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

March 27, 2023

Mr. Ben Langenfeld, P.E.
Lewicki & Associates, PLLC
3375 West Powers Circle
Littleton, CO 80123

Re: Preliminary Adequacy Review, Conversion Application (CN-1), Gold Hill Mill, Permit No. M-1994-117

Mr. Langenfeld:

On February 7, 2023, the Division of Reclamation, Mining and Safety (Division/DRMS) deemed the above referenced application complete for the purposes of filing. On February 7, 2023 the Division determined the conversion application to convert the current 110(2) permit to a 110(d) Designated Mining Operation (DMO) permit to be complex and extended the decision due date to May 8, 2023, pursuant to Rule 1.4.1(7). It should be noted the public comment period ended February 27, 2023 and the Division received 16 timely comments.

The following items will need to be addressed to the Division's satisfaction prior to the decision date. If you are unable to satisfactorily address any concerns identified in this review before the decision date, it will be your responsibility to request an extension of the review period. If there are outstanding issues that have not been adequately addressed prior to the end of the review period, and no extension has been requested, the Division may deny this application. In order to allow the Division sufficient time to review your responses to the adequacy issues, please submit your adequacy responses to the Division no later than three (3) weeks prior to the decision date. Subsequent to receipt and review of the Applicant/Operator's response to these items the Division may identify additional adequacy items. Please respond to this Preliminary Adequacy Review with the requested additional/updated information on permit replacement pages and summarize each response in a cover letter titled "Preliminary Adequacy Response; M-1994-117".

EXHIBIT A – Legal Description (Rule 6.3.1):

1. Pursuant to Rule 6.3.1(2), please provide the coordinates of the primary mine entrance. The applicant will need to specify coordinates of latitude and longitude in degrees, minutes and seconds or in decimal degrees to an accuracy of at least five (5) decimal places (e.g., latitude 37.12345 N, longitude 104.45678 W). For UTM, the operator will need to specify North American Datum (NAD) 1927, NAD 1983, or WGS 84, and the applicable zone, measured in meters.

EXHIBIT B – Site Description (Rule 6.3.2):

2. Pursuant to Rule 6.3.2(d), provide a wildlife statement prepared by Colorado Parks and Wildlife (CPW). Such a statement is required for 110d Limited Impact Operations. The Operator/Applicant may contact the local CPW representative to verify that no critical or important wildlife habitats or wildlife species will be impacted by the proposed operation.

3. Please identify the quarters that the maximum and minimum concentrations were measured in Tables B2-1 and B2-2.

4. Please amend Table B2-3 to provide the mean groundwater results as well as the averages.

EXHIBIT C –Mining Plan (Rule 6.3.3):

5. Please clearly state if the operation is intended to be an intermittent operation as defined in CRS 34-32-103(6)(a)(II).

6. Update Map E-2 to clearly indicate the current volume of topsoil stockpile and volumes of other stockpiled material at the site.

7. Please clarify what the stockpiles located south and west of the Mill Building are composed of.

8. Table U-3 on page U-13 does include the Synthetic Precipitate Leachate Procedure (SPLP) results however, it does not identify the location from which the sample was taken. Please identify the ore material the SPLP sample was collected and describe how the sample was collected. Please note the text on page U-12, last paragraph, needs to be updated as it incorrectly identifies Table U-2 as being the SPLP results.

9. On page C-3, third to last paragraph, the plan states the pump house will be located outside the FEMA 500-yr floodplain. Please update Map E-2 to specifically identify the limits of the FEMA 500-yr floodplain. Currently, the legend does not sufficiently identify the different FEMA floodplains.

10. Has the Applicant collected any water samples from the Times-Wynona Mine pool to date? Please note the mine pool will need to be included into the quarterly sampling of groundwater and surface water at the site.

11. On page C-5, it is stated that water in the mine pool was originally pumped there in the 1980's. Does the Applicant have water levels or analytical samples of the mine pool since that time, if so please provide them?

12. From materials provided by the Left Hand Ditch Company in their objection, part of the water right decree states that 20 acres of irrigated land will need to be dried up to allow for the Applicant to

withdraw water from Left Hand Creek for any one year. Please state the current condition of those 20 acres, e.g. currently irrigated, developed or other? If the acreage is still irrigated the Applicant needs to propose a method of demonstrating compliance that the 20 acres are dry during any year that water is withdrawn from Left Hand Creek.

