58. Flows on the floor of Mogul Mine appeared around the same as during the last mine entry. Sludge along the sides of the drift appeared similar to the previous visit. Documentation from the Mogul Mine inspection is included in **Appendix B**.

Air monitoring throughout the mine entry indicated 20.8% oxygen, and 0% carbon monoxide, hydrogen sulfide, and LEL. A slight dip in oxygen to 20.4% was observed within ten feet of the bulkhead.

North Wind Site Services
Bonita Peak Mining District – Bulkhead Inspections 2022

The bulkhead pressure gauge installed in 2017 was not functioning, a significant change since last year’s inspection. **The pressure gauge requires replacement to continue monitoring mine pool levels behind the bulkhead.** The valve installed in 2017 appears to be functioning, and it opened and closed smoothly during this inspection. We recommend replacing the pressure gauge and oil filled diaphragm, and adding a sampling valve, in the summer of 2023 to continue collecting data on the mine pool behind the bulkhead. Previous gauge and transducer data are included below for context. Due to the failure of the pressure gauge, the decrease in gauge pressure observed between 2017 and 2021 may not indicate a reduced mine pool head, but may instead indicate the slow failure of the pressure gauge. However, the generally decreasing head readings correlate well with the decreasing outflow measurements.

Date	Pressure (psi)	Head (ft)	Elevation (NAVD 88)	Outflow (gpm)
9/13/2017	82	191	11619	34
10/25/2017	82	191	11619	34
8/10/2018	75	174	11602	32
7/24/2019	60	140	11568	30
6/30/2020	42	98	11526	28
7/23/2020	41	95	11523	22
8/4/2020	40	93	11521	20
9/2/2020	39.5	92	11520	21
9/15/2020	39	91	11519	22
9/28/2021	35	81	11509	No Data
8/30/2022	Pressure gauge not functioning; flume transducer compromised – no readings available.			

There is a vertical shaft to surface near Cement Creek upstream of Mogul (212 Raise per design documents) which has been cited as a possible method for measuring mine pool level in Mogul. However, this raise is collapsed 35 feet down and the water level measured through the grate may be perched surface water and not necessarily the mine pool. Soundings in 2017 showed the water level in the shaft 20 feet higher than at the bulkhead. It is also not clear if the crosscut connecting the 212 Raise to the main drift of the Mogul Mine is open. Schnabel recommends re-establishing the bulkhead pressure gauge, and not attempting to monitor the mine pool via the 212 Raise.

The existing rigid yellow vent line from about Station 0+20 to 1+50 is intact. The soft yellow vent bag line from Station 1+50 to 2+90 is stained and sagging from Station 2+04 to 2+65, and it has fallen into the mine sludge from Station 2+65 to 2+90. The soft bag line does not appear salvageable and should be fully removed.

The Mogul bulkhead looks similar to previous years and shows no signs of distress. Heavy dripping and weeping continue but no concentrated flows of concern were noted.

5.0 RED AND BONITA MINE

Conditions in Red & Bonita appeared consistent with the prior entry by Schnabel personnel, which was conducted on September 28, 2021. Some additional ponding on the sill was noted from about Station 2+20 to the bulkhead and appeared to be due to dripping from the sampling valve at the bulkhead, which

North Wind Site Services
Bonita Peak Mining District – Bulkhead Inspections 2022

had been left slightly open at some time prior to our visit. There was evidence of prior seepage on the ribs and back of the adit near the bulkhead, and prior additional ponding on the adit floor, from the 2020 bulkhead test. There was no active seepage or weeping on the ribs or back observed within Red & Bonita during this entry. Documentation from the Red & Bonita inspection is included in **Appendix B**. For a detailed plan and profile, please see the “Red and Bonita Bulkhead Test Final Report” issued by Deere & Ault (a Schnabel Engineering Company), dated March 10, 2021.

Air monitoring throughout the mine entry indicated 20.8% oxygen and 0% carbon monoxide, hydrogen sulfide, and LEL. On August 30, 2022, the bulkhead pressure gauge read 0 psi while the pressure gauge near the portal read 3.5 psi.

