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

July 16, 2019

Eli Doose
Atlas Mining & Reclamation, LLC
19911 Highway 550
Montrose, CO 81403

RE: Von Doose Mine, File No. M-2019-031 , Limited Impact 110(1) Hard Rock Reclamation Permit Application Adequacy Review

Dear Mr. Doose:

The Division of Reclamation, Mining and Safety (Division) is in the process of reviewing the above referenced application in order to ensure that it adequately satisfies the requirements of the Colorado Mined Land Reclamation Act (Act) and the associated Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal, and Designated Mining Operations (Rules). During review of the material submitted, the Division determined that the following issue(s) of concern shall be adequately addressed before the application can be considered for approval.

1. **6.3.2 Exhibit B- Site Description:**

    a. In the existing vegetation section of the site description the entire affected area is described to be covered as a low density of evergreen trees, however the next paragraph describes the ecosystem as relatively homogeneous, dense coniferous forest. Please clarify the existing vegetation within the affected area.

    b. Please clarify the size of the overall watershed that the site lies in as well as the acreage estimation of the watershed.

    c. According to map A1 Von Doose Mine Location Map there appears to be historic mine portal located on the Nella M claim adjacent to the Permit Area. Please clarify if the existence of the portal and if it is located within 200 feet of the affected lands please include it in the site description. Please also update the information in Exhibit E and L as required.

    d. While a wildlife statement prepared by Colorado Parks and Wildlife is not required for 110 Limited Impact Operations the site description does not include any information about the wildlife in the area. Please provide a brief description of the significant wildlife resources on the affected lands and the estimated seasonal use of the area. Please also contact the local Colorado Parks and Wildlife representative to verify that no critical or important wildlife habitats or wildlife species will be impacted by the proposed operation pursuant to 6.3.2 (d)

e. Given the steep nature of the existing slopes on site and on the adjacent areas, please provide a discussion of the avalanche danger that exists on site. This discussion should at a minimum include a map and discussion of any and all known or potential avalanche paths as well as information on any potential protection measures to be installed on site.

2. **6.3.3 Exhibit C- Mining Plan**

a. Pursuant to Rule 6.3.3 (1) (b) you discuss the salvaging and seeding of topsoil for reclamation activities to be conducted at the Lower Affected Area. The seed mix to be used on the topsoil stockpiles however was not specified. Please clarify if the final reclamation seed mix included in Exhibit D is to be used on the topsoil stockpiles or if a temporary seed mix is desired to be used.

b. In the access portion of the Mining Plan, the exclusion of the private roads is discussed. However in other sections there are discussed bar ditches, check dams and other storm water control structures. It is also inferred that if the road is to be used in support of mining operations the Mine Safety and Health Administration (MSHA) will require a safety berm along the road that is as tall as the axel on the largest piece of equipment on site. Please clarify if these improvements will be constructed on the private road between the Upper and Lower Affected Areas. If they are, this area will need to be added to the permit area. Adding the acreage to the Permit Area will constitute an Amendment to an Application and will need to be done in compliance with Rule 1.8.1. This will be treated as a new application for the purposes of determining the date for the consideration of the application by the Office, and for the deadline for a final decision on the application pursuant to Rule 1.8.1(3).

c. It is identified that water will be hauled on site as needed for drilling and domestic needs and will be stored in a variety of 500 gallon trailer mounted tanks and 5,000 gallon cisterns stored in both affected areas. Pursuant to 6.3.3 (1)(h) please clarify if the 5,000 gallon cisterns will be above ground or constructed below ground, include their specific locations on the appropriate maps, and specify whether the cisterns will remain as permanent features of the site. Please also provide an estimate of how much water will be used in conjunction with the operation annually and the source of that water.

d. In addition to the cisterns to be used at both affected areas it is stated that portable composting toilets will be used on site. Please clarify this if this is the long term configuration or if a septic system is to be installed on site. If septic is to be installed please include the details of its construction and update any associated maps. If no septic is to be installed please discuss how domestic wastewater will be handled at the permanent structures located on site.

e. In Exhibit B, Site description it is inferred that the ground water elevation is approximately 200 feet lower in elevation than the mine site based on the location of the nearby creek. This is used as the basis for statements made about not expecting to encounter ground water during mining operations. Please provide more details such as a hydrologic demonstration or details from other sources that confirms the inferred elevation of the ground water in compliance with Rule 6.3.3 (1) (i).

