



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

October 17, 2023

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

Re: Adequacy Review No.3, Conversion Application (CN-1), Gold Hill Mill, Permit No. M-1994-117

Mr. Langenfeld:

On August 29, 2023, the Division of Reclamation, Mining and Safety (Division/DRMS) received your responses to the Division's Adequacy Review No. 2 letter dated July 7, 2023. After review of your responses the Division has identified the additional items that need to be addressed.

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 Adequacy Review No. 3 with the requested additional/updated information on permit replacement pages (as necessary) and summarize each response in a cover letter titled "Adequacy No. 3 Responses; M-1994-117".

For this review the Division will respond the original numbered item contained in the Adequacy Review No. 2 letter. The Division will note if the Applicants responses to the numbered item was adequate or if additional follow-up is needed. Additional follow-up questions to numbered items will have the same number as the original question followed by a, b, or c. Additional new questions will follow at the end of the letter with a numeral starting with the next numeral from the last question in the Adequacy Review No. 2 letter.

EXHIBIT C –Mining Plan (Rule 6.3.3):

7. 7a. Adequate.



8. 8a. Adequate.

10. 10a. Adequate.

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.

Applicants Response

Colorado Milling Company is assembling a response to Left Hand Ditch Company, directly. A copy will be provided to CDRMS under separate cover.

DRMS Follow-up

12a. Please provide an update on this item, as the submittal remains outstanding.

Applicants Response

The status of formerly irrigated land covered by a water court decree is outside the jurisdiction of CDRMS. Colorado Milling Company has a legal water right for diversions from Left Hand Creek. Any dispute of this water right should be conducted in Colorado water court.

DRMS Follow-up

12b. *According to the Water Court Decree 85CW117 the 20 shares of water that can be diverted and used for mining requires the lands historically irrigated by said 20 shares will no longer be irrigated by said shares (Findings of Fact item no. 18 and Adjudged and Decreed item no. 35).*

The protection of water rights during a mining operation and during reclamation are within the jurisdiction of the DRMS pursuant to Rule 3.1.6(1)(a) which states “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 shall be minimized by measures, including, but not limited to:

(a) compliance with applicable Colorado water laws and regulations governing injury to existing water rights.

The Division is seeking a demonstration that the lands historically irrigated are not being irrigated by the 20 shares of water when the Operator is removing water from Left Hand Creek for mining. This demonstration is required to show that downstream water users and water rights holders are not being injured by the Operator removing water for mining and irrigating.

15. 15a. Adequate.

Appendix C-2:

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.

Applicants Response

Appendix C-2 has been revised to cover all sampling to be conducted at Gold Hill Mill. Please see the revised Appendix C-2.

DRMS Follow-up

18a. The Sampling Plan lacks sufficient detail and needs to be revised. There is no discussion in the sampling plan regarding Quality Assurance and Quality Control (QA/QC) sampling (e.g., rate of collection of duplicate samples, rinsate blanks, and field blanks). Please update the sampling plan to address how QA/QC sampling will be conducted at the site for surface water, groundwater, and soil/sediment sampling. Additionally, the plan needs more detail to ensure that sampling can be completed in an accurate and repeatable manner throughout the life of the permit. Details such as collection of field parameters during monitoring well purging, which field parameters will be monitored, filtering of samples, recording of groundwater levels prior to purging, and use of field sheets to record field sampling data on, to be submitted along with sample results, on quarterly basis. Again, the Division recommends developing Standard Operation Procedures to aid sampling consistency during the life of the permit.

Applicants Response

The sampling plan is based on EPA standards for surface water, ground water, and soil sampling. Additional detail has been added to Appendix C-2 as requested by CDRMS.

DRMS Follow-up

18b. *The Sampling Plan still lacks sufficient detail and needs to be revised. There still is no discussion in the sampling plan regarding Quality Assurance and Quality Control (QA/QC) sampling (e.g., rate of collection of duplicate samples, rinsate blanks, and field blanks). Please update the sampling plan to address how QA/QC sampling will be conducted at the site for surface water, groundwater, and soil/sediment sampling. Additionally, the plan needs more detail to ensure that sampling can be completed in an accurate and repeatable manner throughout the life of the permit. Details such what field parameters will be recorded during well purging, purge rate and total volume removed, field filtering of samples, recording of groundwater levels prior to*

purging, and use of field sheets to record field sampling data on, to be submitted along with sample results, on quarterly basis. As an example please see TR-5 for the Cash & Who Do Mines Comprehensive Water Monitoring Plan.