The piping system at Red & Bonita is more complex than at other sites. There are two pipe penetrations through the bulkhead. The first is a ¾-inch stainless steel pipe. At the upstream end it splits into a 700-foot-long injection line and an inflow with a check valve. The check valve requires approximately 7 psi of back pressure (mine pool) to open. On the downstream (air) side of the bulkhead are two stainless steel gate valves with a tee and pressure gauge between them. The other bulkhead penetration is the 8-inch discharge pipe with a perforated vertical intake on the upstream side. On the downstream (air) side of the bulkhead is a stainless steel 8-inch gate valve that was installed in 2016. Past this primary bulkhead gate valve, the pipe transitions to 6-inch diameter HDPE. An external ultrasonic flow meter is attached to the pipe near station 1+05. At the portal from upstream to downstream is a pressure gauge and a 6-inch globe valve that was used to regulate flows during the 2020 bulkhead test. Downstream of the globe valve is a side discharge with butterfly valve. On the main pipe downstream of the side discharge is another butterfly valve followed by an air vacuum valve to keep the pipe from collapsing when the butterfly valve is closed. From there the pipe continues down the steep hill to a tee with two valves along the side of the road. The valves are used to direct discharge into the existing flume and Cement Creek or to the EPA Interim Water Treatment Plant in Gladstone.

At some time prior to our inspection, the discharge pipeline was vandalized and became clogged at a location downstream of the portal and above the discharge point along the road. The result was a backpressure on the discharge pipe resulting in 3.5psi pressure at the portal pressure gauge, clogging of the air vacuum valve, and ~10 gpm discharge exiting from the cleanout port at the edge of the waste rock pile. The pipe was jetted in October 2022 and three additional cleanout ports were installed along the pipe, allowing access for the full pipeline length from the globe valve to the bypass discharge at the road. A fourth cleanout is planned to be installed upstream of the globe valve in 2023, to allow jetting access from the portal to the bulkhead. Annual jetting of the pipe is recommended to remove scaling. Locks for the blind flanges at the cleanouts should also be considered to deter vandalism.

Mold was observed on the ribs and back at locations throughout the adit. Isolated mold was also observed on the floor around the discharge pipe. Cleaning and sterilizing of the adit walls, potentially by spraying with a diluted bleach solution, is recommended to minimize risk to future entry and maintenance teams in case the mold is toxic.

The 8-inch primary bulkhead valve should be greased and exercised annually. The handles of the two valves on the ¾-inch sampling pipe have corroded. The handles and nuts should be replaced with corrosion resistant material, and the valves should be exercised annually. Note that the actual valve bodies are stainless steel.

A future bulkhead test that spans winter months has been under consideration since the completion of the bulkhead test in the summer of 2020. Future maintenance and access during the winter months would require extending the portal structure past the avalanche debris zone.

6.0 AMERICAN TUNNEL

American Tunnel was observed to be relatively unchanged from the last entry by Schnabel personnel, which was conducted on September 28, 2021. Support installed in 2017 was performing well. Bulkhead conditions appear to be the same as in previous years, which makes sense given the relatively constant water level behind Bulkhead 3 (observed via monitoring well ATPZ-2). Documentation from the American Tunnel inspection is included in **Appendix C**. For a detailed plan and profile of the American Tunnel, please see the Record Drawings prepared by Deere & Ault Consultants, dated 10/30/2019.

The only area of concern for adit stability is the wood lagging in places between Station 1+52 and 1+76. In places it is bowed out, with several wood lagging pieces missing. As recommended in prior entry reports from 2020 and 2021, EPA should consider having a mining contractor replace missing lagging in the near future.

The drainage ditch along the right side of the American Tunnel has been periodically cleaned in the past and continues to fill with sludge and precipitate. The ditch should be cleaned every 6 months to maintain channelized flow via the ditch and to reduce sheet flows around/past the flume at the portal.

The existing soft yellow vent bag line is stained and sagging from about Station 1+50 to Station 2+56, and it has fallen into the mine sludge from Station 2+56 to ~3+20. The soft bag line does not appear salvageable beyond Station 2+56, but the initial portion of the bag line may be salvaged if proper care is taken.

Air monitoring throughout the mine entry indicated 20.8% oxygen and 0% carbon monoxide, hydrogen sulfide, and LEL. The air quality was improved over the entry in 2021, at which time there were low oxygen readings (19.8%) close to the bulkhead. Air quality varies from year to year and low oxygen conditions should always be considered when entering the American Tunnel.

Note that prior to the 2022 entry, tunnel discharge flows were routed to the interim water treatment plant (IWTP) at Gladstone by Alpine personnel. Water flows were returned to Cement Creek once the sludge had settled and colors returned to normal. For details on the pipes and mine entry, see Bonita Peak Standard Operating Procedures #2: American Tunnel Portal and Conveyance System, prepared by Schnabel Engineering and Environmental Restoration, dated 2/23/2022.

