COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

MEMORANDUM

Date: May 11, 2020

To: Peter Hays, DRMS

From: Amy Eschberger, DRMS

RE: Cross Gold Mine, Permit No. M-1977-410, Technical Revision No. 7 (TR-07)
Request for Technical Review

On May 7, 2020, the Division of Reclamation, Mining and Safety (Division) received the Technical Revision No. 7 application (TR-07; see enclosed) as a corrective action response to a problem cited in the Division's inspection report sent on April 7, 2020 (see enclosed). The purpose of TR-07 is to provide a Geotechnical Stability Exhibit in accordance with Rule 6.5(3) which demonstrates through appropriate geotechnical and stability analyses that off-site areas will be protected based on current conditions at the Idaho Tunnel, with appropriate factors of safety incorporated into the analyses. The decision date for TR-07 is set for June 6, 2020.

Relevant background information:
The Cross Gold Mine is a 110(2) underground mining operation permitted for 9.35 acres in Boulder County. The permit area includes two historic underground mines, the Cross Mine and the Caribou Mine. The main entrance to the Caribou Mine is called the Idaho Tunnel. This tunnel has collapsed, and is not safe to enter at this time. The operator has initiated stabilization efforts in recent months to address the collapse and to re-establish mine discharge, which is a critical component of the water management program for the site. During its March 26, 2020 inspection of the site, the Division observed potential stability issues related to the collapsed Idaho Tunnel, near the northern permit boundary and adjacent to Caribou Road. The Division has not approved any details of the tunnel stabilization project, including demonstration through appropriate geotechnical and stability analyses that off-site areas will be protected during the project. The Division is concerned that further collapse of this tunnel and/or future rehabilitation work in this tunnel may damage land outside of the approved permit boundary, and potentially impair the stability of Caribou Road, which is frequently used by the public to access recreational areas above the mine site.

I am requesting your technical expertise in reviewing TR-07 to determine whether the information presented demonstrates through appropriate geotechnical and stability analyses that off-site areas will be protected based on current conditions at the Idaho Tunnel, with appropriate factors of safety incorporated into the analyses, in accordance with Rule 6.5(3) and Section 30 of the Policies of the Mined Land Reclamation Board. Please submit your review comments by **May 29, 2020** in the form of a Memorandum on Division letterhead.

Encls: Division's inspection report, sent on April 7, 2020
Technical Revision No. 7 (TR-07), received on May 7, 2020

Cc: Michael Cunningham, DRMS
Jared Ebert, DRMS

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

MINERALS PROGRAM INSPECTION REPORT
PHONE: (303) 866-3567

The Division of Reclamation, Mining and Safety has conducted an inspection of the mining operation noted below. This report documents observations concerning compliance with the terms of the permit and applicable rules and regulations of the Mined Land Reclamation Board.

MINE NAME: Cross Gold Mine	**MINE/PROSPECTING ID#:** M-1977-410	**MINERAL:** Gold, copper and silver	**COUNTY:** Boulder
INSPECTION TYPE: Monitoring	**INSPECTOR(S):** Amy Eschberger, Michael Cunningham	**INSP. DATE:** March 26, 2020	**INSP. TIME:** 10:30
OPERATOR: Calais Resources Colorado, Inc.	**OPERATOR REPRESENTATIVE:** Riley McAllister	**TYPE OF OPERATION:** 110(2) - Hard Rock Limited Impact	

REASON FOR INSPECTION: Citizen Complaint	**BOND CALCULATION TYPE:** None	**BOND AMOUNT:** $31,500.00
DATE OF COMPLAINT: NA	**POST INSP. CONTACTS:** None	**JOINT INSP. AGENCY:** None
WEATHER: Clear	**INSPECTOR'S SIGNATURE:** Amy Eschberger	**SIGNATURE DATE:** April 7, 2020

The following inspection topics were identified as having Problems or Possible Violations. OPERATORS SHOULD READ THE FOLLOWING PAGES CAREFULLY IN ORDER TO ASSURE COMPLIANCE WITH THE TERMS OF THE PERMIT AND APPLICABLE RULES AND REGULATIONS. If a Possible Violation is indicated, you will be notified under separate cover as to when the Mined Land Reclamation Board will consider possible enforcement action.

INSPECTION TOPIC: Records (Succession Of Operation)
PROBLEM #1: Failure to contact the Division within 30 days of a change in the official business name, business ownership, or business form to revise the performance and financial warranty documents and complete a Succession of Operators application, per Rule 1.16(3).
CORRECTIVE ACTIONS: *By the corrective action date, the operator shall submit to the Division a Succession of Operators application, with the appropriate fee, to change the business name from Calais Resources Colorado, Inc. to Calais Resources, Inc. (or another valid entity name). The new business name must be registered with the Colorado Secretary of State.*
CORRECTIVE ACTION DUE DATE: April 26, 2020

INSPECTION TOPIC: Hydrologic Balance
PROBLEM #2: Failure to minimize disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quantity or quality of water in surface and groundwater systems both during and after the mining operation and during reclamation pursuant to Rule 3.1.6(1) and C.R.S. 34-32-116(7)(g).
CORRECTIVE ACTIONS: *By the corrective action date, the operator shall submit a Technical Revision application, with the appropriate fee, that includes a detailed plan of action for addressing the impaired surface water quality at the site. This plan shall describe any measures that have been taken or are proposed to be taken*

at the site to address the water quality issues (including work performed underground and any changes made to the water management and/or treatment system).
CORRECTIVE ACTION DUE DATE: April 26, 2020

INSPECTION TOPIC: Gen. Compliance With Mine Plan
PROBLEM #3: The operation does not have an approved Spill Prevention, Control, and Countermeasure (SPCC) plan or approved fuel/oil storage locations for the site. Additionally, the Division observed a floor drain in the Cross Mine warehouse building which has been used for draining fluids to an unknown location. If the operator cannot provide details on the floor drain, including where it drains, and how any fluids captured by this system are managed, use of this drain must cease immediately until these details can be provided, or the drain must be permanently sealed. Given the site is situated at the headwaters of Coon Track Creek (which eventually drains to Barker Meadow Reservoir) and also includes jurisdictional wetlands, the operator must have a plan in place to prevent any oil or fuel spills or contaminated runoff from reaching these water features. This is a problem at this time pursuant to Section 20.3 of the Policies of the Mined Land Reclamation Board (see enclosed policies) pertaining to oil and fuel spill containment structures, and pursuant to Rule 3.1.6(1) and C.R.S. 34-32-116(7)(g), which require disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quantity or quality of water in surface and groundwater systems both during and after the mining operation and during reclamation to be minimized.
CORRECTIVE ACTIONS: *By the corrective action deadline, the operator shall submit a Technical Revision application (see enclosed form), with the appropriate fee, that includes a site-specific SPCC plan or equivalent, including a description of all fuel/oil storage locations, spill prevention measures (e.g., storage and handling procedures, containment and diversionary structures, personnel training), spill response and mitigation procedures, and a disposal plan. This plan should include details on any floor drains or sumps utilized by the operation, including how substances captured by these systems are managed. This revision shall also include a revised mining plan map in accordance with Rules 6.2.1(2) and 6.3.5(2), which shows all fuel/oil storage locations at the site.*
CORRECTIVE ACTION DUE DATE: May 7, 2020

INSPECTION TOPIC: Gen. Compliance With Mine Plan
PROBLEM #4: The Idaho Tunnel (at the Caribou Mine) has collapsed creating potential slope stability issues near the northern permit boundary and the adjacent Caribou Road. The operator has made recent efforts to stabilize the Idaho Tunnel, including excavating a portion of the tunnel and applying shotcrete on the slope around the portal. The Division has not approved any details of the tunnel stabilization project, including demonstration through appropriate geotechnical and stability analyses that off-site areas will be protected. This is a problem at this time pursuant to Rule 3.1.5(3) and C.R.S. 34-32-116(7)(h) which require areas outside of the affected land to be protected from slides or damage occurring during the mining operation and reclamation.
CORRECTIVE ACTIONS: *By the corrective action date, the operator shall submit a Technical Revision application, with the appropriate fee, that includes a Geotechnical Stability Exhibit in accordance with Rule 6.5(3), which demonstrates through appropriate geotechnical and stability analyses that off-site areas will be protected based on current conditions at the Idaho Tunnel, with appropriate factors of safety incorporated into the analyses.*
CORRECTIVE ACTION DUE DATE: May 7, 2020

OBSERVATIONS

This inspection of the Cross Gold Mine (Permit No. M-1977-410) was conducted by Amy Eschberger and Michael Cunningham of the Division of Reclamation, Mining and Safety (Division) in response to a citizen complaint against the operation received by our Office on March 25, 2020 (see enclosed complaint). The complaint alleges that oil from vehicles and equipment is drained onto the ground without any containment, a fuel tank was crushed by a dozer releasing approximately 300 gallons of diesel fuel onto the ground without any secondary containment, and the operator is performing work underground (related to a collapsed adit) in a hazardous manner.

The operator was represented by Riley McAllister during the inspection. The site is located approximately 4 miles northwest of Nederland, CO in Boulder County, at an elevation of approximately 9,760 feet. Access to the site is off of Caribou Road. A separate entrance exists for each of the two mines at the site, the Cross Mine and Caribou Mine. **Photos 1-34** taken during the inspection are included with this report.

Operation Summary:

This is a 110(2) underground mining operation permitted for 9.35 acres to mine for gold, silver, lead, zinc, and copper (see enclosed mining plan map). The permit area includes two historic mine disturbance areas, the Cross Mine (southern edge of valley) and the Caribou Mine (northern edge of valley). Historic waste rock piles were left in both mine areas. However, much of the waste rock material at the Cross Mine was removed from the site in the 1970's to create a more level surface for equipment handling. The two mines are separated by Coon Track Creek, a perennial stream that is tributary to North Beaver Creek, which flows into Middle Boulder Creek before entering the Barker Meadow Reservoir. Wetland areas associated with the creek were surveyed within the permit area. These wetlands will not be disturbed by the mine operation.

Discharge from the Cross Mine and Caribou Mine portals is directed to two plastic-lined ponds on site. Discharge from the Cross Mine reports directly to pond #1 via pipeline. This water requires daily addition of lime to meet discharge standards for the NPDES permit the operator maintains with the Colorado Department of Public Health and Environment (CDPHE). The treated water is then directed via pipeline to the larger pond #2. Discharge from the Caribou Mine expresses from the Idaho Tunnel and is directed via pipeline to pond #2. Water from the Caribou Mine does not require treatment to meet standards for the NPDES permit. The combined water in pond #2 is discharged via pipeline to the approved outfall at Coon Track Creek, located approximately 140 feet downgradient of the pond. The operator conducts bi-monthly water sampling from the discharge point and reports the data to CDPHE in accordance with the NPDES permit. The operator records daily temperature, pH, and flow readings of the discharges, and also records daily creek flow measurements at an installed weir located upgradient of the mine disturbance. These logs are maintained in the Cross Mine office building.

The permit was last revised through Amendment No. 1 (AM-1), approved in 2012. AM-1 increased the permit area from 2 acres (including only the Cross Mine disturbance area) to 9.35 acres (to also include the Caribou Mine disturbance area). AM-1 also provided for surface waste rock disposal resulting from construction of the Cross Mine Decline portal, construction of a new office/dry room facility at the Cross Mine, and installation of a new sewer line and leach field at the Cross Mine. The approved mining plan in AM-1 does not authorize the operation to utilize the historic Caribou Mine/Idaho Tunnel. Prior to conducting any activities in the Caribou Mine, the operator must submit a permit revision for Division review and approval. According to the permit file, the Caribou Mine workings are currently flooded below the Idaho Tunnel level, which would require dewatering prior to re-entry. Therefore, the permit revision submitted for re-entry into this mine would need to include details of any proposed dewatering activities.

The approved mining plan for the site is centered on mining, waste rock storage, and ore storage activities in the Cross Mine area, and waste rock storage in the Caribou Mine area. No on-site processing is to occur under the approved permit. Run of mine ore is temporarily stored in the large warehouse building near the Cross Mine and will be shipped off-site for processing. No designated chemicals are to be used or stored on site. According to AM-1, waste rock at the site consists primarily of quartz monzonite and gneiss, and is not considered to be acid-producing or metals-leaching material.

Reclamation Plan:

The approved post-mining land use for the site is forestry, with some residential use associated with the historic cabin present on site. The currently held financial warranty of $31,500.00 includes costs for sealing mine openings (Cross Mine portal, new Cross Mine Decline portal, Cross shaft, and Crown Point shaft), demolishing the Cross Mine snow shed, backfilling pond #1, grading areas around the mine openings, replacing 7 inches of topsoil on 1.5 acres of disturbed land, and revegetating 1.5 acres with grasses and trees (Aspen and Englemann Spruce). Costs for reclaiming the Caribou Mine are not included in the currently held financial warranty, as this mine is not to be re-disturbed until the Division has approved a permit revision with proposed mining and reclamation plans for this mine. Existing waste rock dumps will remain for reclamation, with any newly disturbed areas graded to 3H:1V or flatter. This material may be used by Boulder County and/or the USFS to maintain local roads, or used on site for road maintenance and/or reclamation backfilling.

The current approved closure plan for the Cross Mine involves sealing the portal for public safety, and not in a manner that restricts mine drainage. However, during its review of AM-1, the Division discussed with the operator the need for a more adequate long-term plan for water management at the site. The operator committed in AM-1 to submitting another permit revision that addresses this issue, potentially including proposed hydraulic plug designs for the draining mine openings. This revision will also address reclamation of water management infrastructure at the site, including the two lined ponds that receive mine discharge. The current reclamation plan does not include reclaiming these structures, as they will continue to be utilized for water management until the mine discharge has been eliminated. Several structures at the site will remain after reclamation, including the historic residential cabin, existing access roads and parking areas, the existing warehouse and office building at the Cross Mine, the proposed Cross Mine office and dry room, septic tank and leach field, the existing office building, septic tank and leach field at the Caribou Mine, and the three existing groundwater wells.

Operation Status:

The operation had been in temporary cessation since 2013, but returned to active status on June 19, 2018 to begin a small scale 10 tons per day production program in the Cross Mine. Ore extracted during this program will be temporarily stored in the nearby warehouse building (with thick concrete floors and retaining walls) until an off-site mill facility has been secured to accept the ore. The Division last inspected this site on September 11, 2018. At that time, no mining activities were occurring. However, the operation had begun excavating the new Cross Mine Decline portal located south of the existing portal, and stockpiling the waste rock just southeast of the decline portal per AM-1. Approximately 500 tons of overburden from this excavation project had been deposited on the historic dump at the Caribou Mine. The Caribou Mine/Idaho Tunnel had not been re-disturbed. Both mines were discharging at their typical rates for the season, with a combined discharge of approximately 50 gpm into pond #2. No problems were observed during the last inspection. It should be noted, the previous operator, Thomas S. Hendricks, passed away earlier this year (January 2020), and Richard Mittasch, Vice President of Calais Resources Inc., has taken over the responsibilities of operating the site and ensuring all permitting requirements are met.

Inspection Observations:

During the current inspection, the Division's primary focus was following up on the three issues identified in the citizen complaint. The Division first inspected the Caribou Mine area. According to the complaint, a fuel tank had been crushed in this area, potentially discharging 300 gallons of diesel fuel to the ground. According to the operator, three old fuel tanks that were stored just east of the storage shed had been crushed by a dozer near the main parking area. The operator estimates no more than 20 gallons of old diesel fuel had been present in the tanks that were crushed. The metal from the crushed tanks was taken to an off-site scrap yard. The Division previously observed three old tanks stored adjacent to the shed during its last inspection, which were reported empty at the time. The Division inspected the area where the old tanks had been stored and the area where the tanks were crushed. No evidence of fuel discharged to the ground surface was observed in these areas. The Division did observe some minor oil staining of the ground surface in the parking area. The operator has brought a new double-walled diesel fuel tank to the site which has an external secondary containment structure. This tank is currently stored just west of the storage shed, and is not in use at this time.

