



COLORADO

Division of Reclamation,
Mining and Safety

Department of Natural Resources

1313 Sherman Street, Room 215
Denver, CO 80203

November 29, 2018

Dale and Ellen Schmidt
472 Meadows Drive
Pagosa Springs, CO 81147

RE: Schmidt Site, File No. M-2011-014 , Technical Revision (TR-01) Application Adequacy Review

Dear Mr. and Mrs. Schmidt:

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 Land Reclamation Act for the Extraction of Construction Materials (Act) and the associated Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials (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. Structure Agreements

- a. The introduction section of this Technical Revision alludes to the fact that a new structure agreement was sent to the La Plata Electric Association (LPEA) however the included green card was dated October 11, 2011. Please clarify if a new structure agreement was sent for the power pole located within the permit boundaries. If it was not sent please send the new structure via certified mail, return receipt requested. If the agreement cannot be signed an engineering evaluation demonstrating the mining and reclamation activities will have no adverse impacts on the structure will suffice. The engineering evaluation must also demonstrate that the disturbance around the pole will be in compliance with the Factors of Safety for Slope Stability policy which is enclosed with this letter.
- b. Please provide proof that the structure agreement was sent to Susan Moak via certified mail. If the agreement cannot be signed an engineering evaluation demonstrating that the mining and reclamation activities will have no adverse impact on the privacy fence located adjacent to the highwall.
- c. Also, included in this TR is the original list of all permanent man-made structures within 200 feet. While a sample notice was included with the original permit application no proof of mailings or returned agreements were submitted. Please provide proof that the structure agreements were originally sent during the permitting process and provide any signed agreements that were returned. If the notices weren't sent in an



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unintentional oversight, please send the agreements for all structures listed on page 29 of this Technical Revision via certified mail and provide proof of mailing. In instances where the agreements cannot be signed please provide an engineering demonstration that the mining and reclamation activities will have no adverse impacts on the structures.

2. **Geotechnical Stability Exhibit-** While the drawings show the details of the tire bale wall's construction, there are no calculations demonstrating the resulting Factor of Safety. Please provide all necessary data and calculations to demonstrate that the tire bale wall will comply with the Generalized, Assumed or Single Test Strength Measurements for Non-Critical Structures section of the enclosed Factors of Safety for Slope Stability Policy. A copy of this policy is enclosed for your reference.

Please note that while it is understood that the county approval for the use of the tire bale retaining wall is pending, the Division will require documentation of the approval in order to render a decision on the submitted Technical Revision. Please provide that documentation as soon as it is obtained.

Please submit your response(s) to the above listed issue(s) by Monday, December 17, 2018 in order to allow the Division sufficient time for review. The Division will continue to review your application and will contact you if additional information is needed. The decision date for this Technical Revision is Friday December 28, 2018, should you require additional time to address the above listed issues please submit a written extension request prior to the decision date. If you require additional information, or have questions or concerns, please contact me at the Division's Grand Junction Field Office, by phone at (970) 243-6368 or by email at lucas.west@state.co.us.

Sincerely,



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

EC: Nathan Barton, Wasteline Inc.





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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⁾
<u>Non-Critical Structures</u> (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⁾
<u>Critical Structures</u> (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⁾
<p>(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.</p> <p>(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.</p>		

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.