7.0 GOLD KING LEVEL 7

Conditions in Gold King Level 7 adit appeared consistent with prior entry by Schnabel personnel, which was conducted on June 23, 2021. No sludge removal or pumping of water behind the flow control structure was performed prior to our entry, so conditions were observed above the water line (depths of about 3 to 4 feet throughout.) Documentation from the Gold King Level 7 inspection is included in **Appendix D**.

Air monitoring throughout the mine entry indicated 20.8% oxygen, and 0% carbon monoxide, hydrogen sulfide, and LEL.

The team observed the level of accumulation behind the upstream baffle of the flow control structure and observed pressure transducers and sonic water level measurement device installed directly behind the FCS bulkhead. The shotcrete support, muck dams, and flow control structure within the adit all appeared to be in good condition. One entrant noted an area of shotcrete fall out on the upper right rib just past the second coffer dam. This was a thin area past the support extents and not part of the structural support which ends at the coffer dam.

Some of the shotcrete around the sides of the portal canopy, outside of the adit, was observed to be spalling off, leaving piles of loosened rock. To the left of the portal a void is visible behind the shotcrete shell. If not filled, the rock is likely to continue raveling, increasing the void volume. This is shown on Photos 3 and 4 in **Appendix D**. Repairs to this shotcrete are recommended to avoid further compromising portal support integrity. It is worth considering extending the portal shed for long term and winter safety and continued access.

8.0 TERRY TUNNEL

This was the first official inspection of Terry Tunnel since the adit was opened and rehabilitated in the summer of 2021. Conditions were compared to construction photographs from 2021 and appear generally consistent. Documentation from the Terry Tunnel inspection is included in **Appendix E**.

The adit was generally dry with a few inches of ponded and flowing water along the invert and in the drainage ditch. The ditch is muddy and frequently obstructed with sediment and should be cleaned every 1-2 years to maintain flow and prevent ponding across the invert. Channelizing the flow into the ditch is critical, as direct contact with mine water could rapidly degrade the steel supports at the portal.

Air monitoring throughout the mine entry generally indicated 20.7% to 20.8% oxygen, and 0% carbon monoxide, hydrogen sulfide, and LEL. Some low oxygen readings (20.3%) were noted near the bulkhead. The monitoring well which intercepted the tunnel, TTPZ-1, is observable in the tunnel back near Station 2+33. If poor air quality is a problem during future inspections, the cover to this monitoring well (on the road above) could be removed 1-2 days in advance to facilitate air circulation before entry.

Terry Tunnel Bulkhead #2 (the outer bulkhead observed during this inspection) was consistent with observations made during rehabilitation work in 2021. Some additional staining and iron precipitate was observed on the bulkhead face, primarily on the left side. This is more noticeable than in other nearby mines since the face of the bulkhead was cleaned in 2021 so any amount of precipitate was obvious during this entry. The staining and precipitate are typical of minor dripping on bulkheads in the area and does not pose a concern for bulkhead stability. The spurt in the upper left back appeared similar to 2021 but should be monitored for changes. Notable seeps outby the bulkhead were similar to 2021.

The rock bolts, steel sets and gate installed in 2021 were observed to be in good shape with no noticeable deterioration since last year. The strike plate on the gate had to be ground down to fit flush during construction and would benefit from cleaning with a wire brush and painting with a protective coat of paint to prevent corrosion.

9.0 KOEHLER TUNNEL

This was the first official inspection of Koehler Tunnel since 2017 and the first inspection by Schnabel personnel since 2010. Conditions were compared to photographs from 2009 (prior to rehab), 2010 (post rehab), 2011 following tunnel grouting, and 2017 when DRMS last performed an inspection. Conditions appear fairly consistent with 2017, with some notable exceptions outlined below. Documentation from the Koehler Tunnel inspection is included in **Appendix F**.

Air monitoring throughout the mine entry generally indicated 20.7% to 20.8% oxygen, and 0% carbon monoxide, hydrogen sulfide, and LEL. Some low oxygen readings (20.3%) were noted near the bulkhead.

The mine contains between 12 and 36 inches of accumulated iron precipitate, notably between about Station 0+00 and Station 2+50. This appears consistent with 2017, with some increased accumulation along the ribs and the formation of a flow channel through the center of the adit.

The back and ribs of the adit vary from light to heavy dripping from Station 1+60 to the bulkhead at Station 3+05, with most of the inflow coming from several concentrated drips near Stations 1+60 and 2+20. A constant volume of about 10 to 30 gpm drains from the portal, with higher volumes draining when the sludge is disturbed. The tunnel invert does not drain, which allows water to pool in the mine. Reestablishing drainage past the low spot should be considered, as it would reduce these ponding issues.