The Division inspected the inside of the storage shed where numerous containers are currently stored, most of them empty. The Division recommends the operator clean up the storage shed as soon as reasonably possible (including the significant amount of rat droppings observed), label and organize the containers, and ensure proper storage of any hazardous substances. The operator indicated plans to tear down this old shed at some point and install a new storage facility, potentially a fabric building. If the new building will have any permanent features (e.g., concrete foundation), prior to constructing the new building, the operator would need to submit a Technical Revision with details of the proposed design and how the building will be reclaimed.

The Division also inspected the Cross Mine area where the complaint alleges that oil from vehicles and equipment is drained onto the ground. The area described in the complaint is located just north of the large warehouse building. The Division observed no evidence the operator is discharging oil from vehicles and equipment to the ground in this area. The Division did observe minor oil staining in the Cross Mine parking area, as was observed at the Caribou Mine. Inside of the warehouse building, the Division observed a floor drain near an air compressor unit, and dark staining on the floor surrounding the drain. According to the operator, no oil has been directly poured down the drain. However, the adjacent air compressor does leak oil which goes down the drain. The operator stated that automatic transmission fluid has been poured down the drain. The operator did not provide an estimated frequency for this activity, or any estimated volumes. The operator could not provide the Division with details of the floor drain design, including the final destination of any fluids that enter the drain (e.g., holding tank, daylighted open drain). Therefore, the operator must immediately cease using this floor drain until more details can be provided to the Division on its design and how any substances captured by the drain system are managed. If the operator cannot provide this information, the drain shall be permanently sealed and evidence demonstrating this was done provided to the Division. Information on any floor drains or sumps utilized by the operation shall be included in the Technical Revision required for the problem discussed below (Problem #3).

During the inspection, the Division inquired about how the operation manages minor oil/fuel spills at the site. The operator indicated the contaminated soils around a spill are excavated and thrown into a trash receptacle. The operator should be advised, this is not an acceptable spill mitigation plan. Given the site is situated at the headwaters of Coon Track Creek (which eventually drains to Barker Meadow Reservoir) and also includes jurisdictional wetlands, the operator must have a sufficient plan in place to prevent any oil or fuel spills or contaminated runoff from reaching these water features.

The operation does not currently have an approved Spill Prevention, Control, and Countermeasure (SPCC) plan or approved fuel/oil storage locations for the site. Therefore, a problem is cited in this report (Problem #3; see

pages 1 and 2) pursuant to Rule 3.1.6(1) and C.R.S. 34-32-116(7)(g), which requires disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quantity or quality of water in surface and groundwater systems both during and after the mining operation and during reclamation to be minimized. This is also a problem pursuant to Section 20.3 of the Policies of the Mined Land Reclamation Board which requires structures for the containment of petroleum products to be designed and located to minimize the loss of petroleum products, including oil and fuel spills, to groundwater systems in the event of tank, drum, or delivery system failure, or spillage from any source in excess of reporting amounts set by federal, state, or local governments with authority for such matters.

The operator will need to submit a Technical Revision application that includes a site-specific SPCC plan or equivalent, including a description of all fuel/oil storage locations, spill prevention measures (e.g., storage and handling procedures, containment and diversionary structures, personnel training), spill response and mitigation procedures, and a disposal plan. This plan should include details on any floor drains or sumps utilized by the operation, including how substances captured by these systems are managed. This revision shall also include a revised mining plan map in accordance with Rules 6.2.1(2) and 6.3.5(2), which shows all fuel/oil storage locations at the site.

The Division observed the Idaho Tunnel at the Caribou Mine. No work was being done in this tunnel during the inspection. While the operator has indicated the need to rehabilitate this collapsed tunnel for some time, per AM-1, no work was to be done in this tunnel until the appropriate revision had been submitted and approved for the proposed project. According to the operator, a contractor was mobilized to begin work in the tunnel in November of 2019. In the later part of that month, the contractor mistakenly broke piping that carried the tunnel effluent to pond #2 where it is mixed with treated water from the Cross Mine. The connection was repaired as of January 29, 2020. However, full access to the water will not be achieved until the Idaho Tunnel rehabilitation project (currently on hold) is completed.

On February 4, 2020, the Division was notified by CDPHE, WQCD of surface water quality issues (cadmium and zinc exceedances) occurring at the approved discharge location on Coon Track Creek since November 2019, potentially associated with the collapsed Idaho Tunnel. The Division sent a letter to the operator on February 12, 2020 citing a problem for the surface water quality issues documented at the site. The operator is required to submit a Technical Revision that includes a detailed plan of action for addressing the impaired surface water quality. This plan must describe any measures that have been taken or are proposed to be taken to address the water quality issues (including work performed underground and any changes made to the water management and/or treatment system). The plan must also include a timeline for completion of any proposed measures. The deadline for submitting this Technical Revision was set for April 12, 2020. At this time, the Division has not received the required corrective action for this problem. Therefore, the problem is re-cited in this report (Problem #2; see pages 1 and 2).

It should be noted, the operator informed the Division (in a letter received on March 19, 2020), that substantial water quality improvement has been observed at the approved outfall on Coon Track Creek since flows from the Idaho Tunnel were re-established to pond #2 in late January of this year. All February testing has produced results below the 30-day average permit limit for all chemical constituents except for a single potentially dissolved cadmium detection of 2 µ/L, above the 30-day permit limit of 0.63 µ/L. Potentially dissolved cadmium was below detection limits in subsequent analysis.

Since the Division's last inspection of the site in September of 2018, the operator has removed at least half of the 200 foot long snowshed that covered the entrance to the Idaho Tunnel. The operator has also excavated a portion of the tunnel so that the portal is now located approximately 50-60 feet back from the edge of the remaining snowshed, very close to the approved northern permit boundary. The Caribou Mine portal daylights

to the southeast approximately 30 feet below Caribou Road. Shotcrete was recently applied on the slope around the portal. However, according to the operator, the shotcrete is not adequately stabilizing the slope, and further stabilization methods will be required. The operator has constructed a steel frame entrance to the portal with wood siding. The Division observed the portal from the entrance, noting the unstable conditions which have been attributed to the historic rotting timbers inside the portal and freeze/thaw cycles of water in the surrounding substrate. A large ice sheet was observed hanging from the roof inside the portal. The Division observed water flowing from the portal, but was not able to track its flow path due to the snow cover. The Division also observed an above ground section of the new 8 inch pipeline that was recently installed after the old pipeline was damaged during the excavation project.

Just southwest of the Caribou Mine are three plastic-lined pits, increasing in size downgradient. Due to the snow cover, the Division was not able to observe whether any water was present in these lined pits. A pipeline emerges from the lower embankment of the middle pit to discharge water into a drop structure located inside the larger lower pit. According to the operator, these ponds were constructed many years ago to manage discharge water from the Caribou Mine. However, these ponds have not been used for that purpose for some time, as mine discharge is currently routed to an underground pipeline. According to aerial imagery available in Google Earth, these ponds have been present on site at least since 1999. The largest downgradient pond is approximately 0.2 acre in size, the middle pond is approximately 0.1 acre in size, and the smallest upgradient pond is less than 0.1 acre in size. The Division was unable to find any information on these ponds in the approved permit.

The approved permit does not include any details of the water management system installed at the site (besides the two ponds identified in AM-1), including the associated infrastructure, how this infrastructure is maintained, any treatment or discharge points, and the emergency response plan in place for any potential failures of this system (which recently led to impaired surface water quality conditions at the outfall on Coon Track Creek). This information must be submitted in a permit revision for Division review and approval. This revision shall also include a site map showing locations of the major components of the water management system and indicating the general flow path of water through the system. This revision must also address the three lined ponds near the Caribou Mine which appear to not be in use at this time, including how/if the operator plans to utilize the ponds, and how the ponds will be reclaimed. A new problem is not cited in this report for this matter, as it is related to the problem cited in the Division's February 12, 2020 letter to the operator, and again cited in this report (Problem #2; see pages 1 and 2), which requires submittal of a Technical Revision to account for current site conditions. Any future or proposed changes to the existing water management system must be submitted in a subsequent permit revision.

The collapse of the Idaho Tunnel (and later stabilization efforts) have created potential slope stability issues near the northern permit boundary and the adjacent Caribou Road. The Division has not approved any details of the tunnel stabilization project, including demonstration through appropriate geotechnical and stability analyses that off-site areas will be protected during the project. The Division is concerned that further collapse of this tunnel and/or future rehabilitation work in this tunnel may damage land outside of the approved permit boundary, and potentially impair the stability of Caribou Road, which is frequently used by the public to access recreational areas above the mine site. Therefore, a problem is cited in this report (Problem #4; see pages 1 and 2) pursuant to Rule 3.1.5(3) and C.R.S. 34-32-116(7)(h) which require areas outside of the affected land to be protected from slides or damage occurring during the mining operation and reclamation. The operator will need to submit a Technical Revision including a Geotechnical Stability Exhibit in accordance with Rule 6.5(3), which demonstrates through appropriate geotechnical and stability analyses that off-site areas will be protected based on current conditions at the Idaho Tunnel, with appropriate factors of safety incorporated into the analyses. The Division encourages the operator to review Section 30 of the Policies of the Mined Land Reclamation Board (see enclosed policies) which provides acceptable factors of safety for slope stability/geotechnical analyses. Prior to doing any additional work in the Caribou Mine/Idaho Tunnel, the

operator will need to submit an additional Technical Revision to provide engineering stability analyses for the proposed final slope configuration of the Idaho Tunnel/Caribou Mine portal in accordance with Rule 6.5(2).

The operator is directed to Rule 8.1(a) (see enclosed Rule), which requires operators to notify the Division, as soon as reasonably practicable, but no later than 24 hours, after the operator has knowledge of a failure or imminent failure of any impoundment, embankment, stockpile or slope that poses a reasonable potential for danger to human health, property, or environment. Given the location of the Caribou Mine portal beneath Caribou Road and near the northern permit boundary, and its potential impacts on surface water quality at the site, the Division would consider the failure or imminent failure of this portal/slope an emergency situation requiring notification to the Division in accordance with Rule 8.2.

It has also come to the Division's attention that the Permittee name for the Cross Gold Mine "Calais Resources Colorado, Inc." is no longer valid. This means the performance and financial warranty forms, the legal right of entry, and the structure agreements for any permanent, man-made structures located on or within 200 feet of the approved affected lands (including Caribou Road) must be revised to reflect the new company name. This can be done through the submittal of a Succession of Operators application. The Division cited a problem for this issue in its February 12, 2020 letter to the operator. The deadline for submitting the Succession of Operators application was set for April 12, 2020. At this time, the Division has not received the required corrective action for this problem. Therefore, the problem is re-cited in this report (Problem #1; see pages 1 and 2). It is imperative the Succession of Operators application is submitted and approved as soon as possible, as the Division cannot approve any other revisions submitted under the current invalid permittee name.

Inspection Findings:

After conducting this inspection, it is clear there are compliance issues that need to be resolved at the site, some more immediately than others. The immediate responses must address the change in company name, the impaired surface water quality documented at the site, the stabilization project in the Idaho Tunnel, the potential for off-site damage along the northern permit boundary, the water management plan for the site, and the oil/fuel spill prevention and mitigation plan for the site. Other issues that will need to be addressed after the more immediate issues are resolved include commitments made in AM-1 to submit a surface water and groundwater monitoring program for the site, final closure plans for the Cross Mine and Caribou Mine portals (including a long-term water treatment plan if necessary), and an updated bond estimate. At least some of these issues may require submittal of an Amendment application rather than a Technical Revision. The Division would be happy to meet with the operator at a later date to discuss the appropriate revision type for addressing the remaining issues at the site.

None of the compliance issues observed raise to the level of a Possible Violation at this time. However, if the operator fails to respond to the problems cited in a timely manner, the problems could be escalated to the level of a Possible Violation, for which an enforcement hearing must be held before the Mined Land Reclamation Board. At such a hearing, the Board may issue a cease and desist order, assess civil penalties, order additional corrective actions, revoke the permit, and/or find the financial warranty for the operation subject to forfeiture.

It should be noted, on March 19, 2020, the Division received a request from the operator for a 90-day extension of the April 12, 2020 corrective action deadline given for the two problems cited in the Division's February 12, 2020 letter, and re-cited in this report (Problems #1 and #2; see pages 1 and 2). Due to the high priority of the problems cited, and the 60 day period already given for submitting the required corrective actions, the Division cannot approve the 90-day extension requested. However, the Division has approved a two week extension for these two problems, moving the deadline to April 26, 2020.

To summarize, the following items are required at this time:

1) By April 26, 2020 - submit a Succession of Operators application to change the current Permittee name to a valid entity name (registered with the Colorado Secretary of State), including updated Performance Warranty and Financial Warranty forms, demonstration of legal right of entry to the affected lands, and structure agreements for all permanent, man-made structures located on or within 200 feet of the affected lands.

2) By April 26, 2020 - submit a Technical Revision that includes a detailed plan of action for addressing the impaired surface water quality at the site. This plan shall describe any measures that have been taken or are proposed to be taken at the site to address the water quality issues (including work performed underground and any changes made to the water management and/or treatment system). This revision should be primarily focused on existing conditions at the site, but may also include any proposal(s) for future work to be completed as it relates to surface water quality at the site.

   Either in this revision or in a subsequent revision, details must be provided on the current water management system in place, including the associated infrastructure, how this infrastructure is maintained, any treatment or discharge points, and the emergency response plan in place for any potential failures of this system (which recently led to impaired surface water quality conditions at the outfall on Coon Track Creek). This revision should include a site map showing locations of the major components of the water management system and indicating the general flow path of water through the system. This revision must also address the three lined ponds near the Caribou Mine which appear to not be in use at this time, including how/if the operator plans to utilize the ponds, and how the ponds will be reclaimed.

3) By May 7, 2020 - submit a Technical Revision that includes a site-specific SPCC plan or equivalent, including a description of all fuel/oil storage locations, spill prevention measures (e.g., storage and handling procedures, containment and diversionary structures, personnel training), spill response and mitigation procedures, and a disposal plan. This revision should include details on any floor drains or sumps utilized by the operation, including how substances captured by these systems are managed. This revision shall also include a revised mining plan map in accordance with Rules 6.2.1(2) and 6.3.5(2), which shows all fuel/oil storage locations at the site.

4) By May 7, 2020 - submit a Technical Revision including a Geotechnical Stability Exhibit in accordance with Rule 6.5(3), which demonstrates through appropriate geotechnical and stability analyses that off-site areas will be protected based on current conditions at the Idaho Tunnel, with appropriate factors of safety incorporated into the analyses.

This concludes the report.

Any questions or comments regarding this inspection report should be forwarded to Amy Eschberger at the Colorado Division of Reclamation, Mining and Safety, 1313 Sherman Street, Room 215, Denver, CO 80203, via telephone at 303-866-3567, ext. 8129, or via email at amy.eschberger@state.co.us.

PHOTOGRAPHS

Photo 1. View looking east across area located east of storage shed at Caribou Mine, where three old fuel tanks were removed to be crushed for scrap.

Photo 2. View looking north at area east of storage shed at Caribou Mine where three old fuel tanks (circled) were present during Division's September 11, 2018 inspection.

Photo 3. View looking north at small storage shed present at Caribou Mine.

Photo 4. View inside storage shed at Caribou Mine where several containers are stored, most of them empty. This shed should be cleaned up, the containers organized and labeled, and any hazardous materials properly stored.

Photo 5. View inside storage shed at Caribou Mine where several containers are stored, most of them empty. This shed should be cleaned up, the containers organized and labeled, and any hazardous materials properly stored.

Photo 6. View looking north at new double-walled diesel fuel tank with secondary containment currently stored near the storage shed. This tank is not in use at this time.

Photo 7. View looking south at new double-walled diesel fuel tank with secondary containment currently stored near the storage shed. This tank is not in use at this time.

Photo 8. View looking west toward Caribou Mine office building, showing location where the old diesel tanks were crushed (circled).

