STATE OF COLORADO

Cazier - DNR, Tim <tim.cazier@state.co.us>

Hey

Carter, Stephanie <sscarter@blm.gov> Thu, May 23, 2013 at 2:54 PM
To: "Cazier - DNR, Tim" <tim.cazier@state.co.us>

Tim,

As requested, see below for the geologic hazard analysis input on T.H.E. Aggregate Source amendment application:

The operator shall be required to provide adequate evaluation and consideration of potential geologic hazards that may affect onsite and offsite conditions as a result of mining and/or reclamation operations. The operator shall, at a minimum, provide an engineering stability analyses for proposed slopes, highwalls, waste piles and embankments. The analyses should include industry standard approaches that address data collection, conditions considered and design requirements, which are applicable to the proposed operations.

Geotechnical monitoring and assessment will be conducted by the operator during active mining operations. Slope movement monitoring, development of trigger points for mitigation (if significant slope movement is detected), geotechnical pit mapping and routine review of the monitoring results and geotechnical data will assist in the develop of corrective actions or optimize the final pit slope configuration as necessary, in order to minimize the potential for failure during mine operations.

A minimum factor of safety for all slope designs should be determined as part of the site-specific comprehensive geologic hazard analysis provided by the operator, which are subject to approval by the Colorado Division of Reclamation, Mining and Safety, in coordination with the BLM.

Thanks,

Stephanie Carter, P.G.
Geologist

BLM, Royal Gorge Field Office
3028 East Main Street
Canon City, Colorado 81212
Phone - 719.269.8551

[Quoted text hidden]

STATE OF COLORADO

DIVISION OF RECLAMATION, MINING AND SAFETY
Department of Natural Resources

1313 Sherman St., Room 215
Denver, Colorado 80203
Phone: (303) 866-3567
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May 23, 2013

Randy Diluzio
Tezak Heavy Equipment Co. Inc.
205 Tunnel Dr.
Cañon City, CO 81212

Ken Klco
Azurite, Inc.
10001 CR 12
P.O. Box 338
Cotopaxi, CO 81223

Re: T.H.E. Aggregate Source, File No. M-1977-193,
Second Adequacy Review for Amendment 5 (AM-05)

Dear Mr. Diluzio and Mr. Klco:

The Division of Reclamation, Mining and Safety (Division) has completed its review of your response to our preliminary adequacy review for the 112 construction materials reclamation permit amendment application. The response was received on May 10, 2013. The decision date for this application has been extended from the original April 15, 2013 to May 24, 2013. Please be advised that if you are unable to satisfactorily address any concerns identified in this review before the current 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 will deny this application.

The review consisted of comparing the application content with specific requirements of Rules 3.1, 6.4 and 6.5 of the Minerals Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials. Any inadequacies are identified under the respective exhibit heading along with suggested actions to correct them.

For the purpose of continuity, the numbered responses below correspond to the same comment number in our April 5, 2013 Preliminary Adequacy Review.

APPLICATION

1. Response is adequate.

2. Response is adequate.
3. Acreage release request (AR-01) was approved by the Division on April 10, 2013. Response is adequate.

6.4.2 EXHIBIT B – Index Map

4. Response is adequate.

6.4.3 EXHIBIT C - Pre-mining and Mining Plan Map(s) of Affected Lands

5. Response is adequate.
6. The contour lines in the revised Exhibit C are very difficult to see. Both the Division and the BLM would like clarification as to when T.H.E. intends to mine the currently permitted area north of the current active mining area. The proposed Phases One and Two on Exhibit C are in the BLM area of the permit. Please clarify whether the area between the active area and the BLM area and the area to the north will be mined before or after the BLM area.
7. Response is adequate.
8. Response is adequate.