The bulkhead is penetrated by a 4-inch bypass valve which was installed when the bulkhead was constructed in 2003. A sampling valve and pressure gauge were added downstream of the bypass valve in 2011. The sampling valve and gauge have not been exercised since 2011 or 2012. During this mine entry, both the sampling valve handles and pressure gauge were observed to be quite degraded and corroded. The main bypass valve was coved in precipitate. The valves were not opened as the entry team was uncertain if they could be closed. In the future the sampling valve handles and gauge should be replaced and the bypass valve cleaned with a pressure washer. Once the bypass valve is clean, it can be examined for structural integrity and damage to the stem and seals. If the valve appears serviceable, it can be greased and carefully opened. It should then be exercised annually to ensure pressure behind the bulkhead can be monitored. If the valve is not serviceable or the wheel cannot be turned, a hot tap with valve, sampling port, and pressure gauge similar to Mogul should be considered.

The bottom foot of the bulkhead face is submerged. At the base of the bulkhead, small bubbles can be seen rising to the surface of the pooled water. These bubbles, first noticed in 2011, may indicate acidic mine water is reacting with the concrete bulkhead and generating CO₂. The bubbles appear to be consistent with what was observed by Kirstin Brown (DRMS) in 2017. These bubbles should be monitored and assessed, and additional grouting at the base of the bulkhead may be warranted. Another option would be constructing a bulkhead extension including grout ring. We recommend dedicating time and funding to assessing the nature of the bubbling and whether it poses a stability risk to the bulkhead. This would likely involve cleaning the sill and establishing drainage. Flumes with instrumentation near the bulkhead and near the portal would monitor changes in flow over time. Given the tendency to sludge up, the flumes would have to be cleaned regularly.

Temporary ground support installed throughout the adit consists of split set bolts and chain link fence mesh. This support is not permanent, and degradation is evident, particularly in areas where seeping

North Wind Site Services
Bonita Peak Mining District – Bulkhead Inspections 2022

mine water has corroded the metal of the chain link mesh. Long term stability of Koehler Tunnel will require additional engineered support such as shotcrete or longer permanent rock bolts with mesh.

10.0 SUMMARY OF RECOMMENDED ACTIONS FOR ALL SITES

The table below lists recommended actions at all six sites. Urgent actions requiring immediate planning for 2023 action are bolded.

BONITA PEAK MINING DISTRICT – BULKHEAD INSPECTION REPORT 2022 – RECOMMENDED ACTIONS

Site Name	Recommended Action	Timeline
Mogul Mine	Remove vent line Station 0+20 to 2+90.	In the next 1-2 years.
	Replace pressure gauge and install sampling valve on bypass pipe at bulkhead	Summer 2023
	Monthly flume cleaning to maintain transducer discharge record	Ongoing
	Additional fill / sandbags around flume to prevent bypass flows around flume	Summer 2023
Red & Bonita Mine	Grease and exercise 8-inch valve at bulkhead	Annually
	Jet discharge pipe from bulkhead to discharge point along road	Annually
	Install cleanout on discharge pipe between portal and bulkhead	Planned for summer 2023
	Replace wheels & nut on 3/4-inch sampling valves at bulkhead with corrosion resistant materials	Summer 2023
	Spray down ribs and back with diluted bleach mixture to remove potentially toxic mold, paint all exposed wood surfaces with mold-resistant paint	In the next 1-2 years.
	Add locks to blind flanges on cleanouts to deter vandalism	Summer 2023
American Tunnel	Clean ditch to maintain flows into flume and pipeline.	Annually
	Clean pipeline to prevent sludge buildup and backflow	2x annually
	Drain rainwater from overflow holding ponds to maintain functionality	Annually
	Address frost heaving of flume and discharge drop basin	Summer 2023
	Replace missing wood lagging near Station 1+52 to 1+76	In the next 1-2 years
Gold King Level 7	Repair shotcrete around portal structure	In the next 1-2 years
	Consider extending portal shed for long term / winter access and safety	In the next 2-3 years
	Procure spare brass nuts for FCS door panels (15/16-inch, deep socket required)	Summer 2023
	Grease and exercise horizontal drain Gold King valve (into old Gold King workings)	Annually
	Clean FCS weir box and instruments	2x annually
	Jet discharge pipeline	2x annually
	Exercise main line and bypass line valves	2x annually
	Clean portal discharge trough and inspect manholes	Monthly
Terry Tunnel	Clean ditch to maintain flows	Every 1-2 years
	Clean and paint gate strike plate to reduce corrosion	Summer 2023
	Monitor rockfall from cut slope above portal as slopes have changed since portal drilling and rehabilitation.	Annually
Koehler Tunnel	Replace sampling valve and pressure gauge downstream of bypass valve	In the next 1-2 years
	Exercise bypass valve – will require careful planning for first year, as this has not been done in over a decade	Annually
	Re-establish drainage in the mine to reduce ponding and measure flows via flumes	In the next 1-3 years
	Replace failing ground support	In the next 1-3 years
	Remove sludge and debris	Every 1-2 years