Photo 9. Closer view of area at Caribou Mine where the old fuel tanks were crushed. No evidence of fuel discharged to the ground surface was observed.

Photo 10. View of ground surface beneath trailer parked in area where old fuel tanks were crushed. No evidence of fuel discharged to the ground surface was observed.

Photo 11. View of remaining portion of snowshed at Idaho Tunnel with scrap from demolished portion stored inside.

Photo 12. View looking southeast across area where Idaho Tunnel snowshed was demolished, now being used for storage of new lumber for tunnel stabilization project and various pieces of scrap.

Photo 13. View looking west across area where three plastic lined ponds are present near Caribou Mine. A pipeline emerges from lower embankment of middle pond to discharge into lower larger pond. According to operator, these ponds have not been used in many years.

Photo 14. View looking northeast across Caribou Mine parking area where some minor oil staining was observed.

Photo 15. View looking northwest at Idaho Tunnel excavation area, showing new portal location approximately 50-60 feet back from remaining snowshed. Portal daylights to the southeast and is approximately 30 feet below Caribou Road. Note shotcrete applied to slope.

Photo 16. View inside new steel frame entrance constructed around Caribou Mine portal. Water was draining from the portal during the inspection (bottom, left).

Photo 17. Closer view inside Caribou Mine portal, showing historic rotting timbers and large ice sheet hanging from roof inside adit.

Photo 18. View looking northwest from edge of remaining Idaho Tunnel snowshed toward new portal location approximately 50-60 feet ahead.

Photo 19. View looking southeast inside remaining Idaho Tunnel snow shed.

Photo 20. View looking southwest at new section of pipe (circled) installed to direct Caribou Mine drainage to pond #2, after old pipe was broken during excavation project.

Photo 21. View looking southeast across Caribou Mine from edge of Caribou Road.

Photo 22. View looking southwest across Caribou Road, showing edge of slope with Caribou Mine portal very close to road (within approximately 10 feet).

Photo 23. View looking northwest toward Cross Mine office building and parking area. Some minor oil staining was observed in the parking area.

Photo 24. View looking west at area north of Cross Mine warehouse building where complaint alleges vehicle and equipment oil is discharged to the ground. No evidence of oil discharged to the ground was observed in this area.

Photo 25. View looking northwest inside Cross Mine warehouse building.

Photo 26. View looking southeast inside Cross Mine warehouse building. Note ore material stored inside (background, center).

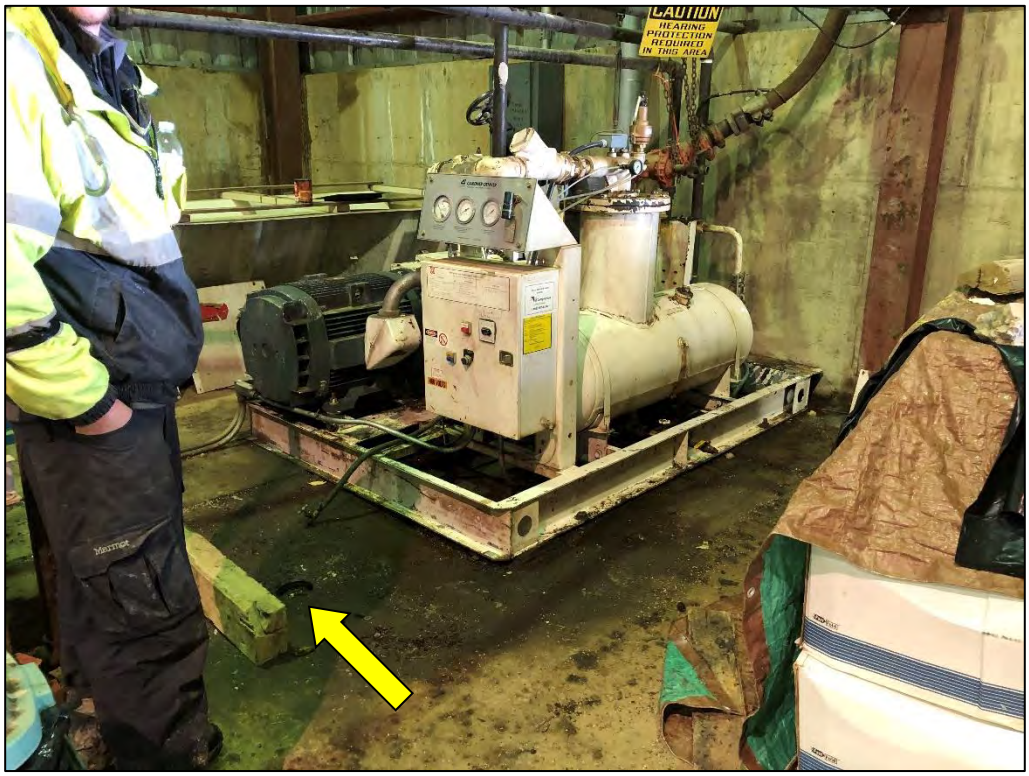


Photo 27. View looking at northern portion of Cross Mine warehouse building where floor drain (indicated) is located, near air compressor.

Photo 28. Closer view of floor drain inside Cross Mine warehouse building which must be permanently sealed if operator cannot describe how substances captured by this drain system are managed.

Photo 29. View looking northwest inside Cross Mine snowshed, showing pipe (at right) directing mine drainage to pond #1 for lime treatment. Note lit area (at right) where continuous flow meter is installed.

Photo 30. View of continuous flow meter installed inside Cross Mine snowshed to monitor discharge rate from this mine. Note discharge rate was 600 gph (10 gpm) during inspection. Caribou Mine discharge is measured by subtracting Cross Mine discharge rate from combined discharge rate at pond #2.

Photo 31. View looking northwest inside Cross Mine snowshed.

Photo 32. View looking northwest across lined pond #1 in which Cross Mine drainage is discharged for lime treatment before being routed to lined pond #2.

Photo 33. View looking northeast at lined pond #2 (indicated) where mine drainage from Cross Mine and Caribou Mine is directed before discharging at permitted outfall on Coon Track Creek. Note shed structures installed (at right) for water management system.

Photo 34. View looking down valley from pond #2 where water from this pond is discharged at permitted outfall on Coon Track Creek (not visible in photo).

GENERAL INSPECTION TOPICS

The following list identifies the environmental and permit parameters inspected and gives a categorical evaluation of each

(AR) RECORDS (Succession of Operation)-----PB	(FN) FINANCIAL WARRANTY-------- N	(RD) ROADS---------- N
(HB) HYDROLOGIC BALANCE---------- PB	(BG) BACKFILL & GRADING----------N	(EX) EXPLOSIVES--------- N
(PW) PROCESSING WASTE/TAILING---- N	(SF) PROCESSING FACILITIES------- N	(TS) TOPSOIL---------- N
(MP) GENL MINE PLAN COMPLIANCE---- 2PBs	(FW) FISH & WILDLIFE---------- N	(RV) REVEGETATION---- N
(SM) SIGNS AND MARKERS---------- N	(SP) STORM WATER MGT PLAN---- N	(RS) RECL PLAN/COMP-- N
(ES) OVERBURDEN/DEV. WASTE--------- N	(SC) EROSION/SEDIMENTATION--- N	(ST) STIPULATIONS------- N
(AT) ACID OR TOXIC MATERIALS------- N	(OD) OFF-SITE DAMAGE----------N	

Y = Inspected and found in compliance / N = Not inspected / NA = Not applicable to this operation / PB = Problem cited / PV = Possible violation cited

Inspection Contact Address
Richard Mittasch
Calais Resources Colorado, Inc.
P.O. Box 3395
Nederland, CO 80466

Encls: Citizen Complaint, received on March 25, 2020
Approved Mining Plan Map
Technical Revision form
Construction Materials Rule 8 – Emergency Notification
Policies of the Mined Land Reclamation Board, effective May 16, 2018

CC: Kory McFarlane, MSHA
Jacob Dyste, CDPHE, WQCD
Michael Cunningham, DRMS

STATE OF COLORADO

Cunningham - DNR, Michael <michaela.cunningham@state.co.us>

Cross and Caribou Mines

Kory MacFarlane <macrockarms@gmail.com> Wed, Mar 25, 2020 at 1:09 PM
To: michaela.cunningham@state.co.us

Hello Michael,

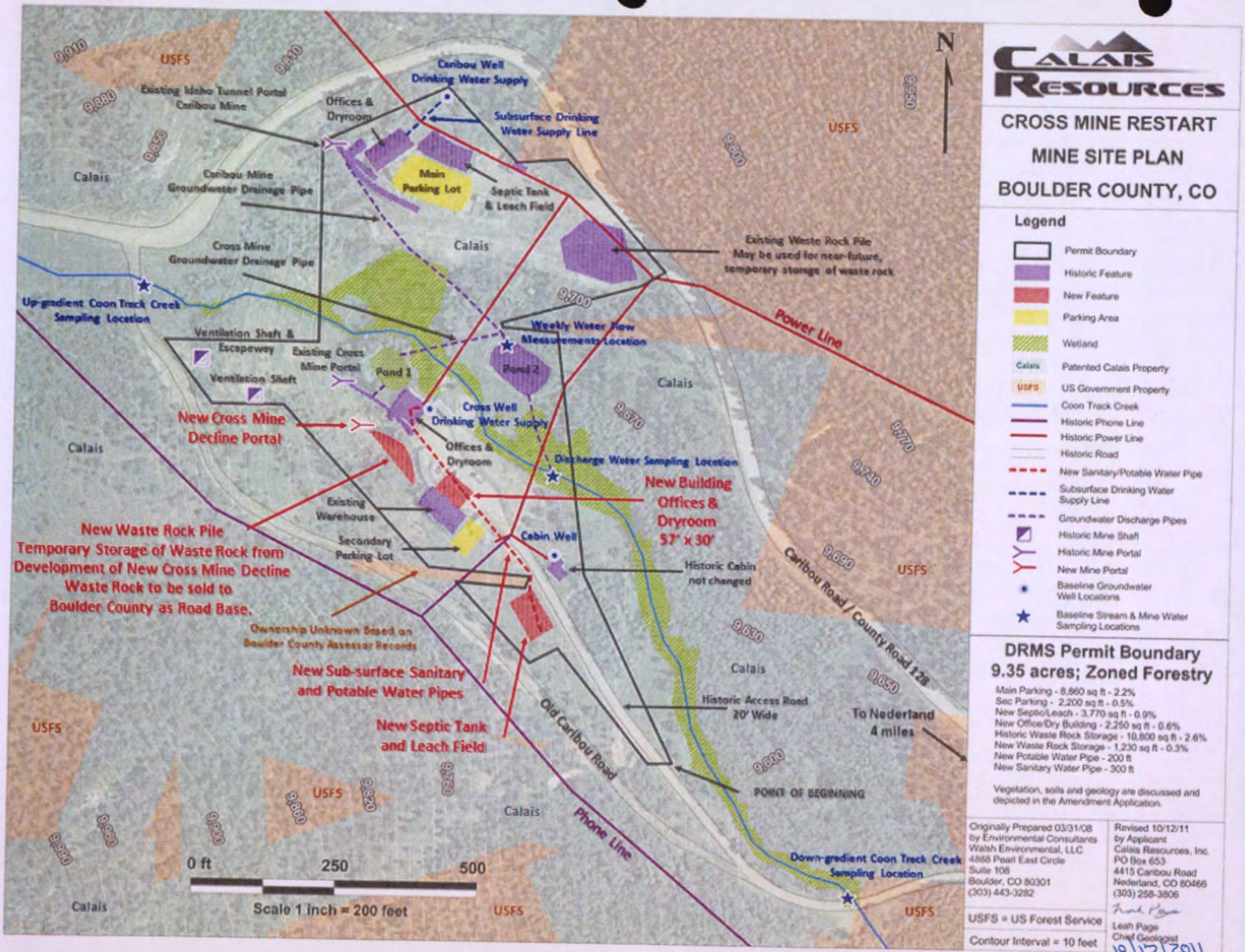
1. At the Cross mine they are draining there oil on to ground on the Northern Portion of an Big Green Building. Northern Entrance is the land mark as you will park in the oil soak ground, from Heavy Equipment and Vehicle old oil drainage.

2. They are rushing to complete the Caribou Portal in an Hazard Conditions as work and Drainage will occur.

3. When you first take a left turn off of main road pass the Cross Mine entrance, is the Caribou Mine entrance. From Entrance to Main Buildings on the left hand side, you will notice an Crushed Diesel Tank in the Contamination of Diesel Spillage. This Spillage was done by one of the Teenagers by the name of Evan. The Bull Dozer on location was the equipment used to crush said Tank, within Tank there was plus 300 gallons of number one Diesel sprayed everywhere. No Containment is made so all fuel is going where drainage goes, and being driven in as well.

Sincerely,

Kory MacFarlane / MSHA Surface and Underground Certified Instructor / Miin # M47314168



CALAIS RESOURCES

CROSS MINE RESTART
MINE SITE PLAN
BOULDER COUNTY, CO

Legend

- Permit Boundary
- Historic Feature
- New Feature
- Parking Area
- Wetland
- Calais — Patented Calais Property
- USFS — US Government Property
- Coon Track Creek
- Historic Phone Line
- Historic Power Line
- Historic Road
- New Sanitary/Potable Water Pipe
- Subsurface Drinking Water Supply Line
- Groundwater Discharge Pipes
- Historic Mine Shaft
- Historic Mine Portal
- New Mine Portal
- Baseline Groundwater Well Locations
- Baseline Stream & Mine Water Sampling Locations

DRMS Permit Boundary
9.35 acres; Zoned Forestry

Main Parking - 8,860 sq ft - 2.2%
Sec Parking - 2,200 sq ft - 0.5%
New Septic/Leach - 3,770 sq ft - 0.9%
New Office/Dry Building - 2,250 sq ft - 0.6%
Historic Waste Rock Storage - 10,800 sq ft - 2.6%
New Waste Rock Storage - 1,230 sq ft - 0.3%
New Potable Water Pipe - 200 ft
New Sanitary Water Pipe - 300 ft

Vegetation, soils and geology are discussed and depicted in the Amendment Application.

Originally Prepared 03/31/08
by Environmental Consultants
Walsh Environmental, LLC
4888 Pearl East Circle
Suite 108
Boulder, CO 80301
(303) 443-3282

Revised 10/12/11
by Applicant
Calais Resources, Inc.
PO Box 653
4415 Caribou Road
Nederland, CO 80466
(303) 258-3806

Leah Page
Chief Geologist
10/12/2011

USFS = US Forest Service

Contour Interval = 10 feet

COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY
1313 Sherman Street, Room 215, Denver, Colorado 80203 ph(303) 866-3567

REQUEST FOR TECHNICAL REVISION (TR) COVER SHEET

File No.: M- _____ Site Name: _____

County _____ TR# _____ *(DRMS Use only)*

Permittee: _____

Operator (If Other than Permittee): _____

Permittee Representative: _____

Please provide a brief description of the proposed revision: _____

_____

_____

As defined by the Minerals Rules, a Technical Revision (TR) is: "a change in the permit or application which does not have more than a minor effect upon the approved or proposed Reclamation or Environmental Protection Plan." The Division is charged with determining if the revision as submitted meets this definition. If the Division determines that the proposed revision is beyond the scope of a TR, the Division may require the submittal of a permit amendment to make the required or desired changes to the permit.

The request for a TR is not considered "filed for review" until the appropriate fee is received by the Division (as listed below by permit type). Please submit the appropriate fee with your request to expedite the review process. After the TR is submitted with the appropriate fee, the Division will determine if it is approvable within 30 days. If the Division requires additional information to approve a TR, you will be notified of specific deficiencies that will need to be addressed. If at the end of the 30 day review period there are still outstanding deficiencies, the Division must deny the TR unless the permittee requests additional time, in writing, to provide the required information.

There is no pre-defined format for the submittal of a TR; however, it is up to the permittee to provide sufficient information to the Division to approve the TR request, including updated mining and reclamation plan maps that accurately depict the changes proposed in the requested TR.