6.4.4 EXHIBIT D – Mining Plan

9. Response is adequate.
10. The November 28, 1995 Board Order requires blast monitoring reports be submitted to the Division on a quarterly basis. This led to Technical Revision No. 3, approving a blasting and monitoring plan which required quarterly monitoring reports. The following numeric protection limits were established by the Division as part of the approval of TR-03:

    - Peak Particle Velocity: ≤ 1.0 inch/second
    - Air Blast: ≤ 133 dB

    The Division acknowledges your commitment to continuing the blast monitoring. Please commit to quarterly reporting.

6.4.5 EXHIBIT E – Reclamation Plan

11. The Division received an acknowledgement from the BLM via email on May 8, 2013 that the intent to not revegetate the highwall benches is acceptable. Response is adequate.
12. Response is adequate.
13. Response is adequate.
14. Response is adequate.
15. Response is adequate.

6.4.6 EXHIBIT F – Reclamation Plan Map

16. Response is adequate.
17. Response is adequate.
18. Response is adequate.
19. Response is adequate.

6.4.12 EXHIBIT L – Reclamation Costs

20. The current bond held by the Division for this site is $540,215.00. The Division is currently estimating the financial warranty for site reclamation under the proposed modifications stated in the Amendment 5 application and responses to our preliminary adequacy review. This estimate will be submitted for your review and comment under separate cover.
21. Response is adequate.
22. Response is adequate.

6.4.19 EXHIBIT S – Permanent Man-Made Structures

23. Response is adequate.

6.5 Geotechnical Stability Exhibit (submitted following Exhibit D – Mine Plan)

24. The Division has reviewed the Galena stability analyses received May 10, 2013. Please see the attached "Highwall Stability Exhibit for Tezak Heavy Equipment Co. (M-1977-193) dated 5/8/13" for specific comments. The primary concerns relate to the uncertainty of the data used, as no geologic investigation of the subsurface rock in the BLM area has been performed; and the Division's lack of understanding as to how the selected sections analyzed relate to the proposed final orientation of the highwall and the foliations and joint sets discussed in the amendment application and response to the preliminary adequacy review. The industry accepted factor of safety when the consequence of failure is small and the certainty in site-specific geometry, geology, rock mass, and strength parameters is high is between 1.25 and 1.30. As the certainty in these parameters is not "high" as noted previously, the Division would expect a minimum factor of safety greater than 1.3 to account for the uncertainty in these parameters and rock structure in the western areas of the site. Please reference the comment numbers in the attached memo when providing responses.
    a. Based on the uncertainty of the data and the proposed 680-foot height of the highwall, the Division requests the Operator commit to long term monitoring of the highwall to detect movement. This monitoring should be based on physical measurements of specific established locations distributed over the face of the highwall as mining progresses. Conversations with Mr. DiLuzio indicate the Operator would be agreeable to establishing survey monuments and using a

GPS system to measure locations over time to monitor potential movement. This approach or an equivalent system would be acceptable to the Division. Please commit to implementing a physically measureable system and provide the Division with a number of specific established locations based on the length and height (or exposed surface area) of the highwall as mining progresses.

25. Response is adequate.

26. Response is adequate.

Other Comments

The Division received additional comments regarding geologic hazard analysis input. The May 23, 2013 email from Ms. Stephanie Carter is also enclosed.

Other Concerns

The Division is not aware of other concerns at this time.

Please remember that the decision date for this application is May 24, 2013. As previously mentioned if you are unable to provide satisfactory responses to any inadequacies prior to this date, **it will be your responsibility to request an extension of time to allow for continued review of this application.** If there are still unresolved issues when the decision date arrives and no extension has been requested, the application will be denied. If you have any questions, please contact me at (303) 866-3567, ext. 8169.

Sincerely,

Tim Cazier, P.E.
Environmental Protection Specialist

Enclosures

ec: Tom Kaldenbach, DRMS
TC Wait, DRMS
DRMS file
Stephanie Carter, BLM

DATE: May 20, 2013
TO: Tim Cazier, DRMS
FROM: TC Wait, DRMS
Subject: Highwall Stability Exhibit for Tezak Heavy Equipment Co. (M-1977-193) dated 5/8/13

Per your request, I have completed a preliminary review of the stability analysis as part of AM-05 for the THE Aggregate Source permit. The comments below should be addressed as part of the adequacy response to DRMS.