11.0 LIMITATIONS

We based the analyses and recommendations submitted in this report on the information revealed by our research and visual observations.

This report has been prepared to aid in the evaluation of this site. It is intended for use concerning this specific project. We based our recommendations on information on the site as described in this report.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report or other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Sincerely,

SCHNABEL ENGINEERING, LLC



E. Morley Beckman, PE
Senior Associate Engineer



Christoph Goss, PE, PhD
Senior Associate Engineer

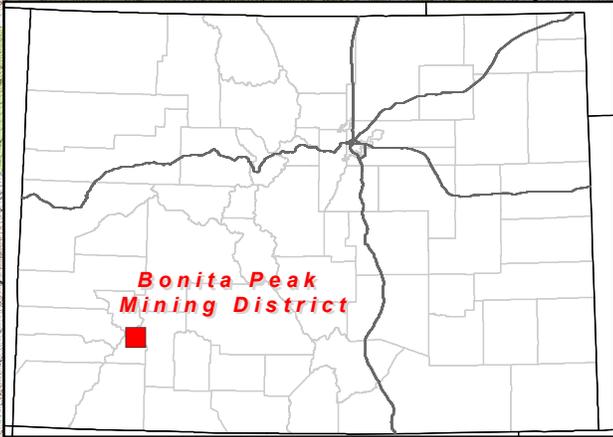
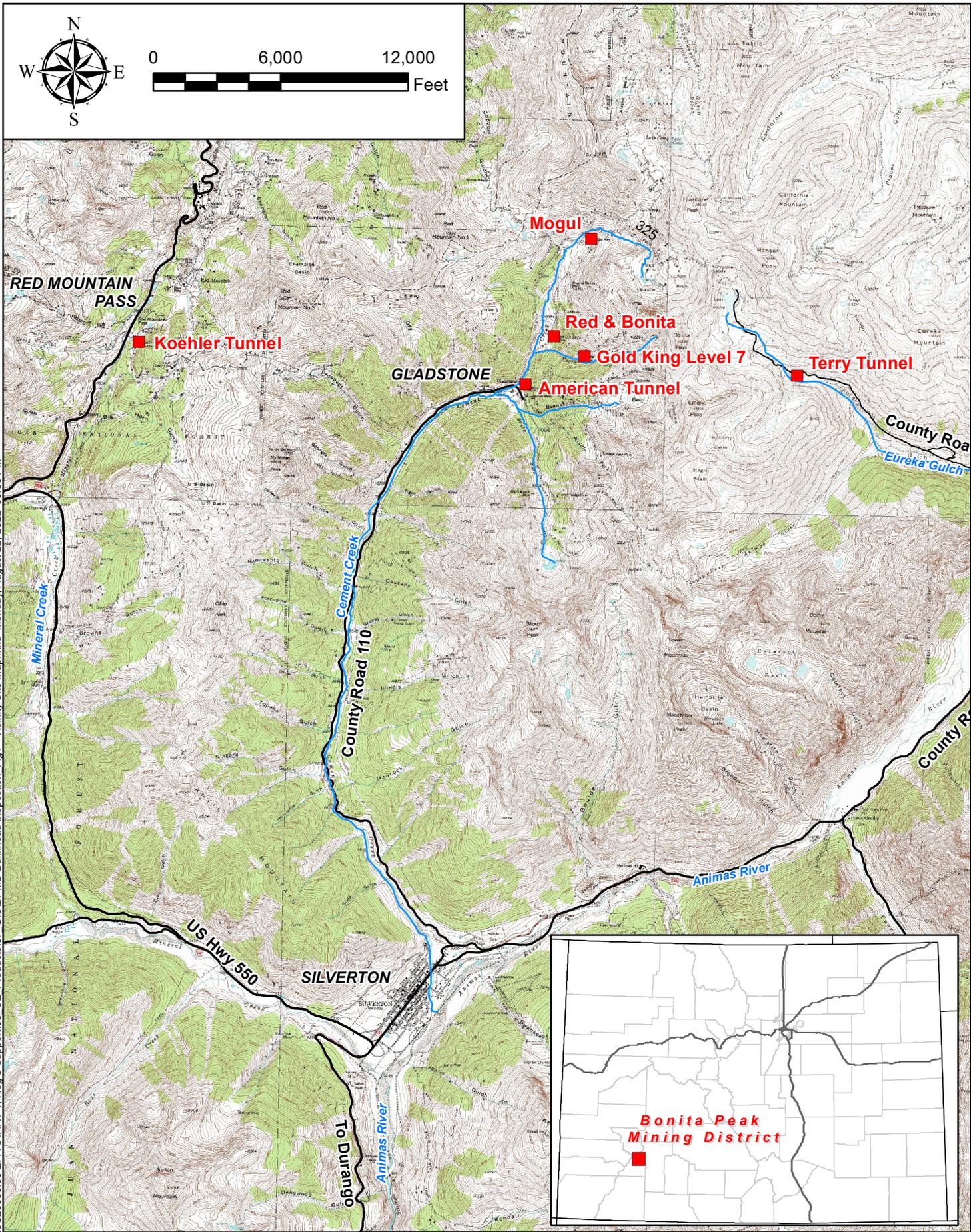
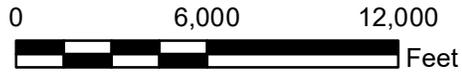
EMB:CDG:EM