Required Fees for Technical Revision by Permit Type - Please mark the correct fee and submit it with your request for a Technical Revision.

Permit Type	**Required TR Fee**	**Submitted** (mark only one)
110c, 111, 112 construction materials, and 112 quarries	$216	☐
112 hard rock (not DMO)	$175	☐
110d, 112d(1, 2 or 3)	$1006	☐

RULE 8: EMERGENCY NOTIFICATION BY ALL OPERATORS, EMERGENCY RESPONSE PLAN FOR DESIGNATED MINING OPERATIONS AND EMERGENCY RESPONSE AUTHORITY OF THE OFFICE

8.1 SITUATIONS THAT REQUIRE EMERGENCY NOTIFICATION BY THE OPERATOR

Operators shall notify the Office, as soon as reasonably practicable, but no later than twenty-four (24) hours, after the Operator has knowledge of a failure or imminent failure of any of the following:

(a) any impoundment, embankment, stockpile or slope that poses a reasonable potential for danger to human health, property or the environment;

(b) for a designated mining operation, any Environmental Protection Facility designed to contain or control designated chemicals or process solutions as identified in the permit;

(c) for in situ leach mining operations, any structure designed to prevent, minimize, or mitigate the adverse impacts to human health, wildlife, ground or surface water or the environment; and

(d) for in situ leach mining operations, any structure designed to detect, prevent, minimize, or mitigate adverse impacts on groundwater.

8.2 OPERATOR'S GENERAL NOTIFICATION RESPONSIBILITIES FOR REPORTING EMERGENCY CONDITIONS

8.2.1 Emergency Reporting Procedure

Telephone notice shall be given to the Office staff as follows:

(a) during regular business hours (8:00 am to 5:00 pm, on working days), the notice shall be given to the Office.

(b) outside regular business hours, or if the Office cannot be contacted, notice shall be given to the Colorado Department of Public Health and Environment 24 hour Colorado Emergency and Incident Reporting Line. Specify to this agency, that the emergency authority is coordinated through the Division of Reclamation, Mining and Safety, and to activate that Division's response network.

8.2.2 Emergency Notification Information Required

Notice required pursuant to this Rule 8 shall contain the following information (to the extent known at the time of the notice, and so long as no delay occurs in reporting results):

(a) that this is notification of an emergency condition as required by Rule 8;

(b) the nature of the condition including any chemicals and toxic or acid producing materials involved;

(c) an estimate of the quantity of any chemical, toxic or acid-forming material that has been or could be released;

(d) the time and duration of the occurrence and if it is on-going, or urgency of the pending situation;

(e) any known or anticipated impacts to human health, property or the environment;

(f) precautions and corrective actions taken by the Operator; and

(g) the Operator's name(s) and contact number(s) for persons to be contacted for further information and response by the Office.

8.2.3 Follow-up Notice Requirements

As soon as practicable after an emergency situation or condition is reported and addressed, but no later than five (5) working days, the Operator shall provide a written report of the event to the Office. The report shall provide a description of:

(a) actions taken to respond to and correct the emergency situation or condition;

(b) any known or anticipated adverse impacts to human health, property or the environment;

(c) name(s), address(s), telephone numbers and e-mail address of the Operator's contact person for additional information and follow-up by the Office;

(d) monitoring and analyses that are necessary to evaluate the situation and corrective actions, copies of all pertinent data; and

(e) results of the Operator's investigation to assess the conditions or circumstances that created the emergency situation, and what corrective or protective measures will be taken to prevent a similar event from occurring in the future.

8.3 EMERGENCY RESPONSE PLAN FOR DESIGNATED CHEMICALS AND URANIUM OR URANIUM BY-PRODUCTS

In compliance with Rule 6.4.21, describing the purpose of an Environmental Protection Plan, Operators/Applicants of Designated Mining Operations shall be required to have on file with the Office an up-to-date Emergency Response Plan for designated chemicals. It shall be the Operator's/Applicant's sole responsibility to provide timely updates of responsible personnel and their phone numbers to the Office.

8.3.1 Non-Designated Mining Operations Exempted

Policies
of
The Mined Land Reclamation Board

Outline of Content

30.0 – Factors of Safety for Slope Stability/Geotechnical Analyses

40.0 – Reserved

50.0 – Reserved

60.0 – Reserved

70.0 – Board Administrative Procedures

- **70.1 – Rotation of Board Chair**
- **70.2 – Authority of Board Chair**
  - **70.2.1 – Hearing Officer**
  - **70.2.2 – Prehearing Motions and Requests**

80.0 – Delegation to Division

- **80.1 – Continuances and Withdrawals from Board Agenda**
- **80.2 – Issuance of Cease and Desist Orders**
- **80.3 – Issuance of Notices of Violations**
- **80.4 – Appointment of Prehearing Conference Officer**

10.0 – Abbreviations and Definitions. As used in these policies:

10.1 – Abbreviations

CDOT – Colorado Department of Transportation

CDPHE – Colorado Department of Public Health and Environment

DMO – Designated Mining Operation, as defined by section 34-32-103(3.5)(a), C.R.S.

NOI – Notice of Intent to Conduct Prospecting Operations

SPCC – Spill Prevention Control and Countermeasure

WQCD – Water Quality Control Division of the Colorado Department of Public Health and Environment

10.2 – Definitions

Construction Materials Act means the Colorado Land Reclamation Act for the Extraction of Construction Materials, Article 32.5 of Title 34, C.R.S.

Construction Materials Rules means the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials, 2 C.C.R. 407-4.

Department means the Colorado Department of Natural Resources.

Director means the Director of the Division of Reclamation, Mining and Safety in the Department of Natural Resources. Where used herein, the term "Director" shall mean the Director or the Director's designee.

Division means the Division of Reclamation, Mining and Safety, Department of Natural Resources.

Hard Rock Act means the Colorado Mined Land Reclamation Act, Article 32 of Title 34, C.R.S.

Hard Rock Rules means the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal, and Designated Mining Operations, 2 C.C.R. 407-1.

Tourist mine means any mine whose primary purpose is for tours open to the public rather than the development of minerals, which the owner/operator does not have the intent to produce and sell a product which significantly affects commerce.

Mining operation shall have the same meaning as set forth in sections 34-32-103(8) and 34-32.5-103(13), C.R.S.

Prospecting shall have the same meaning as set forth in section 34-32-103(12), C.R.S.

20.0 – Division Administrative Procedures.

20.1 – Financial Warranties

20.1.1 – Irrevocable Letters of Credit from Qualified Non-Traditional Banks. The Board authorizes the Director to accept qualified financial warranty letters of credit issued by non-traditional bank financial institutions that are in good financial standing as evidenced by an approved rating system and otherwise comply with the requirements of the Hard Rock Act and the Hard Rock Rules or the Construction Materials Act and the Construction Materials Rules, including Rules 4.3.4 and 4.7, as applicable, and verified by the Director.

20.2 – Tourist Mines

20.2.1 –Concurrent Active Mining/Prospecting and Tourist Operations. Operating a tourist mine concurrently with a mining or prospecting operation is not in the interest of protecting and promoting the health, safety, and welfare of the citizens of this state. Therefore, operators or mine owners who wish to conduct both active mining and/or prospecting and provide mine tours may be allowed to do so only under the following restrictions:

(a) Mining or prospecting activities and tourist mine activities must either be conducted at separate locations, at separate times, or both at separate locations and at separate times (*i.e.*, mining or prospecting conducted in one section of the mine and mine tours conducted in a separate location; or limiting mining or prospecting activities to the weekends and mine tours to weekdays);

(b) Operators or prospectors who apply for a dual tourist mine/mining or prospecting use permit must provide a detailed plan describing when, where, and how mining or prospecting will occur and when, where, and how mine tours will be conducted. All operations approved for a dual use permit will be subject to inspections prior to the tourist season to ensure tourists will be protected from mining or prospecting operations.

(c) Current operators of tourist mines who wish to conduct mining or prospecting must apply and receive approval from the Division or the Board for a reclamation permit or NOI that complies with this policy prior to conducting mining or prospecting activities.

20.3 – Oil and Fuel Spill Containment Structures

Structures for the containment of petroleum products shall be designed and located to minimize the loss of petroleum products, including oils and fuels, to groundwater systems in the event of tank, drum, or delivery system failure, or spillage from any source in excess of reporting amounts set by federal, state, or local governments

with authority for such matters. Even though a SPCC plan may be required at a mining or prospecting site for the protection of surface water quality by the WQCD, the Division should only consider such structures where there is a need to protect groundwater quality. A spill containment structure's capacity shall be sufficient to contain oils and fuels with sufficient freeboard to contain a precipitation event, as specified by applicable federal, state or local government regulations.

20.3.1 – Application and Permit Revisions

For storage of oils and fuels in regulated quantities (*i.e.*, more than 1,320 gallons of oil, or fuel in containers with a capacity of at least 55 gallons) within the permit boundary area at a mine or the area encompassed by a NOI, the Division shall require applicants and operators to submit documentation, in a form acceptable to the Division, that they have a SPCC plan and that plan has or will be implemented prior to storage of fuel or oil products. The Division may require an operator to submit a letter, on company letterhead, affirmatively stating that the SPCC plan has been implemented. The Division shall not require a copy of the SPCC plan, but may require the opportunity to review it during a Division inspection.

If an applicant or operator chooses to submit and implement a SPCC plan, the Division may require the applicant or operator to address any changes to the relevant containment structures in an update to the SPCC plan as necessary and in compliance with applicable federal or state regulations. The Division is authorized to accept, as an alternative to the submittal of a SPCC plan, written containment dimensions adequate to enable the Division to complete bond release calculations and containment details sufficient to demonstrate protection of groundwater.

20.3.2 – Mine Site Inspections

Where groundwater impact from a loss of containment may be expected, the Division may, during an inspection, require a mine site operator to demonstrate that any contained waters in the spill containment structure do not compromise the structure's capacity to contain a storm event. The Division may accept a certification of a Colorado Professional Engineer of a SPCC plan as demonstration of containment capacity requirements. The Division may require removal of accumulated fluids from containment structures in accordance with applicable laws and regulations. The Division shall inspect and include in the inspection report whether a containment structure or, if applicable, a SPCC plan, is in place at a mine site. The Division shall not require secondary containment for double-walled tanks or convault tanks. Operators are encouraged to update spill plan site maps as part of the annual report to show the current location of the tank.

Applicants and operators shall provide a copy of the inspection report to WQCD if a SPCC plan or Materials Containment Plan is not available for inspection and the Division determines that such plans may be required.

The Division may require that site placement of containment structures prevent and protect against the loss of the containment structures due to debris or landslides, avalanches, or other reasonably anticipated events that could compromise the ability of the facility to contain a controlled product spill. For facilities where site placement has the potential to compromise containment, the operator may propose structural improvements or operational procedures. The Division shall determine whether a permit revision is required for the proposed structural improvements in order to prevent and/or protect against the loss of the containment structures due to debris or landslides, avalanches, or other reasonably anticipated events that could compromise the ability of the facility to contain a controlled product spill.

Operators shall report any spill of a petroleum product to the Division in accordance with Rule 3.1.13 of the Hard Rock Rules and Construction Materials Rules.

20.4 – Reserved

20.5 – Mining by a CDOT Contractor Within a Temporary Easement

The Board considers, and directs the Division to consider, the mining or extraction of material by a contractor acting under a valid CDOT contract to be an activity that does not require a reclamation permit, under the following conditions:

(a) The mining or extraction is only conducted within the boundaries of a temporary easement established in conjunction with a CDOT project;

(b) The mining or extraction activity must be for the purpose of supplying material needed to satisfy construction material requirements, in whole or in part, of that particular CDOT contract, including reclamation;

(c) The mined or extracted material is not transported off the site; and

(d) The CDOT contract contains specific requirements for reclamation of the affected area outside the highway right-of-way resulting from product extraction.

Mining or extraction of materials pursuant to a CDOT contract carried on outside the boundary of an existing highway right-of-way or a temporary easement is not exempt under this policy and may require a permit.

20.6 – 110 Limited Impact Mining Operations

20.6.1 – Side-by-Side Operations. The Division is directed not to approve side-by-side 110 limited impact mining operations (*i.e.*, mining operations approved under sections 34-32-110(1), (2) or 34-32.5-110(1), C.R.S.) by the same operator. The Division is further directed not to approve a Succession of Operator request for a 110 limited impact mining operation where the approval will result in two or more side-by-side 110 limited impact mining operations held by the same operator.

The policy shall not apply to a 110 limited impact operation directly adjacent to a 112 regular operation submitted by the same applicant, provided that the 110 limited impact operation precedes the 112 regular operation permit.

20.7 – Inspections

20.7.1 – General Guidelines

20.7.1.1 – Inspections on Citizen Complaints. The Board directs the Division to respond to citizen complaints within thirty days of receipt of the complaint. If a citizen complaint alleges either serious environmental problems associated with an operation or potential violation of approved conditions, rules, or statutes, the Division shall conduct an inspection as soon as possible, but no more than five working days after receipt of the complaint.

20.7.1.2 – Financial Warranty Release Inspections. A financial warranty release inspection by the Division shall be required prior to the release of a financial warranty.

20.7.1.2.1. The Division shall conduct a financial warranty release inspection of any operation located on land owned by federal agency jointly with a representative of the federal agency. Except as provided in Policy 20.7.1.2.3, the Division may waive the financial warranty release inspection requirement for an operation on land owned by a federal agency upon the Division's receipt of correspondence from the federal agency in which the federal agency indicates that the operation has been reclaimed to the federal agency's satisfaction and recommends financial warranty release.

20.7.1.2.2. Except as provided in Policy 20.7.1.2.3, the Division may release a financial warranty without an inspection for operations located on land managed by the State Land Board where the State Land Board provides correspondence stating the State Land Board is satisfied with final reclamation.

20.7.1.2.3. The Division may not waive the financial warranty release inspection requirement for an operation that is a DMO. For all DMOs, the Division shall ensure that the operator is in compliance with the requirements of Hard Rock Rule 7.2.11, conduct a financial warranty release inspection jointly with the federal agency or the State Land Board, and receive the agreement of the federal agency or the State Land Board that the financial warranty should be released.

20.7.1.2.4. In conjunction with each inspection of an operation, the Division shall note the date on which the Division most recently reviewed the financial warranty for the operation. If the financial warranty has not been reviewed in the four years preceding an inspection, the Division shall complete a financial warranty review to address site conditions and the adequacy of the amount of the financial warranty and provide its conclusions in the written report of inspection.

20.7.1.3. At the July Board meeting each year, the Division shall report to the Board the total number of inspections the Division conducted during the previous fiscal year.

20.7.2 – Inspection Types

20.7.2.1 – Complete Inspection. A complete inspection shall include review of the operation's compliance with all pertinent environmental performance standards and permit conditions.

20.7.2.2 – Partial Inspection. A partial inspection shall include review of the operation's compliance with selected relevant environmental performance standards and permit conditions, as the Division determines to be necessary.

20.7.2.3 – Aerial inspection. The Division may conduct the inspection of any operation from the air using photographic equipment. The Board encourages the Division to utilize aerial inspections judiciously and only if access to the site has been denied, is difficult, or Division personnel safety is in question. If potential violations are evident, a follow-up inspection shall occur.

20.7.3 – Hard Rock Operations. The Board directs the Division to inspect all operations that have been issued a permit under the Hard Rock Act as set forth below.

20.7.3.1 – Active Operations. The Division shall inspect all operations that are not either in temporary cessation or in any phase of post-mining reclamation once annually. The Division may adjust the frequency of inspection to every two years for operations which produce resources the Division has determined not to constitute a potential impact to the environment, such as gem stones, alabaster, or marble.

20.7.3.2 – Operations in Temporary Cessation. The Division shall inspect operations that either are in temporary cessation or an operation the Division has designated as an intermittent operator once every three years. At or near the time of the inspection, the Division is encourage to remind the operator of an operation in temporary cessation of the five year limit for temporary cessation status per section 34-32-103(6)(a)(III), C.R.S.