13. Please show the locations of the Cash and Who Do and White Cloud Mines on Map E-2. The Division is familiar with the Who Do Mine, M1983-141, but not the White Cloud Mine. Please provide additional information on the White Cloud Mine.

14. On page C-8, the Applicant states "there remains the potential to develop economically viable gold-silver resources that could be recovered by selective underground mining.". This statement needs to be clarified as it indicates that mining and exploration may occur at the site in the underground workings where earlier in the application the Applicant states that only milling is to occur at the site.

15. On Map E-2 the ore processing area needs to be shown.

16. On page C-10, the Applicant states that no processing will take place at the mill without adequate storage in the tailings facility or an approved offsite disposal/storage location. Approval of an offsite disposal/storage location can only come through the submittal and subsequent approval of a Technical Revision providing additional details of disposal or storage and the analytical results of the tailings material. Please affirmatively acknowledge this condition.

Appendix C-2:

17. Please provide a Quality Assurance Project Plan (QAPP) for sampling groundwater, surface water and tailings sediment for the site. The plan should be consistent with EPA guidance and provide mitigation steps if there is an exceedance at a monitoring location. Please note pursuant to Rule 3.1.7(9) an Operator must provide the Office a written report within five (5) working days when there is evidence of groundwater discharges exceeding applicable groundwater standards.

18. Please provide a sampling and analysis plan (SAP) that addresses how various media samples will be collected, how monitoring will be done during sampling (groundwater and surface water), and what QA/QC protocols will be followed. The Division recommends developing Standard Operating Procedures (SOPs) to include in the SAP to insure samples are collected in a consistent manner over the life of the permit. Additionally individual tables need to be developed demonstrating what analytes each media is being sampled for and the analytes corresponding limit it is being compared to.

19. On pages C2-4 and C2-5 the Applicant states samples results will be reported to the Division within 30 calendar days of the Applicant's receipt of a complete analytical results package from the laboratory. Please commit to providing the Division quarterly monitoring reports by the following deadlines:

- First quarter report due by May 1st of every year.

- Second quarter report due by August 1st of every year.
- Third quarter report due by November 1st of every year.
- Fourth quarter report due by February 1st of the following year.

Appendix C-2:

20. The Exhibit A containing the decreed augmentation plan is missing, provide the missing exhibit.

Appendix C-6:

21. The dewatering plan and approved TR-11 are missing, provide the missing documents.

EXHIBIT D – Reclamation Plan (Rule 6.3.4):

22. For reclamation cost estimate the worst case scenario needs to be taken into account for reclamation of the tailings pond. Please provide a cost estimate that includes a foundation layer, low permeability layer, possibly a geosynthetic barrier, drainage layer, and topsoil layer for reclamation of the tailings pond.

EXHIBIT E – Maps (Rule 6.3.5):

23. Map E-2 has a "Disturbance Area" line labelled and shown. It is unclear what this line is depicting and it is difficult to follow the line to the east, please provide an explanation for the line.

24. Map E-2, Left Hand Creek Area inset, please clearly label and show the extent of Left Hand Creek.

25. Map E-2, Left Hand Creek Area inset, please provide an explanation of the blue dot labelled LHC. Is this the location where water will be withdrawn from the creek?

26. Map E-2, please clearly label Left Hand Canyon Dr., Lickskillet Road and Sunshine Canyon Road. These features should be labeled on all maps.

27. Map E-2, the overview portion of the map has a blue rectangle in the Left Hand Creek Area that extends to Left Hand Canyon Dr. this feature is missing from the inset map of the same area. Please update to be consistent with one another.

28. Maps E-3 and E-5 needs to be updated to reflect the as-built conditions of the tailing pond, including but not limited to a typical liner section and type of subgrade the pond was built upon.

29. Map E-4, the Wynona Shaft needs to be clearly labeled on the cross-section.

EXHIBIT F – List of Permits and Other Licenses Required (Rule 6.3.6):

30. Please provide an update on the status of the Plan of Operations with the BLM and USFS for relevant areas of the permit.