Figures

- Appendix A: Mine Entry Protocol
- Appendix B: Mogul Mine Documentation
- Appendix C: Red and Bonita Mine Documentation
- Appendix D: American Tunnel Documentation
- Appendix E: Gold King Level 7 Documentation
- Appendix F: Terry Tunnel Documentation
- Appendix G: Koehler Tunnel Documentation

FIGURES

- Figure 1: Vicinity Map
- Figure 2: Site Overview
- Figure 3: Bonita Peak Mining District Profile A



G:\2020\Longmont\20C26033.00 EPA START V. Reg 8 Support\03 SE Products\07 GIS\BPMID Bulkhead Inspection Fig1 - Vicinity Site Map.mxd Monday August 22, 2022 03:50 PM



Schnabel
ENGINEERING

BPMID BULKHEAD INSPECTION SITES
Vicinity Map

FIGURE NO.

1

JOB NO: 22690010.000

SCALE: 1 inch=6,000 feet

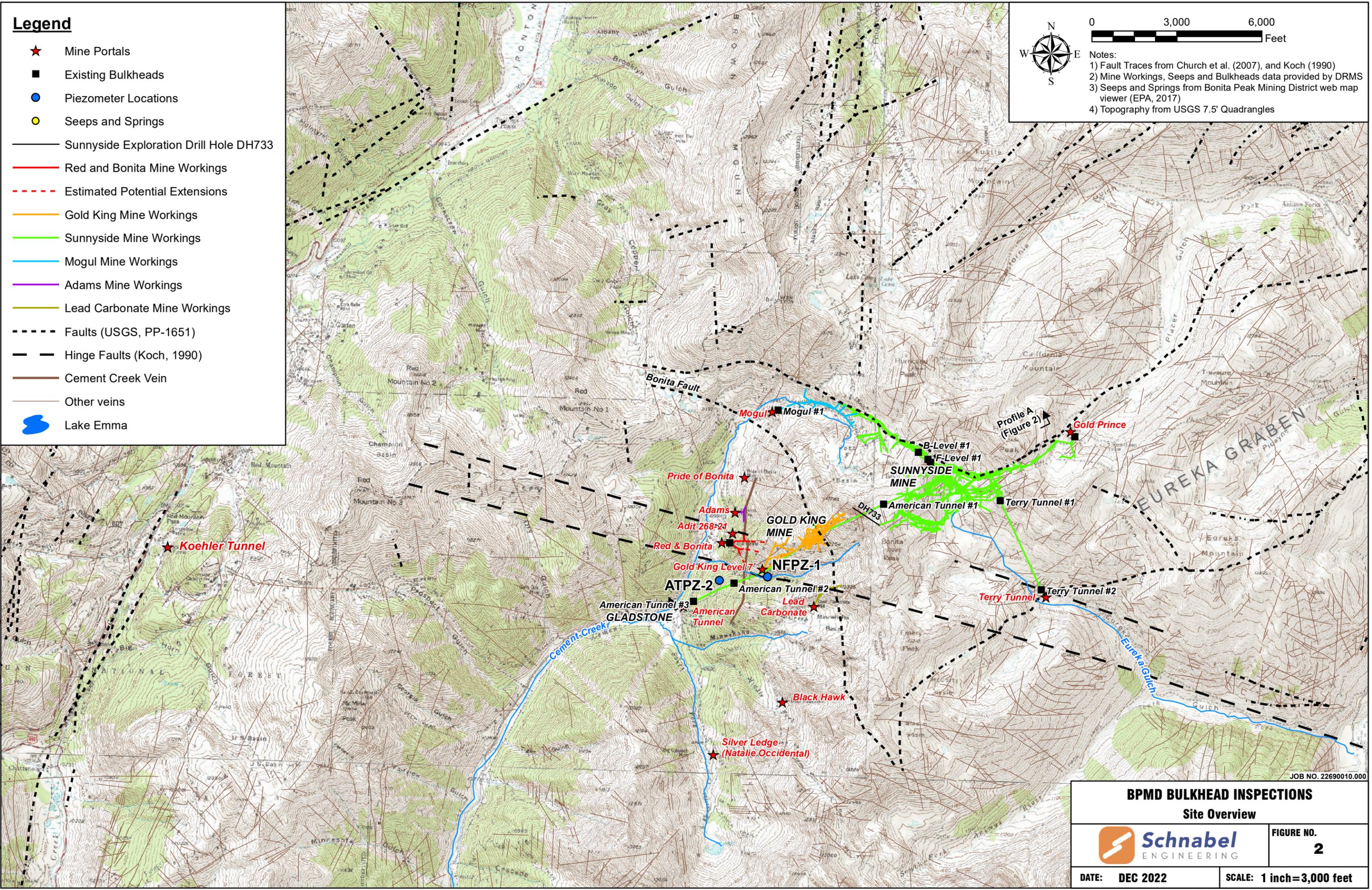
Legend

- ★ Mine Portals
- Existing Bulkheads
- Piezometer Locations
- Seeps and Springs
- Sunnyside Exploration Drill Hole DH733
- Red and Bonita Mine Workings
- - - Estimated Potential Extensions
- Gold King Mine Workings
- Sunnyside Mine Workings
- Mogul Mine Workings
- Adams Mine Workings
- Lead Carbonate Mine Workings
- - - Faults (USGS, PP-1651)
- - - Hinge Faults (Koch, 1990)
- Cement Creek Vein
- Other veins
- Lake Emma

Notes:

- 1) Fault Traces from Church et al. (2007), and Koch (1990)
- 2) Mine Workings, Seeps and Bulkheads data provided by DRMS
- 3) Seeps and Springs from Bonita Peak Mining District web map viewer (EPA, 2017)
- 4) Topography from USGS 7.5' Quadrangles