The Division may adjust the frequency of inspections for operations in either temporary cessation or final reclamation, provided that there are no known environmental concerns as determined in the professional opinion of the Division.

20.7.3.3 – Operations in Final Reclamation. The Division shall inspect operations that are in final reclamation: (a) once during the first year following the Division's receipt of notice of reclamation to ensure reclamation is progressing; and (b) once during the fourth year of reclamation to evaluate whether additional tasks must be accomplished to achieve final reclamation release. The Division may adjust the frequency of inspections as the Division

deems necessary to ensure adequate monitoring of operations that are either sensitive areas or that may require particular environmental protection measures.

20.7.3.4 – Designated Mining Operations. The Division shall inspect all DMOs as set forth in this policy below. The Division has broad discretion to increase the frequency of inspection of any DMO as the Division deems necessary, considering factors including but not limited to the size of the operation, whether the operation includes an active Environmental Protection Facility, or the operation's history of violations.

20.7.3.4.1 – 110d operations and any DMO in temporary cessation shall have one complete inspection annually.

20.7.3.4.2 – 112d-1 and 112d-2 operations shall have one complete inspection annually with additional frequency, as deemed necessary based on operational complexity.

20.7.3.4.3 – 112d-3 operations shall have at least one complete inspection annually, quarterly inspections if active, and more frequent inspections as deemed necessary based on operational complexity.

20.7.4 – Construction Materials Operations. The Board directs the Division to inspect all operations that have been issued a permit under the Construction Materials Act as set forth below.

20.7.4.1 – 110c Permits. All 110c operations shall be inspected at least once every five years unless it meets criteria from section 20.7.3.4 below.

20.7.4.2 – 111c Permits. All 111c operations shall be inspected once annually until the Division determines the operation to be in final reclamation. All 111c operations that are in final reclamation shall be inspected at least once every five years.

20.7.4.3 – 112c Permits. All 112c operations shall be inspected at least once every four years. The Division may increase the frequency of inspections as the Division deems to be appropriate, considering factors including but not limited to, whether the operation has been approved for phased bonding for mining and reclamation plans, whether the operation involves quarrying, whether the operation has exposed or potentially exposed groundwater, whether the operation has a pattern of violations, or whether the operation has any other specific reclamation liability that may require more frequent reviews.

20.7.4.4 – Operations in a Stream Bed or Channel. The inspection frequency set forth in this Policy 20.7.3.4 shall apply to any 110c, 111c, and 112c operation that is partially or completely located within a stream bed, river channel, or other area of particular environmental sensitivity, regardless of permit acreage. All permitted construction materials operations , regardless of permit acreage, shall

be inspected at least once every two years, or more frequently if deemed necessary.

20.7.5 – Notices of Intent

The Board directs the Division to inspect all operations for which a NOI has been submitted to and approved by the Division in accordance with section 34-32-113 and 34-32.5-113, C.R.S. as set forth below.

20.7.5.1 – Pre-operational Inspections. The Division shall evaluate whether to conduct a pre-operational inspection of any new NOI operation or any modification to an existing NOI operation on a case by case basis. The Division shall conduct a pre-operational inspection of any new NOI or any modifications to an existing NOI operation at which historic or pre-law features are to be disturbed or re-established. When sites are on land managed by a federal agency, a joint inspection with the federal agency is advised. The Division may determine not to conduct an inspection of any NOI operation which the Division determines to have minimal disturbance area or no potential to impact either the environment or the prevailing hydrological balance, provided that the NOI includes photographic documentation of pre-activity conditions.

20.7.5.2 – Potential for Environmental Impact. The Division shall inspect any active NOI operation that the Division determines to have no potential to affect the prevailing hydrological balance or have any other environmental impacts at least once every four years. The Division shall inspect any active NOI operation that may affect the prevailing hydrological balance or have any other environmental impacts as the Division deems necessary, but no less than once every four years.

20.7.5.3 – NOI Operations in Reclamation. The Division shall inspect all active NOI operations that are in any phase of reclamation: (a) once during the first year following the Division's receipt of notice of reclamation to ensure reclamation is progressing; and (b) once during the fourth year of reclamation to evaluate whether additional tasks must be accomplished to achieve final reclamation release. The Division may adjust the frequency of inspections as the Division deems necessary to ensure adequate monitoring of operations that are either sensitive areas or that may require particular environmental protection measures.

20.7.5.4 – Abandoned NOI Operations. Any active NOI operation for which an annual report is not submitted for two consecutive years shall be considered abandoned. The Division shall inspect an NOI operation that is considered abandoned for the purpose of ensuring that the financial warranty is sufficient to complete reclamation.

30.0 – Factors of Safety for Slope Stability/Geotechnical Analyses

30.1 – Definitions.

Factor of Safety – Ratio of forces resisting movement to those driving movement.

Slope Failure – the movement (sliding or collapsing) of rock and/or soil in response to gravitational stresses, often under the influence of a rainfall or seismic activity.

Slope Stability – the resistance of inclined surface to failure by sliding or collapsing.

Slope Stability Analysis – performed to assess the safe design of a human-made or natural slopes (e.g. open-pit mining, excavations, embankments, road cuts, etc.) and the equilibrium conditions.

30.2 – Declaration of Purpose

The Division of Reclamation, Mining and Safety Minerals Program (Division) issues this memorandum to promote the orderly development of the state's natural resources while considering the industry's "standard of care" relative to Factors of Safety with the intent to:

i. Protect and promote the safety and general welfare of the people of Colorado,
ii. Ensure reclamation of lands affected by mining to beneficial use, and
iii. Aid in the protection of aquatic resources and wildlife.

30.3 – Background

In the past, the Division has typically accepted a factor of safety (FS) greater than 1.0 for slope stability analyses to demonstrate "that such structures shall not be damaged by activities occurring at the mining operation" pursuant to Rules pertaining to permanent man-made structures and geotechnical stability: Construction Materials Rules 6.3.12(b) and 6.4.19(b) and 6.5 and Hard Rock Rules 6.3.12(b), 6.4.20(b) and 6.5. This practice was based on the oversimplified concept that a slope with a FS > 1.0 is stable. This is technically true **IF** there is a *comprehensive and complete* understanding of all the geologic, hydraulic, land use, and other conditions that influence the forces and stresses determining whether or not the slope in question can or will fail. However, this is very rarely possible or feasible, particularly in a mining application. An FS must account for uncertainties (geologic setting, groundwater conditions, mining parameters, etc.), and the selection of an appropriate FS for slope stability should consider the following factors:

1. Magnitude of damages (potential risk to human safety, environmental impact and property damage),
2. Reliability of geologic information such as the proximity to faults, orientation of jointing, and subsurface soil and water data,

3. Changes in soil properties due to mine operations and variability in subsurface material,
4. Accuracy (or approximations used) in developing design/ analysis methods,
5. Additional considerations if relevant: Construction tolerances, Relative change in probability of failure by changing the factor of safety, and Relative cost of increasing or decreasing the factor of safety.

The Division engineering staff has researched the standard of care for factors of safety accepted by the industry, including literature searches, regulatory agency requirements/guidelines, and departments of transportation standards. In order to be consistent with other Colorado State agencies, we also considered FS standards used by the Colorado Department of Transportation (CDOT) and the Colorado Geological Survey (CGS). CDOT uses the AASHTO minimum FS of 1.3 for construction slopes near roadways and utilities. CGS uses a minimum FS of 1.5 for residential areas when using "generalized" strength values, or 1.3 for analyses when good quality site-specific soil parameters are known. It should be noted that most industry standards assume a permanent slope configuration, ignoring the temporary conditions that are frequently observed in the mining industry.

30.4 – Guidance for Stability Criteria and Use of Minimum Factors of Safety

The permittee should either follow the criteria in Table 1 for all stability analyses submitted to the Division; or, alternatively, the permittee may submit stability analyses based on site-specific engineering analysis performed in consideration of good practices as specified in relevant industry guidelines and/or professional standards and reviewed by the Division on a case-by-case basis.

Slope stability analyses for existing facilities may also be reviewed on a case-by-case basis, subject to the criteria described herein.

Table 1. Recommended Minimum Factors of Safety for Slope Stability Analyses for Operations and Reclamation

Type of Structure/Consequence of Failure	Generalized, Assumed, or Single Test Strength Measurements	Strength Measurements Resulting from Multiple Tests(1)
Non-Critical Structures (e.g., fences) No imminent danger to human life, minor repair costs, and minor environmental impact if slope fails	1.3 (1.15)(2)	1.25 (1.1) (2)

Table 1. Recommended Minimum Factors of Safety for Slope Stability Analyses for Operations and Reclamation

Critical Structures (e.g., residences, utilities, dams, pipelines, irrigation canals, public roads, etc.) Potential human safety risk, major environmental impact, and major repair costs if slope fails (includes Environmental Protection Facilities/EPFs, such as tailings facilities, heap leach pads, process effluent ponds, milling facilities, overburden/waste rock storage facilities, and hazardous/toxic material storage facilities, etc.)	1.5 (1.3) (2)	1.3 (1.15) (2)

(1) The number of tests required to provide a high degree of confidence in the strength parameters used depends on the variability of the material being tested and the extent of disturbance.

(2) Numbers without parentheses apply for analyses using static conditions. Those within parentheses apply to analyses using seismic parameters. Based on site specific conditions, seismic analyses may be required and parameters selected shall be consistent with the risk and duration of the condition being considered.

* The values presented in Table 1 are not intended to supersede standards required by other agencies.

40.0 – Reserved.

50.0 – Reserved.

60.0 – Reserved.

70.0 – Board Administrative Procedures.

70.1 – Rotation of Board Chair

The position of Chair of the Board shall rotate among all members with the exception of the Department Executive Director or the Executive Director's designee and the member appointed by the State Conservation Board. Each Board member shall serve as Chair of the Board for a term of six months, beginning in April and October annually.

70.2 – Authority of Board Chair

70.2.1 – Hearing Officer. At any Board hearing conducted pursuant to section 24-4-105, C.R.S., the Board Chair shall serve as the hearing officer unless another Board member is otherwise designated to serve as hearing officer. The hearing officer shall have the authority set forth in section 24-4-105(4), C.R.S.

70.2.2 – Prehearing Motions and Requests. The Board authorizes the Board Chair to, at the Board Chair's sole discretion, rule upon written prehearing motions and requests prior to a Board meeting, including, but not limited to, written requests to participate in a Board hearing by telephone. The ruling upon any such motion or request by the Board Chair shall constitute a ruling of the Board. Prehearing motions and requests that are not ruled upon by the Board Chair may be considered by the Board at a Board meeting.

80.0 – Delegation to Division.

The Board makes the following delegations to the Division in accordance with section 34-32-107(2), C.R.S.

80.1 – Continuances and Withdrawals from Board Agenda. The Board delegates to the Director authority to remove from a posted Board meeting agenda any matter that the Director determines to be continued or withdrawn. The Division shall include in the Board meeting agenda packet a list of all matters continued or withdrawn from the Board's meeting agenda.

80.2 – Issuance of Cease and Desist Orders. The Board delegates to the Director authority to sign and issue, on behalf of the Board, cease and desist orders in any circumstance that, in the determination of the Director, requires issuance of a cease and desist order pursuant to sections 34-32-122(4)(c), 34-32-124(2)(a), or 34-32.5-124(2), C.R.S. The Division shall schedule the cease and desist order for Board consideration at the earliest Board meeting following issuance of the cease and desist order. At such meeting, the Board shall have discretion to affirm, rescind, or modify the cease and desist order, or take such further action as the Board deems appropriate.

80.3 – Issuance of Notices of Violation. The Board delegates to the Director authority to sign and issue, on behalf of the Board, notices of violation to any operator that, in the determination of the Director, has failed to pay an annual fee required by section 34-32.5-116(3), C.R.S. within sixty days of the permit anniversary date.

80.4 – Appointment of Prehearing Conference Officer. The Board delegates to the Director authority to appoint a prehearing conference officer to conduct a prehearing conference in any matter where the Board's rules allow or require the appointment by the Board of a prehearing conference officer. The prehearing conference officer shall have no involvement in the matter to be heard by the Board and shall be employed in a specialty area (*i.e.*, minerals, coal, inactive mines, mine safety) different than the specialty area of the matter to be heard by the Board.

STATE OF COLORADO

Eschberger - DNR, Amy <amy.eschberger@state.co.us>

TR application 7, for Cross Gold Mine (m1977-410) a Geotechnical Stability Exhibit in accordance with Rule 6.5(3)

rmittasch@nedmining.com <rmittasch@nedmining.com> Thu, May 7, 2020 at 1:00 PM
To: "Eschberger - DNR, Amy" <amy.eschberger@state.co.us>

Dear Ms. Eschberger:

As you requested in your correspondence dated April 7, 2020, attached is the Technical Revision Application to the Division. I will be mailing a hard copy to your office.

This Technical Revision is to Geotechnical Stability Exhibit in accordance with Rule 6.5(3), which will show through appropriate geotechnical and stability analyses that off-site areas will be protected based on current conditions at the Idaho Tunnel, with appropriate factors of safety incorporated into

Please feel free to contact our Team or myself if there are any questions regarding this matter.

Yours truly,

Richard Mittasch

Calais Resources Colorado, Inc.

Grand Island Resources, LLC

VP of operations

(516) 582-0833

Rmittasch@nedmining.com

Idaho Tunnel Slope Stability TM (final)x.pdf
3678K

COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY
1313 Sherman Street, Room 215, Denver, Colorado 80203 ph(303) 866-3567

REQUEST FOR TECHNICAL REVISION (TR) COVER SHEET

File No.: M- _____ Site Name: _____

County _____ TR# _____ *(DRMS Use only)*

Permittee: _____

Operator (If Other than Permittee): _____

Permittee Representative: _____

Please provide a brief description of the proposed revision: _____

_____

_____

As defined by the Minerals Rules, a Technical Revision (TR) is: "a change in the permit or application which does not have more than a minor effect upon the approved or proposed Reclamation or Environmental Protection Plan." The Division is charged with determining if the revision as submitted meets this definition. If the Division determines that the proposed revision is beyond the scope of a TR, the Division may require the submittal of a permit amendment to make the required or desired changes to the permit.

The request for a TR is not considered "filed for review" until the appropriate fee is received by the Division (as listed below by permit type). Please submit the appropriate fee with your request to expedite the review process. After the TR is submitted with the appropriate fee, the Division will determine if it is approvable within 30 days. If the Division requires additional information to approve a TR, you will be notified of specific deficiencies that will need to be addressed. If at the end of the 30 day review period there are still outstanding deficiencies, the Division must deny the TR unless the permittee requests additional time, in writing, to provide the required information.

There is no pre-defined format for the submittal of a TR; however, it is up to the permittee to provide sufficient information to the Division to approve the TR request, including updated mining and reclamation plan maps that accurately depict the changes proposed in the requested TR.

Required Fees for Technical Revision by Permit Type - Please mark the correct fee and submit it with your request for a Technical Revision.

Permit Type	**Required TR Fee**	**Submitted** (mark only one)
110c, 111, 112 construction materials, and 112 quarries	$216	☐
112 hard rock (not DMO)	$175	☐
110d, 112d(1, 2 or 3)	$1006	☐

Cross Mine (M1977-410)

Technical Revision No. 7

Submitted by:

Calais Resources Colorado, Inc.