Table 1 needs to be updated to clearly state which location is the point-of-compliance well for the site.

Table 3 needs to be separated into two separate tables, one for groundwater and the other for surface water. Again the regulatory limit the sample result will be compared to needs to be included into each table.

Will the surface water samples collected from Left Hand Creek be compared to the WQCC Regulation No. 38 – Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin, Stream Segment COSPSV04A Mainstem of Left Hand Creek, including all tributaries and wetlands, from the source to a point immediately below the confluence with James Creek? If not, please clearly list the limit to which the sample results will be compared along with an explanation for the limit.

Table 4 needs to have the limits for groundwater added for comparison purposes.

Please provide a discussion comparing the water levels and water quality results between the monitoring wells and the mine pool (where measurements and results occur at the same time) that provides a demonstration the mine pool is not influencing the groundwater.

While the Applicant has stated the groundwater and tailing pond analytes are going to be the same as were approved in TR-9 and AM-1 the Division does not agree. In TR-9 the analytes were reduced because the mill was no longer in operation and AM-1 expanded the permit boundary. The application currently under review would allow for milling operations to resume and this is a fundamental change to the current conditions at the site. The Division will require the Applicant to analyze groundwater and tailings pond samples for the most stringent of the criteria contained in Tables 1-4 of the Water Control Commission (WQCC) Regulation No. 41 – The Basic Standards for Ground Water for a minimum period of five quarters, prior to start of milling activities, to establish baseline conditions at the Site. Once the five quarters concludes the Operator may submit a Technical Revision to reduce the analyte list with sufficient justification.

Applicants Response

The DMO conversion is not a “fundamental change to the current conditions at the site”. No new process, component, or disturbance is proposed as part of the conversion application. Colorado Milling Company submitted the conversion application in order to bring the Gold Hill Mill’s already approved facilities inline with the contemporary CDRMS DMO regulations. Again, no new facilities, disturbance, and or process is proposed in this conversion application. Colorado Milling Company requests that CDRMS acknowledge that fact.

The substantial quantity of water data gathered at the Gold Hill Mill over the past nearly 20 years is more than sufficient to establish baseline conditions. Furthermore, since the mill has been in place since 1986, it is impossible to establish pre-mill water conditions with sampling.

However, Colorado Milling Company recognizes that CDRMS regulations have changed over the years and that the requested DMO conversion typically requires five quarters of baseline water sampling data prior to any operations. In light of the long history of the Gold Hill Mill and the current CDRMS regulations, the Colorado Milling Company proposes a compromise:

Beginning promptly, Colorado Milling Company will sample the four groundwater wells associated with the Gold Hill Mill (Wells W1 through W4) and the Tailings Pond surface water for an list of parameters based on *Tables 1-4 of the Water Control Commission (WQCC) Regulation No. 41 – The Basic Standards for Ground Water*. Not present in this parameter list are irrelevant parameters such as asbestos, coliforms, cyanide, gross alpha particles, beta emitters, foaming agents, chlorophenol, corrosivity, phenol, cobalt, chromium, lithium, mercury, and selenium. Most of these items are inapplicable (ex: asbestos is not present at the mill facilities, which would be its only source) or have never been detected despite frequent sampling (mercury, lithium, etc.). The revised sampling parameters list can be found in the updated Appendix C-2.

Sampling will be conducted for five quarters. **Colorado Milling Company requests that the development of EPFs, site maintenance, installation of necessary infrastructure such as the bulkhead and waterline, may take place during the sampling period.** No ore will be processed prior to authorization from CDRMS that the necessary baseline sampling is complete.

DRMS Follow-up

18b. The Division agrees that the development of EPFs, site maintenance, installation of necessary infrastructure such as the bulkhead and waterline, may take place during the sampling period. Please revise the tables as requested above so the Division may better evaluate the reduced sampling parameter list. The Division does agree there is substantial groundwater quality data, see permit documents related to TR-9, for the site and there is a basis for not needing to continue sampling for analytes that have never been detected at the site. However, there is a gap of water quality analysis for the Wynona Shaft. The Wynona Shaft will need to be sampled for an expanded suite of analytes. Please propose an expanded analyte list for this location. Upon completion of five quarters of sampling the Applicant may submit a Technical Revision to reduce the analyte list with sufficient justification.