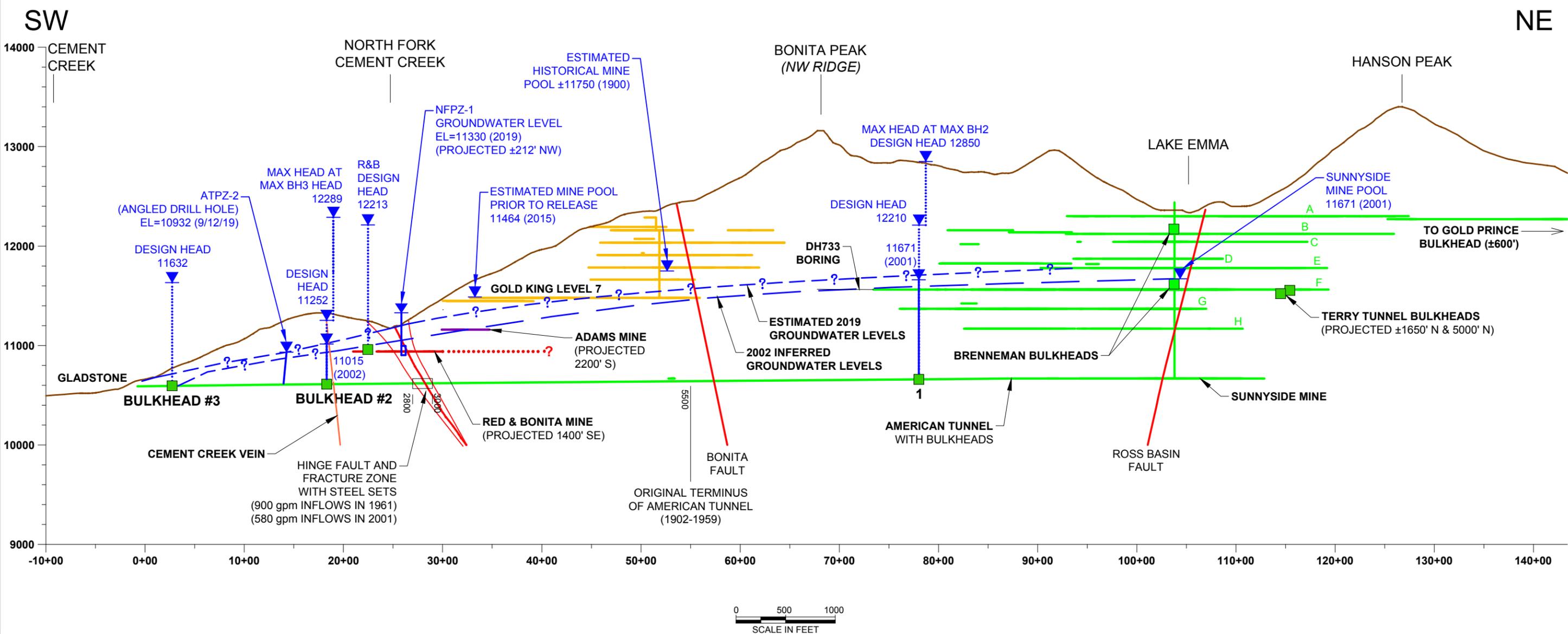
G:\2020\Longmont\20226033.00 EPA START V. Reg 8 Support\03 SE Product\107 GIS\BPMID Site Map + Koehler.mxd Tuesday, December 6, 2022 09:13 AM



BPMID BULKHEAD INSPECTIONS	
Site Overview	
	FIGURE NO. 2
DATE: DEC 2022	SCALE: 1 inch=3,000 feet

JOB NO. 22690010.000

Wednesday, December 7, 2022 9:19:47 AM DRAWING: G:\2022\TBU-69\22690010.000 Northwind_USACE\03_SE_Products\08-CAD\04-CONTRACT_DWGS\CROSS_SECTION.DWG



NOTES:

1. MINES FROM 3D CAD MODEL USING CDRMS GIS DATA.
2. PROFILE A IS ALONG THE AMERICAN TUNNEL APPROXIMATELY PARALLEL TO THE GOLD KING AND DAVIS VEINS.
3. 1900 ESTIMATED SUNNYSIDE MINE POOL FROM MARKS, 1917.
4. EXISTING GROUND SURFACE FROM USGS DIGITAL ELEVATION MODEL.

JOB NO. 22690010.00

BONITA PEAK MINING DISTRICT BULKHEAD INSPECTIONS	
Bonita Peak Mining District Profile A	
	FIGURE NO. 3
DATE: DECEMBER 2022	SCALE: AS NOTED

APPENDIX A

MINE ENTRY PROTOCOL

APPENDIX B

MOGUL MINE DOCUMENTATION

Bulkhead Inspection Form