Prepared for:

Colorado Division of Reclamation, Mining and Safety

May 7, 2020

Technical Memorandum

DATE:	7 May, 2020	**PROJECT:**	Cross Mine
ATTENTION:	Richard Mittasch	**COMPANY:**	Grand Island Resources, LLC
PREPARED BY:	Dave Hallman, PE, PG	**REVIEWED BY:**	RM

SUBJECT: Idaho Tunnel Portal – Slope Stability Analysis

1.0 INTRODUCTION

This Technical Memorandum has been prepared to present geotechnical stability analyses for the slopes adjacent to the Idaho Tunnel Portal in response to a Minerals Program Inspection Report from DRMS dated March 26, 2020 in conjunction with the Cross Mine, DRMS Permit No. M-1977-410. As indicated in the Inspection Report from DRMS, the Idaho Tunnel (at the Caribou Mine) has collapsed creating potential slope stability issues near the northern permit boundary and the adjacent Caribou Road. This is a concern pursuant to Rule 3.1.5(3) and C.R.S. 34-32-116(7)(h) which require areas outside of the affected land to be protected from slides or damage occurring during the mining operation and reclamation.

The stability evaluation presented was based largely on observation and professional judgement as limited engineering data was available. This work was conducted by Mr. David Hallman, a geological engineer with 37 years of experience and licensed as Colorado Professional Engineer (Civil) 26076, as affirmed by the stamp and signature affixed at the end of this document.

1.1 BACKGROUND

1.1.1. Location

The Cross Mine site is located approximately 3 miles west of Nederland, Colorado adjacent to the Roosevelt National Forest, at an elevation of 9700 feet above mean sea level (MSL). The general location is parcels of land in Section 9, Township 1 South, Range 73 West of the 6 Principal Meridian, County of Boulder, State of Colorado. This is an existing hard rock mining operation owned by Grand Island Resources Inc. (GIR), although at present, no active mining is being conducted.

1.1.2. Portal Rehabilitation

Entrance to the Idaho Tunnel at the mine site was in such a state of neglect and disrepair from long-term gradual deterioration that it was not safe to enter and operate the mine water system per the approved permit. In particular, the timber ground supports at the portal were tilted dangerously askew and the ground slopes adjacent to the portal also exhibited signs of shallow slope failures and sloughing, such as titled trees (Photograph 1).

Photograph 1 – Idaho Tunnel Portal prior to Rehabilitation

The timbered tunnel entrance and area around the opening were excavated in November 2019 in order to stabilize the tunnel portal. This effort involved excavating approximately 25 feet into the hillside, installing soil anchors, and applying a layer of shotcrete of variable thickness (Photograph 2). This work was performed by Harrison Western Construction Corporation, a licensed contractor.

The tunnel portal is being enlarged to a nominal 10-ft. x 10-ft. opening in order to replace the existing ground support which is failing and remove the loosened rock surrounding the present opening. The enlarged tunnel opening is supported by steel sets installed at 4-ft center-to-center spacing with full lagging on the back and ribs. The steel sets consist of W6x20 wide-flange I-beams and support posts. The lagging consists of 3-in. x 8-in. Douglas Fir planks. Grouted threadbar spillings were installed at 12-inch spacing above the tunnel opening prior to excavation.

In December 2019 a roof collapse occurred a short distance into the tunnel during initial rehabilitation efforts by Harrison Western. The roof failure occurred in an 11-12 ft section of unsupported ground as the tunnel opening was being enlarged through a section of mixed soil and decomposed gneiss. The collapse completely blocked the mine opening, crushed the pipe carrying the flow of mine water, and daylighted in the slope below County Road 128 (Caribou Road), leaving a large remnant void above the tunnel opening which estimated to be approximately 65 cubic yards.

Photograph 2 – Current Condition of the Idaho Tunnel Portal. The three safety cones and caution tape at the top of the slope mark the edge of Country Road 126 (Caribou Road). The crown hole over the void is visible between the two small trees above the portal.

1.1.3. Collapse Repair

In late February 2020, two additional new steel sets were installed in the area of the tunnel portal beneath the collapse and lined with lagging on the ribs and back. As with the initial two steel sets, these consisted of W6 x20 wide flange steel beams and posts installed on 4-ft center-to-center spacing. Lagging consisted of 3-in. x 8-in. treated Douglas Fir planks. This design and installation were inspected and approved by Mr. David Hallman, a geological engineer with 37 years of experience and registered as Colorado Professional Engineer No. 26076.

The narrow gap between the new ground supports and the existing ground was been closed using pieces of lagging, plywood, polyurethane foam, and caulk to create a tight seal. The remaining void created by the portal collapse will be backfilled with pervious cellular concrete to provide permanent ground support that will stabilize the slope and allow drainage.

The completed cellular concrete backfill will be significantly stronger than the soil which originally comprised the slope while imposing only a fraction of the weight. This will serve to increase stability of the slope below the county road. The flowable nature of the backfill will allow it to completely encapsulate the tunnel lining system in a solid mass to create robust permanent support for the mine entrance. The previous nature of the backfill will allow groundwater to freely drain from the slope in order to ensure long-term stability.

Mix Design Information (per cubic yard):

Cement:	622 lbs
Water	323 lbs
Cellular Foam:	18.7 cf
Air Content:	69%
Unit Weight:	35.0 pcf
water/cement ratio:	0.52
Permeability (ASTM D2434):	8.7 x 10^{-2} cm/sec

Compressive Strength

7-Day:	100 psi
28-day:	214 psi

Placing the cellular concrete backfill was originally scheduled for April 1, 2020 but was postponed due to the Corona virus and social distancing concerns. At this time, it is not known when the work will resume. Following placement, the cellular concrete backfill will harden rapidly and allow rehabilitation of the tunnel to resume within several days following receipt of the appropriate approvals

This Technical Memorandum presents the results of an engineering evaluation of the geotechnical stability of the overall slopes above and adjacent to the portal slopes, and provides this information to DRMS.

1.2 Geology

1.2.1. Regional

The Caribou area, which is part of the Front Range Mineral Belt, is underlain by igneous and metamorphic rocks of pre-Cambrian age. These rocks are and, with the exception of locally covered by unconsolidated Quaternary glacial and stream deposits. . is devoid of sedimentary rocks., The pre-Cambrian rocks in the Caribou area and in the adjoining areas to the north and south are intruded by Tertiary igneous rocks which form several small stocks. The three principal rock formations in the Caribou area are the Idaho Springs formation and the Boulder Creek granite of pre-Cambrian age, and the Tertiary monzonite of the Caribou stock. The Caribou stock also contains comprises small bodies of diorite, diabase, gabbro, and ultra-basic rocks. Minor units The Idaho Springs formation consists of include pre-Cambrian amphibolite, mica schist, biotite gneiss, quartz monzonite gneiss and pegmatite.

1.2.2. Roadside Geology

The Caribou Road (County Road 126) above the Idaho tunnel is located entirely in mixed soil and rock colluvium and regolith materials. Fresh gneiss of the Idaho Springs formation is present a short distance above the road and to the south of the tunnel portal.

1.2.3. Tunnel Geology

Figure 1 depicts a 1954 geologic map[1] of the initial portions of the Idaho Tunnel which was annotated by the previous operator and local miner, Tom Hendricks. As depicted on this map the ground conditions starting at the portal consist of "Alluvial Rock" transitioning to "Decomposed Granite" and then "Weak Hard Rock", none of which are proper terms to describe the geology, although they do provide some indications in that regard.

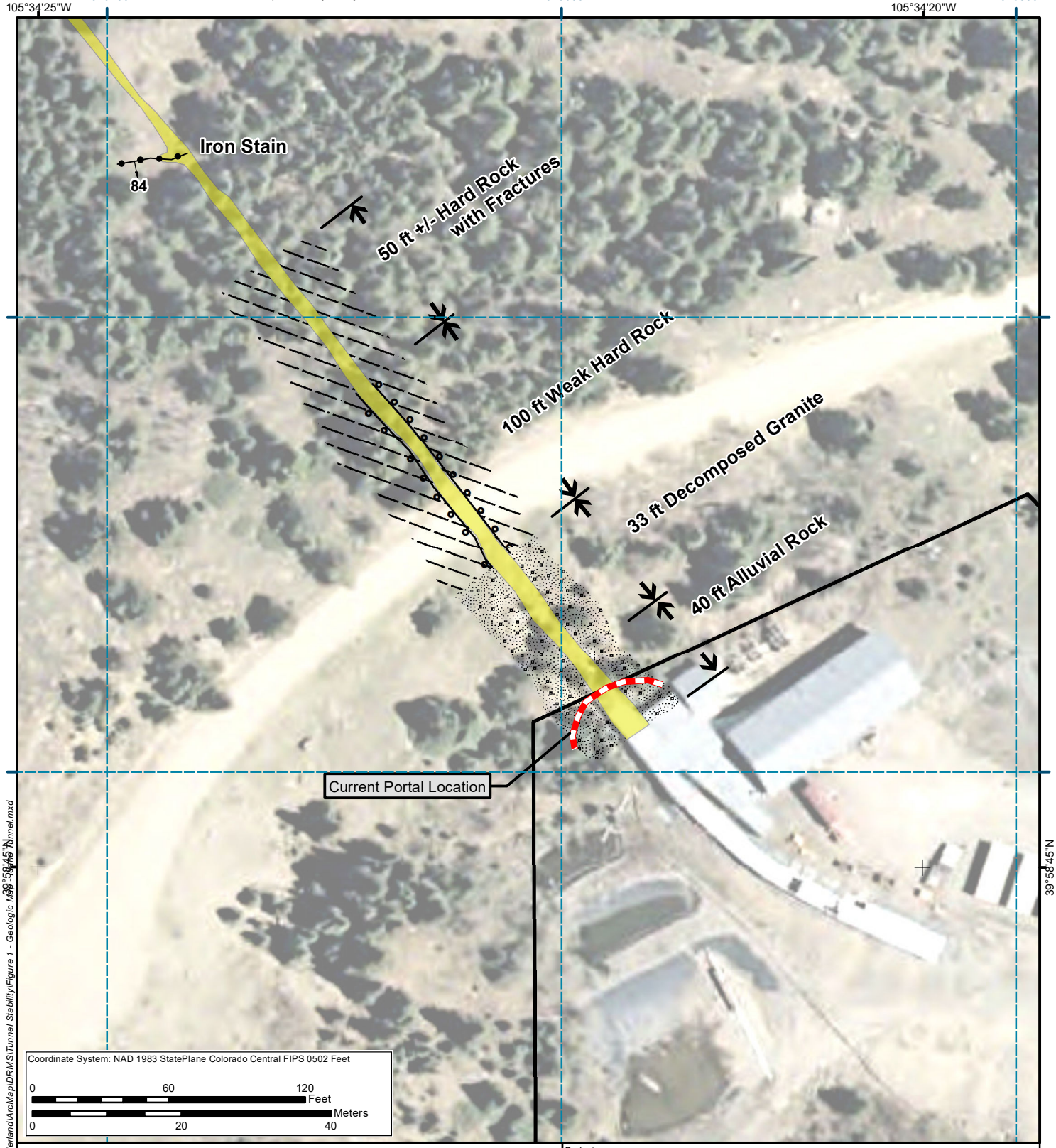
Geology exposed in the initial portal excavation and collapse void includes fractured and weathered blocky gneiss in the left wall or 'rib' when looking into the tunnel (Photograph 3). This material is interpreted as similar to the "Weak Hard Rock" depicted on Figure 1.

Photograph 3 – Weathered and fractured gneiss in the left rib beneath the portal collapse. Green paint marks at 4-ft intervals mark the approximate location for the next steel sets.

The right rib of the portal in the area of the collapse occurs in granular decomposed gneiss overlying deeply weathered blocky gneiss (Photograph 4). This material is interpreted as similar to the "Decomposed Granite" depicted on Figure 1.

Regolith and colluvial soils are exposed in the collapse void above the tunnel horizon (Photograph 5), excavation wing walls (Photograph 6), and the Caribou Road cut. This material is interpreted as similar to the "Alluvial Rock" depicted on Figure 1.

[1] Moore, F.B., Cavender, W.S., and Kaiser, E.P., 1954; "Geology and Uranium Deposits of the Caribou Area, Boulder County, Colorado." US Geological Survey Trace Elements Investigations Report 228, March 1954



Legend

- SWMP Boundary
- Idaho Tunnel
- Portal Location

Geology

- Overburden
- Gneiss and Schist
- Cribbing
- 85 Vein, showing dip; dashed where inferred

N

Project: Idaho Tunnel Portal Slope Stability

Title: **Geologic Map - Idaho Tunnel**

GRAND ISLAND RESOURCES

Project No. US 0401			File No.	
GIS:	JST	05/06/20	Scale As Shown	Rev 0
Check:	JST	05/06/20	**Figure 1**	
Review:	JST	05/06/20		

Path: C:\Users\jst52\Documents\NMXG\S\Projects\Wedefriand\ArcMap\DRMS\Tunnel Stability\Figure 1 - Geologic Map - Idaho Tunnel.mxd

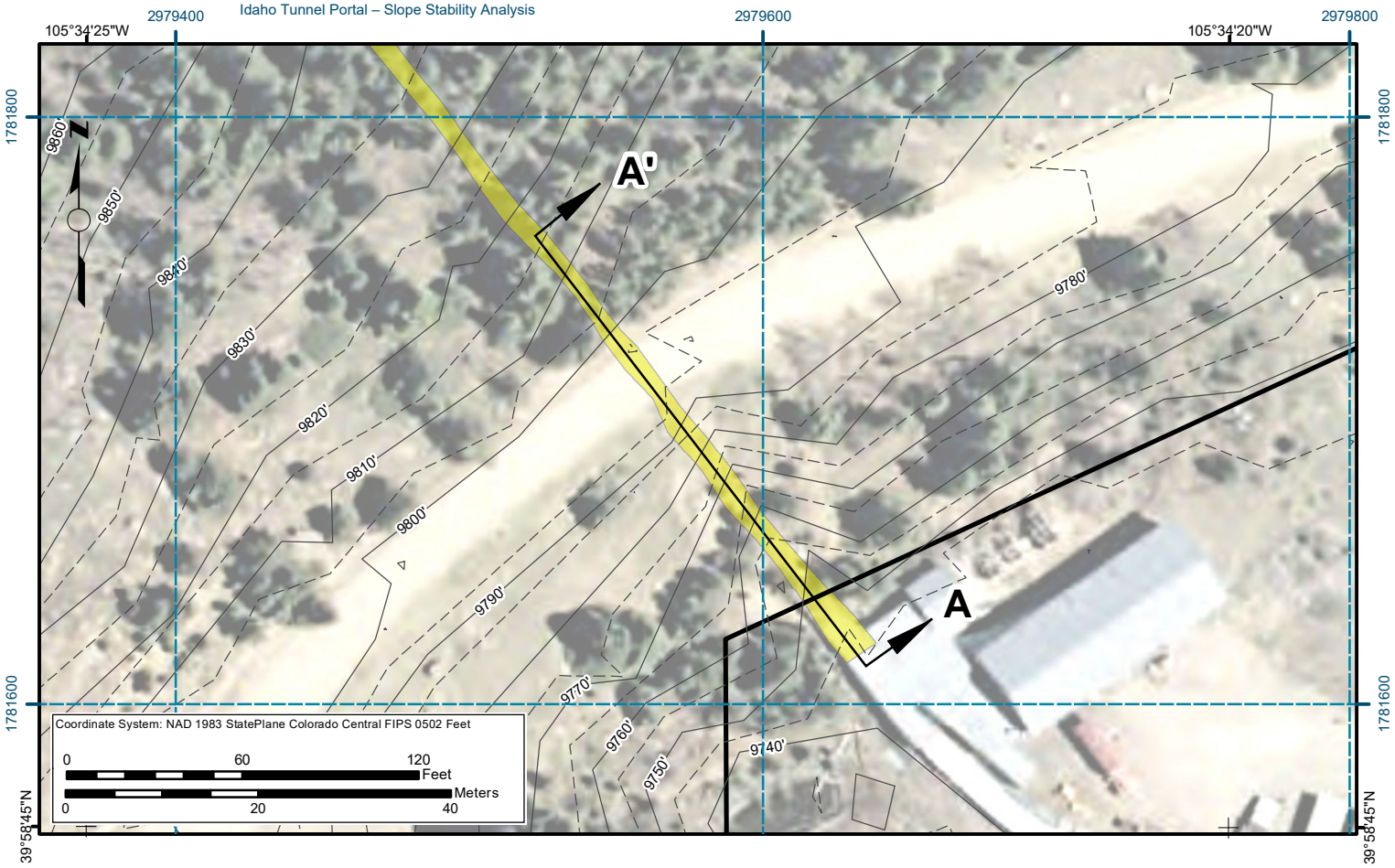
Photograph 4 – Decomposed gneiss overlying weathered and fractured gneiss in the right rib beneath the portal collapse. Green paint marks the approximate location of the next steel sets at 4-ft intervals.