31. On February 24, 2023 the Boulder County Community Planning and Permitting Department provided the Division with a comment letter that was subsequently forwarded to the Applicant. In the letter it states the site may not be incompliance with County Land Use Code. Please provide more information on this subject and what steps are being pursued to determine whether the site is in compliance or not.

EXHIBIT L – Permanent Man-made Structures (Rule 6.3.12):

32. Exhibit L states there are structure agreements attached, however the Division was unable to locate the structure agreements. Please provide the missing documents.

EXHIBIT U - Environmental Protection Plan (EPP) (Rule 6.4.21):

33. On page U-2 the Applicant states groundwater samples are collected and analyzed for the analytes listed in Table U-4. However in Appendix C page C2-2 Table 2 the listed analytes are different. Please clarify this discrepancy and note comments made for Appendix C above.

34. On page U-2 the Applicant states that sample results will be reported annually with the annual report map and fee, this is inconsistent with what is in Appendix C-2. Please clarify this discrepancy.

35. Please provide a potentiometric surface map that demonstrates groundwater flow across the site. It appears that there is a possibility that the site may need multiple points-of-compliance across the site.

36. The Division was unable to review maps and descriptions of the required items pursuant to Rules 6.4.21(8) and (9). Please provide the missing information that meets the requirements of the Rules.

37. Please provide the missing information pursuant to Rule 6.4.21(13)(a) and (b).

Objections and Comments:

38. The Division received a timely objections and comments, in accordance with Rule 1.7.1(2)(b), from The Watershed Center, Stephen Strand, Left Hand Canyon Residences, Town of Gold Hill, Boulder Watershed Collective, Gold Hill Fire Protection District, Boulder Flycasters and St. Vrain chapters of Trout Unlimited, Norman Skarstad, Amy Fotunato, Left Hand Ditch Company, John Daspit, and Pine Brook Water District. Please respond to the objections and comments. Please inform the Division if

the Applicant does not have a copy of the comments or objections from the parties listed and they will be resent. Additionally the Division received an untimely letter of objection from the Four Mile Fire Protection District and a letter of support from Rene Murphy.

Other:

39. Please respond the Adequacy Review Letter, included as Attachment 1, from Lucas West.

40. Please provide proof of publication of the public notice in a newspaper of general circulation as required by Rule 1.6.3 and Rule 1.6.2(1)(d). Proof of publication may consist of either a copy of the last newspaper publication that includes the date published, or a notarized statement from the newspaper.

41. Pursuant to Rule 1.6.2(1)(e), please provide proof that all Owners of Record of all land surface within 200 feet of the boundary of the affected lands received a copy of the notice in Rule 1.6.2(1)(d) immediately after the first publication.

42. Pursuant to Rule 1.6.2(2), please demonstrate that the Applicant's response to these adequacy issues have been placed with the application materials previously placed with the County Clerk or Recorders Office, and made available for public review

Please respond to these adequacy issues no later than three weeks before the decision deadline, to ensure ample time for the Division to complete its review prior to its decision deadline. **The current decision due date for this application is May 8, 2023**. If additional time is required to respond to these adequacy issues please submit a written request for extension of the review period. The Division reserves the right to further supplement this document with additional adequacy issues and details as necessary.

If you need additional information or have any questions, please contact me by telephone at **303-866-3567 x8114**, or by email at patrick.lennberg@state.co.us.

Sincerely,

Patrick Lennberg
Environmental Protection Specialist

Attachments: 1. Gold Hill Mill, CN-1, Adequacy Review Letter by Lucas West

cc: Jared Ebert; DRMS

ec: Ben Langenfeld, Lewicki & Associates, PLLC, benl@lewicki.biz
Jerry Jergensen, Colorado Milling Company, jerryjergensen@aol.com

Attachment 1

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

March 23, 2023

Ben Langenfeld, P.E.
Lewicki & Associates, PLLC
3375 West Powers Circle
Littleton, CO 80123

RE: Gold Hill Mill, File No. M-1994-117 , Conversion Application (CN-1) Additional Adequacy Review

Dear Mr. Langenfeld:

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). This portion of the review is primarily focused on Exhibits C and U as well as their appendices. During review of the material submitted, the Division determined that the following issue(s) of concern shall be adequately addressed before a decision can be rendered.