Please update the analyte tables to show the corresponding regulatory limit for each analyte and provide separate a separate table for each media to be sampled at the Site.

Applicants Response

Regulatory limits are now listed for each parameter. Water sampling parameters are collected in Appendix C-2, section 3. Ore and tailing sampling parameters are collected in Appendix C-2, section 10.

DRMS Follow-up

Please see 18a above.

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

30. 30a. Adequate.

31. 31a. Adequate.

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

32. 32a. Adequate.

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

33. 33a. Please see comments in 18a and 18b.

37. 37a. Adequate.

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.

Applicants Response

Response letters addressing the issues of each of the commenting entities have been mailed to those parties. Copies of these letters will be provided under separate cover.

DRMS Follow-up

38a. Submission of the letters remains outstanding. Failure to submit the letters will result in the Division providing additional adequacy review questions regarding the Objections.

43. Adequate.

44. Adequate.

45. Adequate.

46. Adequate.

47. Adequate.

New Items:

- 48.** Tables B2-1 and B2-2, the sample results are being compared to the Agricultural Standards from Regulation 41. The tables need to be revised to compare the results to the most restrictive standards found in Regulation 41 Tables 1-4. The histograms need to be updated as needed.
- 49.** Exhibit C, Section 1.7, Water Consumption, needs to be updated to the dates and rates at which water can be removed from Left Hand Creek as is mentioned in Section 2 Water Rights.
- 50.** Exhibit C, Section 1.8, first paragraph needs to be updated to address the comment made by DWR regarding impounding stormwater.
- 51.** Exhibit C, Section 3, it is stated that ore brought to the Site will be tested only for ABA. However, in Section 4 it is stated that any ore coming onsite will be tested for SPLP and ABA. These two sections need to be revised for consistency. Additionally, in Section 3 it appears to state that ore material may be received by the site regardless of ABA testing but in Section 4 it seems to state that only material meeting a certain criteria (non-toxic and low to non-acid generating) will be accepted. Please clarify. Exhibit U, Section 9, needs to be updated as needed to reflect edits made in this section for consistency.
- 52.** Exhibit C, Section 4, the Applicant states that the Division will be notified prior to accepting material from a mine for processing. A description of what will be provided in the notification needs to be clearly stated. At a minimum the Division expects the notification to come in letter form that identifies the mine location, permit number, permittee providing the material, the results of the SPLP and ABA testing, quantity of material, and time frame for importing the material. Exhibit U, Section 9, needs to be updated as needed to reflect edits made in this section for consistency.
- 53.** Exhibit C, Section 4.3, the second paragraph needs to be updated to include “storage”.
- 54.** How was the estimate for the remaining TSF capacity performed in January 2022? A review aerial imagery from 2023 indicates the TSF may be at capacity.
- 55.** Exhibit C, Section 4.3.1, needs to be updated with monitoring well MW-1.
- 56.** Exhibit D, Section 1.3.5, why will the uphill diversion ditches be reclaimed?

- 57.** Appendix C-7, the mine pool elevation graph needs to be updated to include the water level measured in 2022 prior to the brief pump test.
- 58.** Exhibit D, Section 1.7, this section states that the adit will be left in a condition to allow for drainage. While the Applicant has stated that there will be no acid-mine drainage or need for water treatment the drainage will have to be sampled to demonstrate this is the case. Develop a plan for sampling any mine drainage during reclamation to demonstrate there is no acid-mine drainage or need for water treatment at the site.
- 59.** Exhibit D, Section 1.9, a statement needs to be added to this section clearly indicating the monitoring wells will be plugged and abandoned according to Department of Water Resources 2 CCR 402-2 Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction. The Applicant will have to submit a summary report describing the monitoring well abandonment process along with any relevant DWR documentation.
- 60.** On page U-11 Section 2.3 Froth Floatation, Table U-3 is referenced as containing a list of reagents to be used. However, Table U-3, page U-13, lists tank capacities and Table U-4 on page U-14 lists Chemicals Stored On-Site.
- 61.** On page U-12 Section 2.7 Processing Containment Table U-3 is referenced correctly but it appears this table should be re-labeled as Table U-4.
- 62.** In 2010 during an inspection the Division noted tailings materials had been deposited outside the TSF through either wind or water erosion. In the Board Order dated April 2012 for MV-2011-033 the Operator at the time was directed to submit a Technical Revision to address reclamation of historic prospecting pits and the transport of tailings from the pond. In January of 2013 TR-8 was submitted and approved to address the historic pits but it did not address transport of tailings from the pond. Please provide a management plan to address the wind and water erosion of the tailings pond beach material away from the pond and potentially contaminating the environment.
- 63.** Exhibit U, Section 5, please clarify why a process water discharge permit is required from WQCD. The SPCC Plan and MCP Plan have different primary points of contact, please clarify who is going to be the primary point of contact and if there are differing contacts please explain why. The documents should be updated as needed.