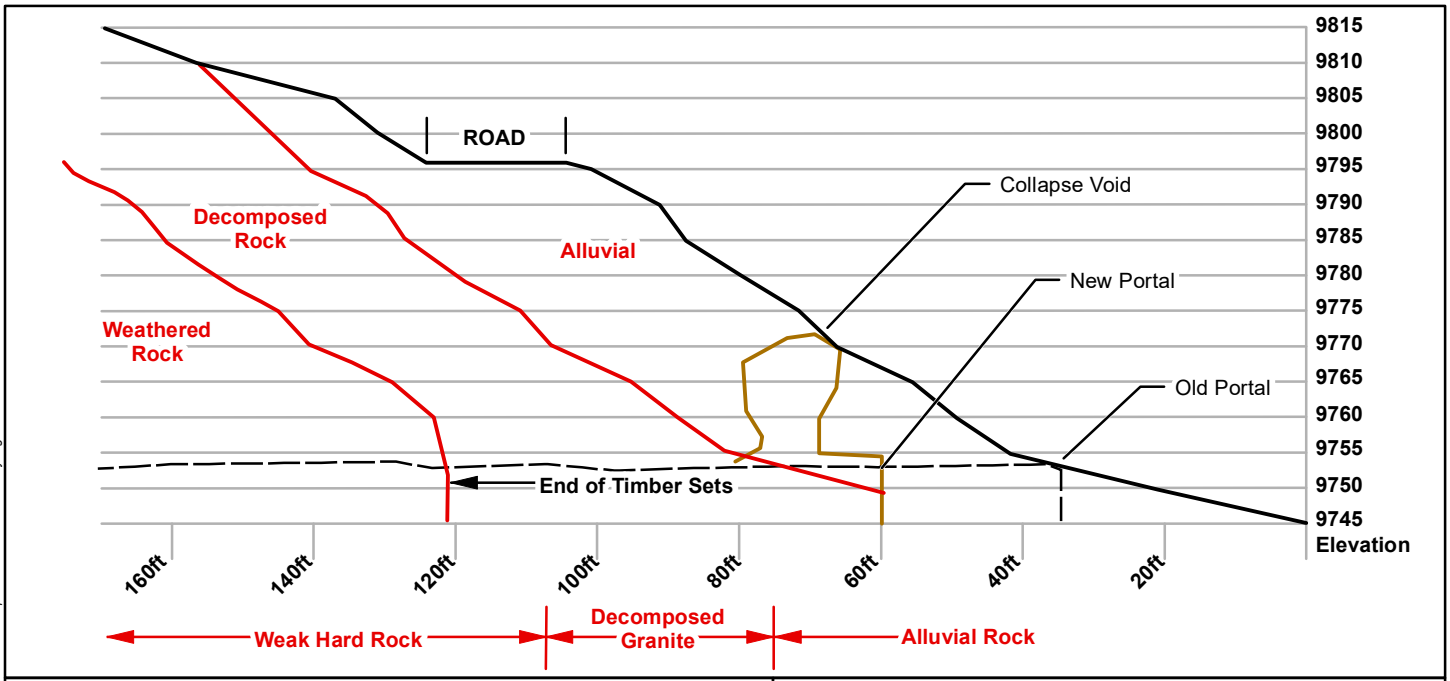
Photograph 5 – Regolith and colluvium exposed in the walls of the collapse void. The threaded bars are some of the spillings which were installed before enlarging the portal excavation.

Photograph 6 – Regolith and colluvium exposed in the right (north) wing wall of the portal excavation.

GIR has explored the first 200 ft of the Idaho Tunnel in order to investigate the corresponding ground conditions that can be anticipated during the rehabilitation efforts. Starting from the back of the last steel set, the existing ground support consists of timber sets with full lagging on the back and ribs for the next 41 ft, followed by rock bolts and chain link mesh. The timber sets retain loose soil and rock, obscuring the undisturbed ground. Loose blocky material has also fallen onto much of the chain link and pulled it from the roof in places. The ground mass and rubble observed consists of granular fragments of decomposed rock mixed with blocky pieces of rock, transitioning more to angular pieces of highly fractured weathered rock with increasing distance into the tunnel. Other than a change in the type ground support previously employed, there does not seem to be a well-defined point in the tunnel at which a change from "Decomposed Granite" to "Weak Hard Rock" occurs. It appears to be a gradual transition with some of each type of material found within the other.

At approximately 200 ft from the new portal there is a collapse after which, the rock exposed in the sides of the tunnel (ribs) appears to be fresh and less fractured gneiss, the tunnel exhibits a more regular 6 ft x 6 ft opening, and there is no ground support visible. This is interpreted as the "Hard Rock with Fractures" indicated on Figure 1.





Legend

- SWMP Boundary
- Idaho Tunnel

NOTE:
Contours were generated using open source LiDAR data collected from *https://www.opentopography.org/*.
Golden Field Services processed the data using Global Mapper and provided ground truthing on site using GPS equipment. Golden Field Services then combine the ground truthing and open source data.

Project: Idaho Tunnel Portal Slope Stability

Title: **Plan and Profile**

GRAND ISLAND RESOURCES

Project No. US 0401			File No.	
GIS:	JST	05/06/20	Scale As Shown	Rev 0
Check:	JST	05/06/20	**Figure 2**	
Review:	JST	05/06/20		

Path: C:\Users\jst52\Documents\NMXG\S\Projects\Nederland\ArcMap\DRMS\Tunnel Stability\Figure 2 - Plan and Profile.mxd

2.0 PROBLEM DESCRIPTION

Figure 2 presents a plan and profile of the Idaho Tunnel based on 10-ft topographic contours of the original ground surface. Superimposed on this figure are the approximate position of the rehabilitated tunnel portal following excavation.

The material encountered during portal excavation and currently exposed in the wing walls consisted of regolith and colluvium, with some decomposed rock encountered at depth. The excavated slopes stood unsupported following excavation and were dry at the time (Photograph 7). The maximum height at the taller left (south) wing wall is 28 ft, sloping at an angle of 70-80 degrees from horizontal. The top of the excavation is approximately 40 ft from County Road 128 (Caribou Road) at the closest point and 20 ft lower in elevation. This creates potential long-term concerns for stability of the road.

Photograph 7 – Idaho Tunnel Portal following excavation

The excavated slope above the portal opening and wing walls were reinforced with 10- and 20-ft soil nails, 6-gauge wire mesh, and nominal 6-inches of fiber-reinforced shotcrete. Grouted threadbar spillings were also installed at 12-inch spacing above the portal. These were reportedly 35 ft long, extending into harder ground and grouted. Unfortunately, little as-built documentation is available.

As of May 2, 2020, the sink hole above the collapse has crown slightly in size. Otherwise, there are no obvious signs of slope stability issues with the excavation or adjacent slopes, such as cracking or slumping, despite the occurrence of spring thaw and presence of some ground water. Locations which had been seeping water have stopped (Photograph 2) and the ground exposed in the non-shotcrete covered margins of the excavation has dried considerably.

3.0 STABILITY ANALYSIS

3.1 Approach

The stability analyses were conducted as two-dimensional limit-equilibrium analysis using commercially available software. Three cases were considered at which the slope was observed to be stable and therefore must exhibit a Factor of Safety (FoS) greater than unity; at the end of excavation, during spring thaw, and with an open void present. For the end of excavation scenario, the slope reinforcement was neglected in the analysis and the slope was assumed to be fully drained. For the spring thaw scenario, the presence of groundwater in the slope was considered in the analysis. The open collapse void and backfilled void were considered separately.

The actual FoS should be higher than the results presented for 2D analyses section due to the concaved slope orientation and 3D edge effects. Studies have shown that these 3D effects can become significant, often increasing the FoS by 10-20 percent, or even more[2]. This effect tends to become more significant as the amount of slope curvature increases, particularly as the ratio of the slope width to slope height drops below 3. In the case of the Idaho Tunnel Portal, the excavation has a relatively narrow open width of approximately 30 ft at the base of the mouth of the excavation relative to a height ranging from 15 to 28 ft. These effects have been considered qualitatively in the results discussion.

3.2 Software

The stability analyses were conducted using the RocScience SLIDE2 software, a 2D slope stability program for evaluating the safety factor or probability of failure, of circular and non-circular failure surfaces in soil or rock slopes. Slide2 analyzes the stability of slip surfaces using vertical slice or non-vertical slice limit equilibrium methods like Bishop, Janbu, Spencer, and Sarma, among others. Search methods can be applied to locate the critical slip surface for a given slope. The Bishop method of slices for circular failures surfaces while the Janbu method of slices for satisfying both moment and force equilibrium was adopted for non-circular surfaces.

The Slide2 software also allows the effects of slope reinforcement to be included in the analyses.

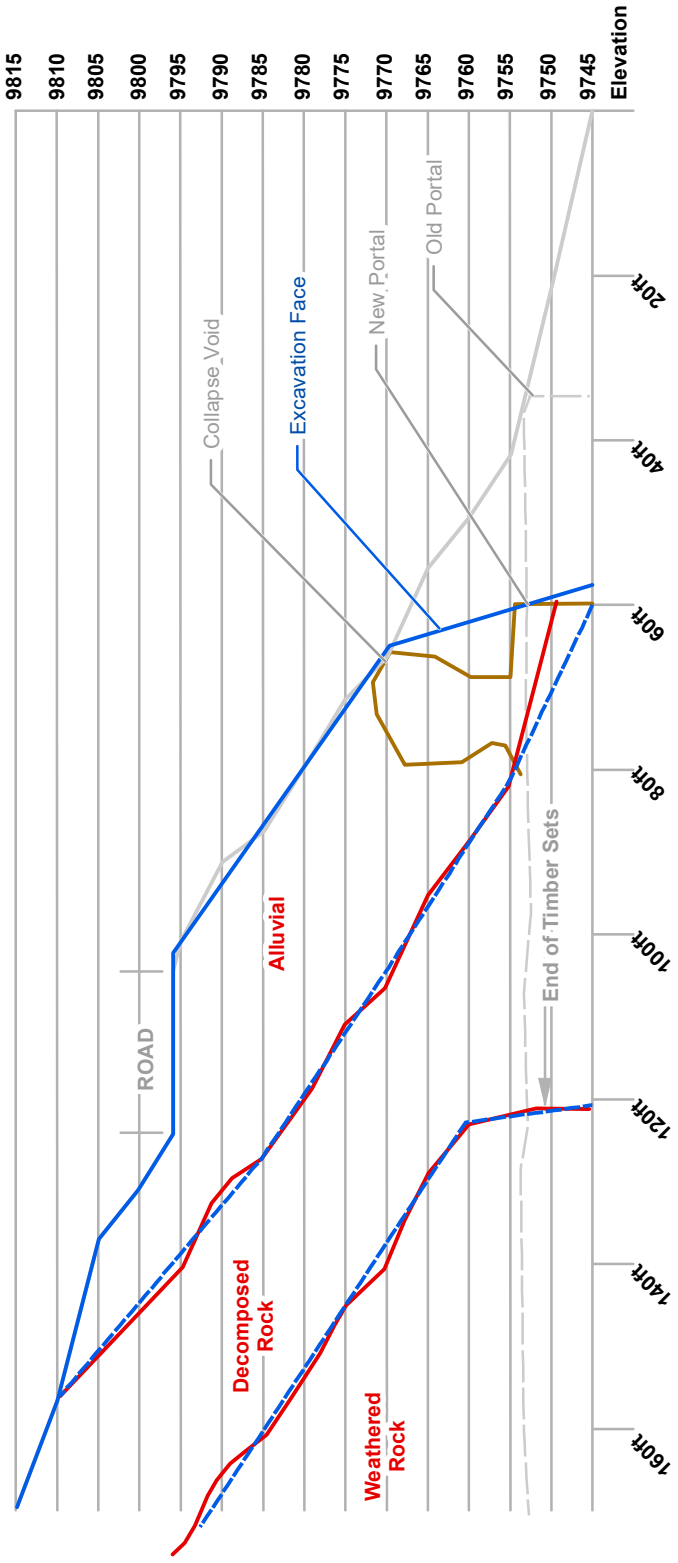
3.3 Model Input

3.3.1. Slope Geometry

An idealized representative two-dimensional cross-section was considered for analysis. This section consisted of the profile along the axis of the tunnel included on Figure 2, at the maximum cut slope on the left (south) side of the portal excavation. The idealized slope consisted of a 28-ft high excavation at an angle of 75-degrees then natural ground sloping at approximately 40 ft to the edge of the 20-ft wide County Road. Figure 3 presents the idealized slope stability cross-section superimposed on the tunnel profile section.

Included on this figure is the assumed material distributions as described in the following section.

[2] Zhang, Y., Chen, G., Zheng, L., Li, Y., and Zhuang, X,. 2013; “Effects of geometries on three-dimensional slope stability.” Canadian Geotechnical Journal. Vol. 50, No. 3, pp. 233 – 249.



Project
Idaho Tunnel Portal Slope Stability

Title
Idealized Slope Stability Analysis Section

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Project No. US 0401			File No.	
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3.3.2. Material Distribution

An "Alluvial Rock" soil unit was assumed to comprise the first 40 ft of the original tunnel as depicted on Figure 2. Based on the rock materials exposed at the base of the portal excavation (Figure 7) and currently exposed in the tunnel ribs (Photographs 3 and 4), this is a conservative assumption as at least some portions of this interval will include decomposed or weathered rock.

For the stability analysis, the "Decomposed Granite" unit was assumed to comprise the next 33 ft at the tunnel horizon. The transition from "Decomposed Granite" to "Weak Hard Rock" was modeled to coincide with the change in the type of ground support used in the tunnel. This is slightly further into the slope than the geology depicted on Figure 1 and therefore, more conservative.

This layered profile was then carried up the height of the slope for the stability analysis section as depicted on Figure 3. In reality, these layers are likely thickest at the toe of the slope down at the portal level and taper in thickness moving higher up the slope and this assumption will also be conservative.

3.3.3. Material Properties

The analyses incorporated shear strength parameters for the soil material, decomposed rock and weak weathered rock mass separately. Since the slope height is not great, the shear stresses will be low. For the low range of stresses present, equivalent linear Mohr-Coulomb shear strength parameters were assumed.

During excavation the regolith and colluvium "Alluvial Rock" unit was observed to stand near-vertical for up to 28 ft without ground support. From an engineering perspective this material consists of poorly-graded sandy gravel with cobbles, silt and clay (GP). For the purposes of the stability analysis this material was assigned a friction angle of 38 degrees and 500 psf cohesion with a moist unit weight of 125 pcf. Areas which contain a higher proportion of coarse rock fragments will exhibit higher shear strength, and the overall average strength is likely higher, however, if failure were to occur it will tend to pass through the weaker materials which offer less resistance.