Mine Plans with 2022 Observations
Selected Site Photographs
Mine Entry Pre-Entry Briefing Checklist and Permit

APPENDIX C

RED AND BONITA MINE DOCUMENTATION

Bulkhead Inspection Form
Mine Plans with 2022 Observations
Selected Site Photographs
Mine Entry Pre-Entry Briefing Checklist and Permit

APPENDIX D

AMERICAN TUNNEL DOCUMENTATION

Bulkhead Inspection Form
Mine Plans with 2022 Observations
Selected Site Photographs
Mine Entry Pre-Entry Briefing Checklist and Permit

APPENDIX E

GOLD KING LEVEL 7 DOCUMENTATION

Bulkhead Inspection Form
Mine Plans with 2022 Observations
Selected Site Photographs
Mine Entry Pre-Entry Briefing Checklist and Permit

APPENDIX F

TERRY TUNNEL DOCUMENTATION

Bulkhead Inspection Form
Mine Plans with 2022 Observations
Selected Site Photographs
Mine Entry Pre-Entry Briefing Checklist and Permit

APPENDIX G

KOEHLER TUNNEL DOCUMENTATION

Bulkhead Inspection Form
Mine Plans with 2022 Observations
Selected Site Photographs
Mine Entry Pre-Entry Briefing Checklist and Permit