Other:

- 64.** Please respond to the Adequacy Review Letter No. 3, included as Attachment 1, from Lucas West.
- 65.** Please respond to the Review of Appendix C-5 Tailings Storage Facility As-Built, included as Attachment 2, from Tim Cazier.

66. 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 Records Office, and made available for public review

Please respond to these adequacy issues 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 December 14, 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 No. 3 by Lucas West
 2. Review of Appendix C-5 Tailings Storage Facility As-Built by Tim Cazier

cc: Jared Ebert; DRMS
 Lucas West, DRMS
 Tim Cazier, DRMS

ec: Ben Langenfeld, Lewicki & Associates, PLLC, benl@lewicki.biz

Attachment 1



October 11, 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-3

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.

Adequacy Review 2 Responses

1. In your responses to the Division's Additional Adequacy Review- 2 dated July 5, 2023 the commitment was made to address each Environmental Protection Facility (EPF) in separate Technical Revisions for each. The Division is accepting of this commitment, and for clarity will outline the requirements for each Technical Revision (TR) below. Please note that each TR will be subject review and must meet the applicable requirements of Rule 6.4.21, 7.3 and 7.4. All TR's should include maps, schematics and issued for construction drawings were appropriate. The EPF's will not be considered certified for operations until all applicable QA/QC documentation and certified as built have been submitted and accepted by the Division. The requirements include but are not limited to;
 - a. **Mill Facility:** As the Mill Facility is already constructed, This Technical Revision shall include a proposed list of upgrades needed to bring the mill into production, detailed designed drawings including the proposed upgrades, more detailed information regarding the dosing per ton of each reagent, proposed construction schedule including stop lock testing, and test runs. Additionally, though it was provided in this Conversion Application, further volumetric demonstrations of containment capacity as compared to operational volumes of Designated Chemicals, ore, water, slurry and Tailings will be required as part of the Technical Revision.
 - b. **Reagent Storage Area:** Though the Reagent Storage Area exists within the Mill Building, and partially outside of the mill building, for all intents and purposes it will be



considered a separate EPF. This Technical Revision shall include finalized volumes of reagents to be stored in each separated area within the facility, dosing, mixing and delivery into the mill system information.

- c. **Tailings Storage Facility:** In Addition to the specific concerns being addressed in this review process, the commitment was made in the Responses to the Division's Preliminary Adequacy Review dated May 15, 2023, to complete a recertification of the liner of the tailings storage facility. This Technical Revision shall include a proposed plan for the recertification including inspection methodologies and any testing to be conducted during the certification process.
- d. **Tailings Delivery Line:** The Technical Revision for the Tailings delivery line shall include all maps and drawing related to the upgrading of the delivery line, including specifications for the sections requiring double walled piping. Also details including flow rate and deposition location within the TSF should be included.
- e. **Surface Ore Stockpile Facility:** This Technical Revision shall include all maps and drawings of the proposed facility, detailed information regarding subgrade preparation and dirt work, liner specifications and installation as well as all finish grading and compaction testing as needed.

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

- 2. Section 7, Pg. U-16 states that temporary shutdown of the mill will include removal of any Designated Chemicals from the mill. Fore stored bulk chemicals this is considered adequate, however for chemicals already in solution, please provide an estimated volume and concentration of the process water. Additionally please identify the detoxification procedures and water management measures, including disposal of process and wash water in the event of a hard stop or Temporary Cessation pursuant to Rule 6.4.21(6)(a).
- 3. In conjunction with Item 1, b, Section 3.1 on Pg. 9 of the Materials Containment Plan suggest reagent unloading will take place outside of a secondary containment structure. Please note that all handling of designated chemicals including unloading should be conducted within a secondary containment facility. As designs have not been completed or submitted, and the commitment to addressing the Chemical Storage EPF through the TR process, please additionally commit to including the design and construction of a secondary containment area specific for the purposes of unloading bulk chemicals in the TR for the Reagent Storage Area.