Exhibit C- Mine (Milling) Plan- Rule 6.3.3

1. Though the mill facilities and plan have been approved as stated on Page C-1, please provide a detailed description of all milling processes, facilities and operations pursuant to Hard Rock and Metals Mining Rule 6.1.3 (1)(e). Further details regarding facilities evaluation, design schematics, chemicals handling and secondary containment will be addressed in the Exhibit U section of this review.
2. Section 1.8, pg. C-4 discusses on site surface water controls used to contain and or divert surface water. Pursuant to Rule 6.4.21(10)(a)(i-iii) and Rule 7.3.1(3) such facilities must be designed and certified by a licensed P.E. with design criteria being found in Rule 7.3.1(3). Please provide a detailed description of the design capacity of each of the surface water controls. Further details such as design drawings, hydrologic demonstrations and certifications will be addressed under the Exhibit U section of this review.
3. Section 3, Pg. C-7 states that no toxic producing materials will be mined or exposed during operations as the site is not an active mine. However ore is imported from the source and stockpiled on site. Additionally, Table U-3 on Pg. u-13 does include the Synthetic Precipitate Leachate Procedure (SPLP) results but no Acid Base Accounting (ABA) results were included. Please provide the Division with the ABA results and discussion for the ore material that the ore stored on site is not acid generating in accordance with Rule 6.3.3(1)(k). If the results indicate that the ore does possesses acid generating potential, please provide a detailed description of

the ore handling practices, designs and construction information of surface stockpile facilities, please also update all applicable sections of Exhibit U accordingly.

4. Section 5, pg. C-8 references Appendix E-2 for the SPLP results for the tailings and claims that the tails are chemically inert, however no Appendix E-2 was included in the application materials. Please provide the Division with the SPLP results for the tailings material. Additionally please provide an ABA analysis and interpretation to ensure the tails are also not acid generating.

Appendix C-1; Surface Water Hydrology

5. Appendix C-1 includes surface water hydrographs with no context or reference in Exhibit C. It appears the hydrographs are correlated to Map E-2. Please provide a narrative discussing the hydrologic demonstrations included in this Appendix with references to the appropriate Exhibit(s) and or Map(s).

Appendix C-5; Tailings Storage Facility As-Built

6. Appendix 5 documents the construction and certification of the Tailings Storage Facility, however given the lack of continuous operations and maintenance of the facility the integrity of the facility needs to be verified. By use of some variation of the Electric Leak Location Survey or other approved method please provide a demonstration that the portion of the liner that presently contains tailings material is not compromised. Additionally, please provide an in depth demonstration that the liner above the existing tailings is competent and ready to accept new tailings materials.

7. Appendix C, or Appendix C-5, appears to indicates considerable back and forth between the Division and the construction company dated November 16, 1998 indicating changes in the embankment foundation construction and its resulting factors of safety. Given the age of the construction and the possibility of movement, the geotechnical stability of the embankment as well as its associated factors of safety needs to be verified. Using historical as well as new samples or information, please provide the Division with an adequate demonstration that the embankment of the Tailings Storage Facility currently, and will with additional material being placed, meets or exceeds the Divisions accepted factor of safety requirement for critical structures of 1.5. The Division's policy on Factors of Safety for Slope Stability is attached to this review for your reference.

Exhibit U- Environmental Protection Plan (EPP) - Rule 6.4.21

8. Throughout the review of this application, Division staff has identified several Environmental Protection Facilities (EPF's) as defined Rule 1.1(21). The list of EPF's includes but is not limited to;

    a. Mill Facility, including Tailings Thickener

    b. Reagent Storage Area

    c. Times Wynona Bulkhead

d. Tailings Storage Facility

e. Tailings Delivery Line

f. On site Surface Water Controls, including Up Gradient Diversion structures

g. Surface Ore Stockpile Facilities

h. Monitoring wells

For the above listed facilities, and any others that meet the definition, please provide an in depth facilities evaluation supported with maps, drawing and schematics addressing all components of section 6.4.21(7). For those already constructed, as-built packages with drawings and certification by a licensed P.E. as well as demonstration that secondary containment structures meet their design specifications found in 6.4.21(7)(f) and/or Rule 7.3.1(3) will be required. For those not yet constructed please submit a detailed construction schedule, proposed incremental inspection schedule with QA/QC checks during construction. Please note that certified as built packages upon their completion will be required.