f. It is stated a General Construction Stormwater Permit along with a Storm Water Management Plan (SWMP) will be submitted to CDPHE. Pursuant to 6.3.3(1)(i) please proved a copy of the SWMP including details of the storm water control structures as well as an associate map showing their locations. The plan should also take into consideration preventing overland flows from impacting an adjacent properties. Please also identify if the storm water control structures are to remain as permanent features of the site post reclamation.

g. In the Protection of Groundwater Resources the implementation of a hydrologic bulkhead is discussed should the mining operations encounter ground water and drawings are included. Please note that the Division recognizes the bulkhead plan is conceptual and will only be used if a seep is encountered. Should groundwater be encountered the details of the bulkhead plan such as specific location, engineered design specs and details of construction will need to be addressed through the Technical Revision or Amendment process.

h. Details of the waste rock dump are discussed in the Lower Affected Area portion of the Mining Plan. The use of the topsoil stockpile at the toe of the dump as a storm water control feature as well as rock catch is identified. Please clarify if the details of the berm as it relates to storm water control and if there will be a sediment basin incorporated with it. The Division sees potential run on of storm water from the access road above the waste rock as a point of concern, therefore pursuant to Rule 6.3.3(1)(k), please commit to constructing an “Upland Diversion Ditch” above the shoulder of the waste rock dump to prevent overland flows from coming in contact with the waste rock material. Please include the details of its construction, location and update and all associated maps as required.

i. In the Equipment and Materials section of the mining plan it is identified that all fuel and potentially hazardous materials will be stored in secondary containment to prevent accidental releases. Please specify where on site the fuel tanks and cargo container will be stored, and specify the type of secondary containment used with the fuel tanks in compliance with Rule 6.3.3 (1)(l). Please also update the appropriate maps to reflect this change.

j. The site is located up Corkscrew Gulch which is identified to flow into Red Mountain Creek shortly downstream. A compliance point exists under the Colorado Department of Public Health and Environment’s Consent Decree and Remedial Action Plan to monitor many things including the zinc loading in Red Mountain Creek. Please further

discuss how the operation will minimize impacts to the prevailing hydrologic balance in compliance with Rule 6.3.3 (1)(l) with special attention to potential zinc loading as it may impact the downstream compliance point.

k. Throughout the Mining Plan the use of explosives and blasting techniques are discussed. Pursuant to Rule 6.5(4) please demonstrate through appropriate blasting, vibration studies, Geotechnical and Structural engineering analysis that off-site areas will not be adversely affected by blasting. Please also include a blasting plan which includes the estimated number and size of blasts, the estimated ground vibrations associated with the blasts as they relate to the engineering analysis. Please also specify if the blasting will be conducted by a licensed third party contractor or if the Operator will be obtaining the license to conduct blasting. The blasting plan should also discuss the location of the approved ATF powder and cap magazines prior to moving them underground and if necessary update any corresponding maps to reflect this change. This information should also be included in the Geotechnical Stability Exhibit.

3. **6.3.4 Exhibit D – Reclamation Plan**

a. Throughout the Mining Plan as well as the Reclamation Plan the Shop building, laydown yard, boarding house and headframe / shaft structure are proposed to remain as permanent structures post reclamation. Please provide documentation that the buildings will be allowed to remain as permanent structures post reclamation.

b. In several areas of the Lower Affected Area such as the cut slope for the laydown yard, the out-slope of the laydown yard and the waste rock dump the final grades are identified as steeper than 3:1. In accordance with Rule 6.3.4(1)(b) please provide appropriate justifications for the steeper slopes. Please also demonstrate by engineered factor of safety calculations that all constructed slopes will comply with the enclosed Slope Stability / Geotechnical Analysis Policy for the generalized, assumed or single test strength measurements for non-critical structures. The details of this information should also be included in the Geotechnical Stability Exhibit.

c. In the seed plan section of the Reclamation plan the slopes that will required seeding will be scarified and scattered with onsite debris. It is inferred that the onsite debris will be generated from the construction of the site facilities but please specify the location that the material will be stored until it is used in reclamation.

d. It is noted that the seed rates will be tripled based on the hand seeding and mechanical raking application method. The Division suggests the use of a hydro-seed with fertilizer if required, mulch and tackifier application be used given the high elevation and steep slopes. If desired please clarify that the application method in the seeding plan will be hydro-seeding with mulch and tackifier.

e. The fertilizer identified in the seed plan is Pelletized Richlawn Organic 3-6-3 Fertilizer applied at a rate of 2,000 lbs/Acre. As this rate seems high, please provide a justification for this product and its application rate.

f. Throughout the reclamation plan no management of noxious weeds is discussed. Pursuant to Rule 6.3.4 (1)(c) please provide a noxious weed management plan that indicates species expected to be encountered, herbicides to be used and application method.