The Division will continue to review your application and will contact you if additional information is needed. Based on the additional information requested please update all applicable exhibits, tables, maps and drawings where necessary. If additional changes are made please annotate them in your responses. 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

Attachment 2



MEMORANDUM

To: Patrick Lennberg

From: Tim Cazier, P.E. 

Date: October 17, 2023

**Re: Gold Hill Mill – Permit No. M-1994-117; Conversion (CN-1)
Review of Appendix C-5 Tailings Storage Facility As-Built**

The Division of Reclamation, Mining and Safety engineering staff (DRMS) have reviewed the recent Appendix C-5 with the Lewicki & Associates re-evaluation of the embankment stability dated August 2023 for the Gold Hill Mill.

The review consisted of comparing the contents of Appendix C-5 with specific requirements of Rules 6.4.21, 6.5 and 7.3 of the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal, and Designated Mining Operations; and the Mined Land Reclamation Board Policy 30 for Factors of Safety for Slope Stability/Geotechnical Analyses. Any inadequacies are described below with suggested actions to correct them.

The following items must be addressed by the applicant in order to satisfy the requirements of C.R.S. 34-32-101 et seq. and the Mineral Rules and Regulations of the Mined Land Reclamation Board:

Geotechnical Review

1. Stability Model Comparison: As outlined in Appendix C-5, McCulley, Frick & Gilman (MCG) used Xstabl to analyze embankment stability in 1998. Lewicki & Associates (Lewicki) elected to use Galena to re-evaluate slope stability in 2023. There appears to be additional differences in the modeling approach. MCG employed the Janbu method which analyzes block failures, whereas Lewicki used the Bishop method which only looks at circular failures. It's not clear why MCG only investigated block failures. Perhaps the potential failure planes related to the placement of a geogrid, 60-mil HDPE liner, and a GCL layer may have prompted that approach. Regardless, because the GCL and the HDPE liner could both act as slip planes, the internal slope should be evaluated for non-circular failure surfaces, as well as circular failures, given the nature of the embankment materials.



Both the liner and the GCL were installed at 1.5H:1V slopes and could act as slip planes. The geogrid appears to have been only installed horizontally or on a terraced surface (Drawing No 5461-C-5, Rev. 2, June 1998) and is unlikely to have any negative impact on stability. In fact, MCG states in the “Background” section of the October 9, 1998, technical revision report: *“The geogrid was not specifically designed as a reinforcing member in the embankment raise, although some reinforcement benefit is realized.”* It also appears MCG did not analyze the stability of the external or outslope of the new embankment in 1998, but only the internal slope failures that might impact the liner system. The Lewicki portion of App. C-5 reports they arrived at a Factor of Safety (FoS) of 1.3 using the same strength parameters as MCG’s analysis that yielded a FoS of 1.2. This is an eight percent difference. The DRMS does not necessarily concur with Lewicki’s assertion that the difference is not significant, especially considering that different failure surface methods were implemented in the two different models. It should be noted that Galena can also be used to employ the Spencer-Wright method, which allows both circular and non-circular methods to be used in the analyses of slope stability. As a re-evaluation exercise, the DRMS requests similar methodology be used for comparison.

- a. Please consider using the Spencer-Wright method for non-circular failures in the Galena re-evaluation; or use another model/method that utilizes block failures.
 - b. Both circular and non-circular failure surfaces should be evaluated for internal slope failures.
 - c. The DRMS concurs only circular failure surfaces need be considered for external slope failures.
2. Factor of Safety: Section 3, Conclusion indirectly cites the Mined Land Reclamation Board Policy No. 30 (Policy 30) for establishing an acceptable FoS, inferring the static FoS ≥ 1.3 (pseudo-static FoS ≥ 1.15) for “critical structures with site specific materials properties” is appropriate. The 1998 McCulley report states *“The soil parameters used in the computer model analyses were based, in part, on results of laboratory analyses of representative soil and tailings samples collected from the site and, in part, on conservative estimates from published literature and previous experience with similar materials.”* The Lewicki report states these same values were used in the updated analyses. Therefore, as not all parameters are based on site specific material testing, the more conservative Policy 30 criteria are appropriate: FoS ≥ 1.5 and pseudo-static FoS ≥ 1.3 . It should also be noted that as the tailings impoundment is considered an environmental protection facility (EPF) where a slope failure could lead to offsite impacts, the impoundment itself is considered a critical structure. Before any more material is added to the tailings impoundment, the FoS

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needs to meet the most conservative criteria of Policy 30, or site-specific material testing data needs to be provided to the DRMS for all seven materials.