From an engineering perspective the "Decomposed Granite" unit consists of rock which has been weathered and decomposed in situ, but has not been disturbed and retains the original rock fabric. This material represents a weak rock mass for which the Hoek-Brown criterion[3] was used to estimate the average rock mass strength across this material based on a large body of empirical data. Assumed rock mass parameters for Decomposed Rock:

Intact Rock UCS = 1000 -2000 ksf (7,000 – 14,000 psi)
GSI = 15 (Disintegrated with highly weathered surfaces with soft clay coatings or infilling)
mi = 25
D = 0

[3] E.Hoek and E.T.Brown, 2018; "The Hoek–Brown Failure Criterion and GSI – 2018 Edition." Journal of Rock Mechanics and Geotechnical Engineering, Volume 11, Issue 3, June 2019, Pages 445-463

The "Weak Hard Rock" unit represents highly fractured rock with some weathering and is quite variable. In some areas the material is quite weathered and grades into fully decomposed rock, while in other areas it more closely resembles fractured hard rock with little weathering present. Assumed rock mass parameters for Weak Hard Rock:

Intact Rock UCS = 1000 -2000 ksf (7,000 – 14,000 psi)
GSI = 45 (Blocky/Disturbed/Seamy with rough, slightly weathered, iron stained surfaces -or- Very Blocky with smooth, moderately weathered and altered surfaces)
mi = 25
D = 0

3.3.4. Ground Support Elements

Due to their relatively short length and irregular pattern of placement, the soil anchors were neglected in the analyses. The shotcrete will have little overall effect on global stability of the slope and was also neglected in the analyses for conservatism. The primary purpose of the shotcrete is to control shallow surface sloughing and raveling.

3.3.5. Idaho Tunnel

Due to the ground support elements that will be employed and its small size relative to the scale of the slope, the tunnel opening was not included in the stability section. Spillings installed above the top of the tunnel opening will become integrated with the cellular concrete void fill to help stabilize the opening and face of the excavation below the County Road. Its is anticipated that additional spillings and possibly forepolling will be required when tunnel rehabilitation resumes. These measures as well as the timely installation of steel sets or shotcrete and mesh as ground support for the tunnel will be employed to prevent additional collapse beneath the road.

3.3.6. Groundwater Conditions

The slope was initially modeled as drained, without groundwater to calibrate the model to conditions which existed as the excavation was completed.

Subsequently, a parametric study was conducted to evaluate the sensitivity to water levels to reflect conditions which may exist during spring thaw. This was conducted by progressively raising a perched water table within the Alluvial Rock unit in 5 ft increments to evaluate the effect this had on the Factor of Safety.

3.3.7. Collapse Void

The open collapse void was neglected in the base case analyses since it is not present everywhere within the slope. However, its inclusion is useful for back analysis to provide constraint on the shear strength of the material comprising the slope.

The 200 psi cellular concrete void fill is much stronger than the soil and rock colluvium material it replaces. Additional runs were made to assess the amount of beneficial effect this mass of stronger material has on stability of the slope in the sections where it will be present.

4.0 ANALYSIS RESULTS

Analysis of the slope under drained conditions indicates a minimum Factor of Safety (FoS) failure surface of 1.36 for a non-circular failure of the excavation slope. The minimum FoS for a failure surface which intersects the County Road was only slightly higher at 1.37. Figure 4 presents a summary of these stability analysis results and includes the critical failure surface as well as a summary plot of all trial failure surfaces color-coded by FoS. These analyses demonstrate that the lower FoS failure surfaces pass entirely through the colluvium and regolith soil materials due to the slope geometry. The position of the weak hard rock and decomposed rock beneath the slope has little to no effect on the overall stability.

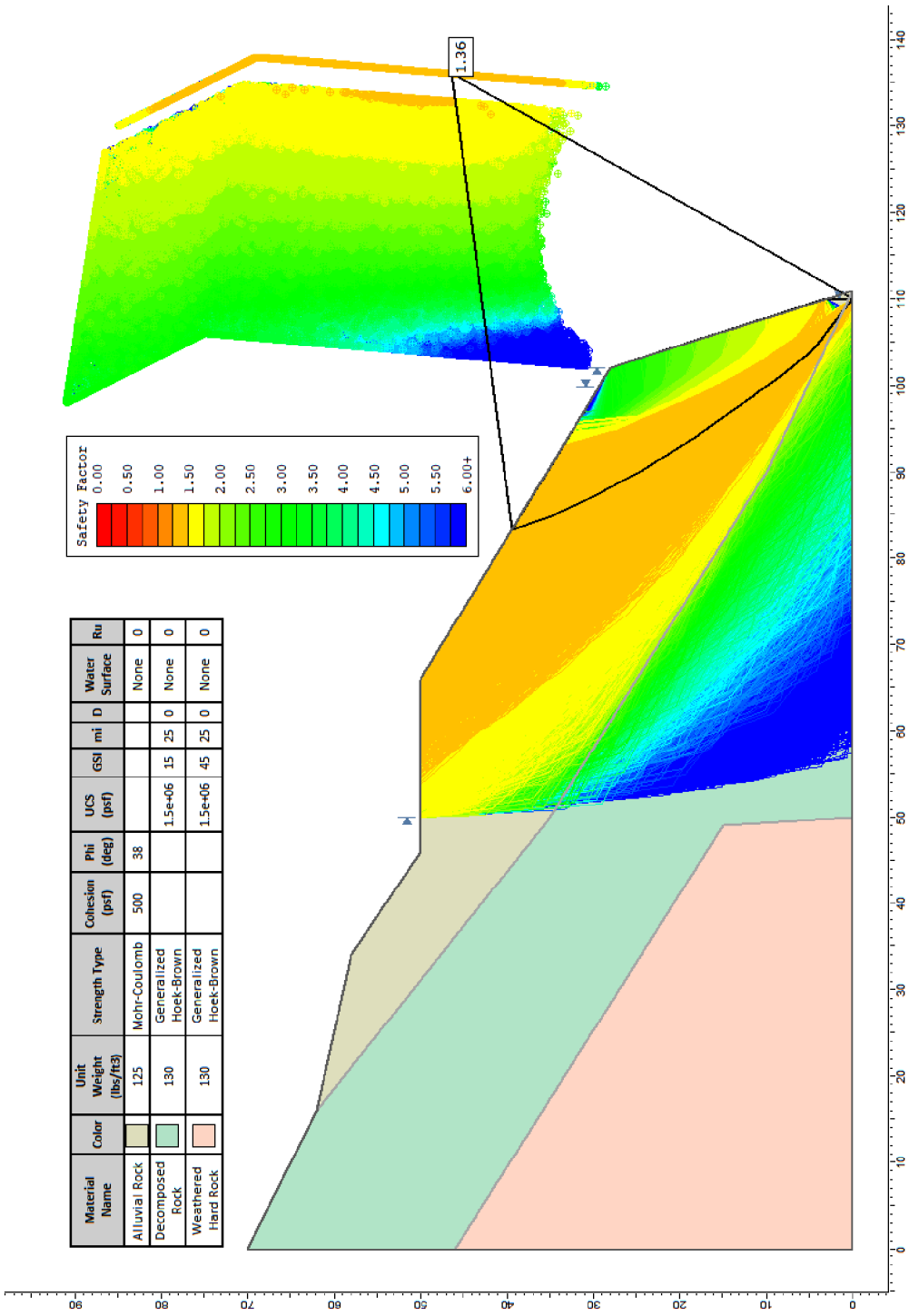
During spring thaw, several areas of seepage were observed coming through the shotcrete facing (Photograph 2). This seepage indicates that portions of the slope may become saturated during seasonally high water levels. The seepage is not present everywhere and does not discharge uniformly from the slope which suggests isolated areas of seepage flow rather than complete saturation. Table 1 presents a summary of perched water depth with the Alluvial Rock unit versus FoS. As indicated in this table, a perched water depth of 15 ft, or about half the thickness of the material, results in a FoS of 1.0. Figure 5 depicts the stability section with the assumed perched water table and critical failure surface from this analysis.

Including the open collapse void in the stability section reduces the minimum FoS to 0.74 for a non-circular and 0.90 for a circular failure surface respectively, indicating a condition of instability. Since the slope was observed to be stable despite the presence of the tunnel and open void, these results serve to demonstrate that the shear strength adopted for the regolith and colluvial soils is conservatively low. These results are presented in the summary included in Table 1.

Including the 200 psi cellular concrete void fill within the stability section increases the FoS considerably. The minimum FoS for all trial failure surfaces passing through the cellular void fill is above 4.0.

Table 1 – Stability Analysis Summary

Model Case	Water Depth (ft)	Minimum FoS	
		Janbu, non-circular	Bishop, circular
Fully Drained	0	1.36	1.46
Perched Water	5	1.32	1.46
Perched Water	10	1.12	1.40
Perched Water	15	1.00	1.24
Open Void	0	0.74	0.90
Cellular Concrete	0	> 4.0	> 4.0



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D	Water Surface	Ru
Alluvial Rock		125	Mohr-Coulomb	500	38					None	0
Decomposed Rock		130	Generalized Hoek-Brown			1.5e+06	15	25	0	None	0
Weathered Hard Rock		130	Generalized Hoek-Brown			1.5e+06	45	25	0	None	0

Project

Idaho Tunnel Portal Slope Stability

Title

Stability Analysis Summary
Base Case, Drained, Non-Circular

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Project No. US 0401			File No.
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5.0 CONCLUSIONS

For geotechnical stability of the Country Road a required minimum FoS is not defined by the current Boulder County Multimodal Transportation Standards[4]. The Colorado Department of Transportation (CDOT) Geotechnical Design Manual[5] requires a minimum FoS of 1.1 during construction and 1.3 under long term static loading conditions for embankment and cut slopes except where failure or significant deformation will affect bridges or critical facilities. Design for seismic loading conditions is not required by CDOT for non-critical slopes.

The results of the analyses and discussion presented herein are sufficient to demonstrate that the slope meets the CDOT stability criteria for the construction case in its current condition. With a calculated minimum FoS of 1.36 for the slope under drained conditions, the 2D analyses also demonstrate that the slope will meet the CDOT criteria for long-term static loading conditions provided that adequate drainage can be maintained.

The presence of seepage during spring thaw indicates that some saturation of the slope may occur during seasonally high water levels. This can have a significant deleterious effect on stability of the slope. Parametric analyses suggest that should the surficial colluvium and regolith soil materials become saturated over approximately half their thickness then instability could occur. However, seepage from the slope does not appear uniformly which suggests isolated areas of seepage flow through discrete pathways typical in mountainous terrain, rather than complete saturation. The shotcrete facing should be provided with weep holes to prevent the buildup of water pressure in the slope behind the shotcrete.

The Idaho Tunnel also serves as a drain to some extent to limit water pressures in the slope. The collapse void will be mitigated by backfilling it with pervious cellular concrete which will increase this effect. Stability of the slope could be further enhanced with horizontal drains if necessary.

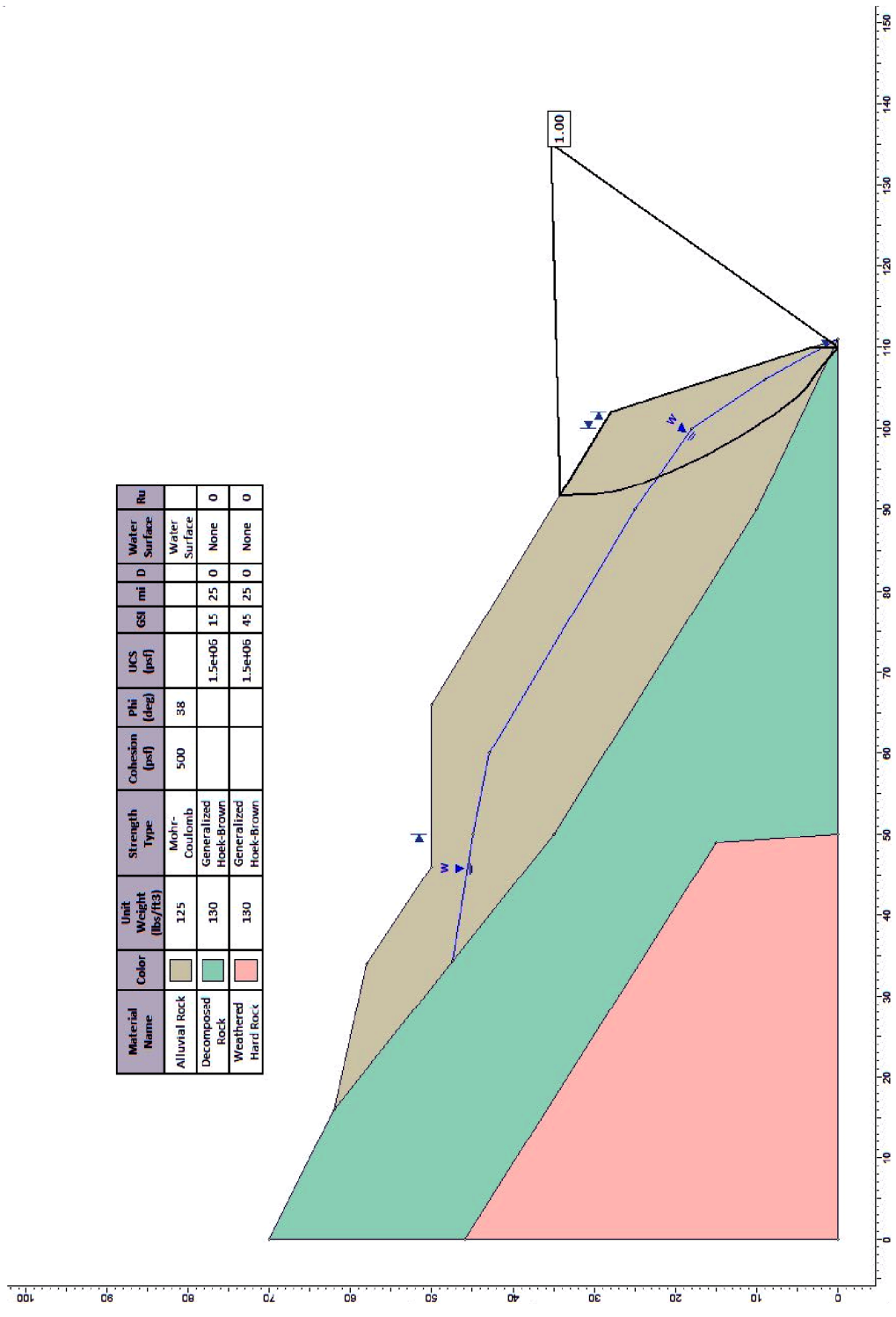
The cellular concrete void fill is much stronger than the colluvial material it replaces and increases the FoS significantly when included in the analyses by imparting a buttressing effect. There are areas of the excavated slope on either side of the portal which would have none of this material in section. However, the actual FoS on these sections should be higher than 2D analyses results due to 3D effects related to the concaved slope orientation and adjacent areas which are buttressed by the cellular concrete void fill.

Spillings installed through the cellular void fill and similar ground control elements installed when rehabilitation of the tunnel resumes will serve to underpin the portion of the slope directly above the Idaho Tunnel and below the County Road. Permanent tunnel lining ground support installed as the tunnel is rehabilitated will ensure that stability of the tunnel itself does not impact the road.

The slope stability evaluation presented was based largely on observation and professional judgement as limited engineering data was available. Data deficiencies at this time include:

- As-built configuration of the portal excavation
- Accurate topographic data for the slope and road
- Subsurface geology beneath the slope

[4] https://assets.bouldercounty.org/wp-content/uploads/2017/02/multi-modal-standards.pdf
[5] https://www.codot.gov/business/designsupport/materials-and-geotechnical/programs/geotech/docs/cdot-gdm



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Project

Idaho Tunnel Portal Slope Stability

Title

Stability Analysis Summary
Spring Thaw, Undrained, Non-Circular

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- Groundwater conditions
- Laboratory testing data to determine the geomechanical properties of the materials comprising the slope
- Shotcrete thickness distribution
- Soil anchor installation details and pullout capacity

This study should be updated and reassessed once additional data such as the as-built slope geometry becomes available. In other cases, the cost and effort required to refine the analyses may be more than the value provided. For example, the cost to accurately characterize the highly variable geologic conditions within the slope may be higher than the cost implications of adopting conservative assumptions, such as those provided herein. Similarly, the cost to accurately characterize and monitor the potential ground water variations would likely be higher than the cost to install horizontal drains to ensure drainage.

Stability analysis of the Idaho Tunnel portal slopes was conducted by Mr. David S. Hallman, licensed as Colorado Professional Engineer (Civil) 26076, as affirmed by the stamp and signature affixed below.