4. **6.3.5 Exhibit E – Map**

   a. Maps E 1-4 as submitted address most of the requirements of this section however not all requirements are met. In an effort to avoid adding to the Project Overview map and making it unreadable please submit a supplemental overview map that shows and labels the owners or record of the surface within 200 feet of the affected area, identifies the owner of the subsurface to be mined and the location, types and owners of all structures within 200 feet of the affected area. The permanent man-made structures should include the pre-existing access roads as well as county road 20A. Please also update Exhibits B and L accordingly. This map does not need to be shown on a standard 1:24,000 scale U.S. Geologic Survey Map.

5. **6.3.6 Exhibit L- Permanent Man-Made Structures**

   a. It is stated that because the closest that blasting will occur to County Road 20A is 540 feet away a structure agreement was not sought with Ouray County. Pursuant to Rule 6.3.12 a structure agreement is required for all permanent man-made structures within 200 feet of the Affected Lands. Please obtain and submit to the Division a signed structure agreement with Ouray Count. If an agreement cannot be reached, the applicant shall provide an appropriate engineering evaluation that demonstrates that such structure shall not be damaged by the activities occurring at the mining operation.

6. **6.3.7 Exhibit G – Legal right of Entry**

   a. In comments submitted by the U.S. Forest Service, which will be forwarded to the Applicant, the seniority of the patented claims is questioned. The comment outlines the existence of an unpatented claim called the “Something Ethel” that bisects the Oceota and Veto Claims. Please verify the existence of this claim as well as demonstrate the seniority of the claims. If necessary please consult with the U.S. Forest Service to obtain any required documentation to demonstrate the legal right of entry. Please also update Map A-1 to show this unpatented claim.

   b. Please confirm that no mining activity or disturbance will be conducted on the American Eagle, Mountain Dale or Victorious Claims that are owned by Red Mountain Trust, LLC.

   c. As stated in Item 1, c of this review please clarify the existence of a historic mine portal located on the Nella M Claim. Please also assess the portal as part of the Blasting Plan to be required to ensure there will be no adverse effects as a result of blasting activities.

7. **Rule 6.5 – Geotechnical Stability Exhibit**

a. Details of the Blasting Plan as referenced in Item 2, (j) of this review and in accordance with Rule 6.5(4) should be included in this exhibit. The Blasting Plan should be summarized in the Mining Plan as well as detailed in this Exhibit.

b. Similarly, the details of the slope stability analysis should be detailed in this exhibit. Please refer to item 3, (a) of this review for details. The information should be summarized in the Reclamation Plan and detailed in this Exhibit.

Please submit your response(s) to the above listed issue(s) by Friday, August 09, 2019 in order to allow the Division sufficient time for review. Please note that the Decision Date for the application is set at August 16, 2019. Should you need more time to adequately address the above listed items please request an extension to the Decision Date, in writing prior to the current decision date. The Division will continue to review your application and will contact you if additional information is needed. If you require additional information, or have questions or concerns, please contact me at the Division's Grand Junction Field Office, by phone at 303-866-3567 Extension 8187 or by email at lucas.west@state.co.us.

Sincerely,

Lucas West
Environmental Protection Specialist
Division of Reclamation, Mining and Safety

Enclosure: Proposed Slope Stability / Geotechnical Analysis Policy

Cc: Travis Marshall, Senior Environmental Protection Specialist

Ec: Mike Thompson, Reardon Steel LLC.

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

PROPOSED SLOPE STABILITY/GEOTECHNICAL ANALYSIS POLICY FOR THE MINED LAND RECLAMATION BOARD

To: Tony Waldron, Mined Land Reclamation Board

From: Tim Cazier, P.E.; TC Wait, P.G.

Date: May 16, 2018 – ***FINAL DRAFT***

Re: **Factors of Safety for Slope Stability/Geotechnical Analyses Associated with Mining Operations**

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.

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. A 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.

Guidance for Stability Criteria and Use of Minimum Factors of Safety

Based on the review described above, 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]
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.

Disclaimer

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

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.