3. Pseudo-Static Factor: It appears a pseudo-static earthquake coefficient of 0.05 was used in the Galena models for pseudo-static loading. Please provide rationale for using this value.
4. Decant Pond: On p. 3 of the McCulley report, the second to last sentence states “The impoundment will be maintained such that the decant pond is toward the back of the impoundment.” Based on photos from our August 9, 2018 inspection, it appears water was within 15 feet of the line in the south corner (**Photo 1**). Furthermore, reviewing Google Earth historical imagery suggests water within two feet of the liner in the same area in October of 2013 (**Photo 2**). Please address the following:
 - a. Establish a minimum beach width where the normal operating pool level in the tailings impoundment must remain offset from the embankment, and provide rationale for this distance.
 - b. Describe how the facility will be brought into compliance with the beach width criteria proposed in Comment 3.a above.



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Photo 1. Decant water near south corner of tailings impoundment (8/9/2018 inspection, looking south).



Photo 2. Less than 2 ft from water edge to embankment (October 2013 Google Earth image).

Hydrologic Review

5. **Water Balance:** Water management is critical to the operation of an EPF. DRMS records indicate the tailings impoundment is designed to function with two feet of freeboard (embankment crest height above the normal operating pool). The water level in Photo 1 appears to be very close to two feet from the embankment crest. Assuming no tailings have been placed since the October 2013 Google Earth image (Photo 2), it seems likely there was less than two feet of freeboard at the time. The water balance in Section 5.1 of the conversion submittal is a very simplified calculation based on average annual evaporation, sublimation, and precipitation (snow and rain). It is not uncommon for typical monthly evaporation and precipitation values to complicate, or even invalidate a water balance based on average annual values. Furthermore, as the tailings impoundment is an EPF, Rule 7.3.1(3) requires the facility be designed to sufficiently handle the design storm, which for this EFP has been determined to be the 100-year, 24-hour storm. Please address the following:

- a. Provide the DRMS with a more detailed water balance with a time step of no less than one month. That is to include monthly precipitation, evaporation and other inputs and losses as necessary, including snowmelt (the annual water balance provided indicates the average annual snowfall water equivalent is 38.5 inches, which if it realistically melts in a single month could consume all the 24 inches of freeboard). If the water stored in the impoundment after 12 months is greater than it was under the initial water balance conditions (i.e., if there is a net gain in water storage over 12 months) then a deterministic water balance is insufficient, and a probabilistic approach needs to be implemented. The water balance also needs to demonstrate that the tailings impoundment can also accommodate the aforementioned design storm while maintaining freeboard.
 - b. How is the available freeboard monitored?
 - c. If the freeboard in the impoundment is observed to be insufficient, what actions are taken to restore the required freeboard?
 - d. If water is pumped out of the impoundment, is it treated prior to releasing it? If not, where is the pumped-out water stored?
6. Diversion of Unimpacted Runoff: The McCulley report drawing 5461-C5 (As-Built drawing) references a V-notch drainage ditch with 1.5H:1V side slopes. No other pertinent information was found. Pursuant to Rule 7.3.1(3) unimpacted runoff from the design storm needs to be diverted from the tailings impoundment. This diversion channel will need to convey the peak flow from the 100-year, 24-hour design storm with sufficient freeboard (the lesser of one foot or half the velocity head $[v^2/2g]$, but an absolute minimum of six inches) and include armoring protection as necessary. The DRMS acknowledges hydraulic analyses provided in Appendix C-1. However, these analyses are for a V-ditch with 1H:1V side slopes and the alignment shown on E-5 Tailings Storage Facility shows the V-ditch all inside what appears to be the Tailings Storage Facility (TSF), whereas 5461-C5 shows the diversion outside the TSF. Please address the following:
- a. Provide a hydrologic analysis estimating the peak flow in the diversion channel resulting from the design storm.
 - b. Provide a hydraulic analysis of the diversion channel demonstrating it has sufficient capacity (including freeboard) and the necessary scour protection for both the flattest and steepest reaches of the channel. This should address both the steepest and shallowest reaches of the channel.
 - c. If either of the hydraulic criteria in Comment 6.a cannot be achieved by the existing diversion channel, please provide an updated design.

October 17, 2023

If either you or the applicants have any questions regarding the comments above, please call me at (303) 328-5229 [mobile #].