Overall, I do have some concerns regarding the long-term stability of the proposed final configuration for the highwall. These concerns are not as much for the ongoing mining activity, but rather for the future long-term reclamation of the site. As you are aware, the permit just north of this site, Canon Dolomite Quarry (M-1977-376) is in a similar geologic setting, and had a benched highwall that failed in the 1990s.

General Geologic Background Information

1. Geologic materials in the 5/8/13 analysis are reported to be massive granitic rock banded with layered metamorphic rocks and migmatitic intrusions. The stability analysis done in 3/30/97 for this site describes the geology as massive outcrop of magmatic Precambrian gneiss. The geologic quadrangle map references this area as layered gneisses with magmatic variations (more consistent with the 1997 analysis report). An accurate understanding of the geologic materials involved is a key parameter for a meaningful stability analysis. Please clarify and provide a more detailed map of where different geologic materials are located in relation to the permit boundaries and proposed highwall orientation.
2. The presence of layers of weaker minerals (ie, biotite and muscovite) and any weathered surface (joints, fractures, etc) will likely be the weak planes for failure surfaces. The description of the site includes multiple foliations, joints, and intrusions, making the geology relatively complex. The actual geology and structure at the site should be identified (see note 1 above) and shown on cross sections correlating to stability analysis sections.
3. There was very little discussion about seismic influences, although there are several geologically recent (late Cenozoic) faults within 15 miles of the site. The CGS earthquake database shows the epicenters of three 2008 earthquakes (magnitude 2.5 – 3.2) located within 15 miles of the site. The analysis did use a conservative seismic coefficient in the modeling.

Geometry of the proposed Mine Highwall Alignment

4. It would be worthwhile to include a kinematic analysis of the orientations of the structural elements (joints, foliations, etc), bedding orientation, and the highwall alignment to determine if the proposed orientation for the final grading will adversely impact the existing areas of weakness.
5. The stability analysis indicates that the proposed geometry will have areas where foliation intersects the primary joint strike and bench alignment direction, which will result in localized rockfall from the edge of the mine bench onto the bench run. These areas should be indicated on the Reclamation map, and discussion as to impacts for post mining land use should be included. Are these areas to be maintained and cleared of debris? If not, how will this impact the geometry and function of the benches on the highwall?

Stability Analysis Discussion

6. There are several analysis profiles that have Factor of Safety values less than 1.5. Please indicate where these profiles are located in relation to the proposed highwall alignment. These represent areas where the greatest stability concerns may be, and could require additional analysis.
7. Site-specific rock mass analysis was done for this site in 1997, reportedly taking 12 samples for testing. What rock types were represented, and where the sample locations in relation to the cross sections for the stability analysis runs.
8. There is no location map included for where the stability analysis runs were located in relation to the highwall design and the site geology. It would be prudent to run analysis on several sections, including the areas of weakness indicated with the kinematic analysis, and various aspects of the final highwall design.
9. The analysis seems to consider a homogenous rockmass profile, rather than a "layered" as described in the report. How does the analysis take into account zones of weakness, such as joints, foliation, and weathered mineral zones?
10. The most probable failure scenario would be a planer or wedge failure surface along joints, fractures, or foliations of the rockmass. The stability analysis includes several circular failure surfaces. Please provide rationale as to why these analyses were included. Is there evidence that a circular failure surface may occur?
11. The analysis assumes no water influences. Please confirm that there are no seeps, and that groundwater levels are not within range to affect the stability of the highwall design.

If detailed information is not available for this site to more accurately depict the potential failure surfaces and orientations and factors that may affect long-term stability, it may be worthwhile to reconsider the highwall geometry, possibly including a setback from the permit boundary that would minimize potential failure impacts to adjacent property, and increasing the desired Factor of Safety for the final benched highwall design to accommodate unknown conditions.

If you have any questions or need clarification, please let me know.