9. In addition to the drawings and schematics addressed in item 8 of this review, please provide the Division with an Environmental Protection Facilities Map, or revise an existing map to depict all required elements of Rule 6.4.21(2).

10. Section 2 of the EPP pgs. u-3 throughu-7 provides a cursory review of the ore processing operations. As referenced in Item 1 of this review, please provide a more detailed narrative supported by schematics, flow diagrams of the layout of the ore processing operations. The narrative should include equipment layout, flow of materials, introduction of water, introduction and dosing of reagents, feed flows, volumes of systems including rate of slurry and other materials within the process and a demonstration of containment of the entire process. Pursuant to Rule 6.4.21(7)(f) the containment volume shall be the volume of material contained within the entire system.

11. As referenced in Items 2 and 8 of this review, please provide the design criteria, location information, drawings and certifications for all surface water control features including the up gradient diversion ditches. Design criteria for surface water controls of Designated Mining Operations can be found in Rule 7.3.1(3).

12. Also, as referenced in Item 3 of this review, please provide the analytical geochemical analysis (SPLP and ABA) with interpretation narrative of the ore material to be imported to the site pursuant to Rule 6.4.21(14). Please also provide a detailed narrative addressing ore handling, and if the makeup of the ore suggests the potential of acid generation, please provide evaluation, construction designs, maps and drawings addressing the ore stockpile facility(s). This evaluation should also address the containment, handling and disposal of any precipitation collected within the facility.

13. Section 2.5 briefly discusses Tailings Output and Storage. Please provide a more detailed review of tailings management including moisture content, delivery methods including flow rate with secondary containment of the delivery system, QA/QC of tailings placement including moisture

monitoring, aeration operations, etc. Information regarding the geochemical analysis (SPLP and ABA) of the tailings should also be duplicated and discussed in depth in this section.

14. Sections 3, 6 and 7 respectively address process chemicals used and stored on site, and designated chemicals evaluation. Section 3 however does not adequately address storage methods, location, mixing and delivery into the mill system. Also, none of the sections address the fact that some of the reagents are incompatible and if spilled or mixed improperly produce extremely hazardous conditions and or byproducts. Please submit a detailed narrative evaluating the chemicals on site, provide details on storage, mixing and delivery into the mill system as well as all elements required in Rule 6.4.21(5) and (6). The narrative should also address secondary containment including separation measures to ensure uncontrolled mixing does not occur. This evaluation should be supported by drawings detailing storage areas, secondary containment devices and volumetric demonstrations of adequate containment volumes. It is noted that some of these details are included in the Materials Containment Plan however that information should be included in this section. Additionally the narrative must address loading and loading locations, procedures and containment for that area as well.
15. Sections 3, 6 and 7 also state that the Safety Data Sheets (SDS) for Designated Chemicals was included in Appendix U-2 however the appendix did not contain the referenced data sheets. Please provide the SDS for all designated chemicals used and stored on site.

Appendix U-1; Materials Containment Plan

16. Pg. 7 of Appendix U-1 indicates that the facility is an underground metal mine, please correct that discrepancy.
17. Section 3.1 on pg. 9 references an underground mill, please correct that discrepancy.
18. Based in the increased details required in this review, please update the applicable information into the MCP. The information includes but is not limited to transportation, storage, handling, mixing and use of Designated Chemicals as well as secondary containment.
19. Section 3.3, pg. 12 states that reagents may be stored outside of a lined storage area. Please note that no reagents regardless of quantity will be permitted to be stored anywhere without designed and certified secondary containment.
20. Section 3.4 states that should a spill occur, the secondary containment device is manually emptied into approved disposal containers and sent to an approved facility for disposal. Please identify that facility.
21. Section 4 references an Emergency Response Plan that is part of the DRMS permit, however no Emergency Response Plan was included in the application materials. Please submit the Emergency Response Plan for review.
22. Section 4.3 addresses spill notification forms and spill/release notifications through the National Response Center however does not address the spill reporting through the Colorado Department of Public Health and Environment. Please revise this section to include the proper information regarding release notification through CDPHE's program.

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 Ext. 8187 or by email at lucas.west@state.co.us.

Sincerely,

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

Cc: Patrick Lennberg, DRMS
Jared Ebert, DRMS

Encl: Factors of Safety for Slope Stability/Geotechnical Analyses Policy

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