



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

June 23, 2021

Kimberly Dennis
Aggregate Industries – WCR, Inc.
1687 Cole Blvd
Suite 300
Golden, CO 80401

RE: Lyons Quarry, Permit No. M-1977-141, Technical Revision No. 5 (TR-05), Adequacy Review No. 3

Ms. Dennis:

The Division of Reclamation, Mining and Safety (Division) has identified the following additional adequacy items that must be addressed before an approval of TR-05 can be issued:

- 1) Please address the adequacy items identified in the enclosed letter from Tim Cazier, P.E., dated June 22, 2021.

This completes the Division's 3rd adequacy review of the materials submitted for TR-05. The decision date for TR-05 is currently set for **July 5, 2021**. If additional time is needed to address the adequacy items, an extension request must be received by our office prior to the decision date.

If you have any questions, you may contact me by telephone at (303) 866-3567, ext. 8129, or by email at amy.eschberger@state.co.us. You may also contact Tim Cazier by telephone at 303-866-3567, ext. 8169 or by email at tim.cazier@state.co.us.

Sincerely,

Amy Eschberger
Environmental Protection Specialist

Encl: TR-5 Review of June 2021 Adequacy Response, from Tim Cazier, P.E., dated June 22, 2021

Cc: Travis Snyder, HDR
Chance Allen, Aggregate Industries - WCR, Inc.
Tim Cazier, DRMS
Michael Cunningham, DRMS





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Date: June 22, 2021

To: Amy Eschberger

From: Tim Cazier, P.E.

RE: Lyons Quarry, DRMS File No. M-1977-141;
TR-5, Review of June 2021 Adequacy Response

The Division of Reclamation, Mining and Safety (DRMS) engineering staff has reviewed the June 2021 Adequacy Response to our April 23, 2021 review letter. Additional responses are requested prior to approval. Please note the original comment numbering is retained for continuity.

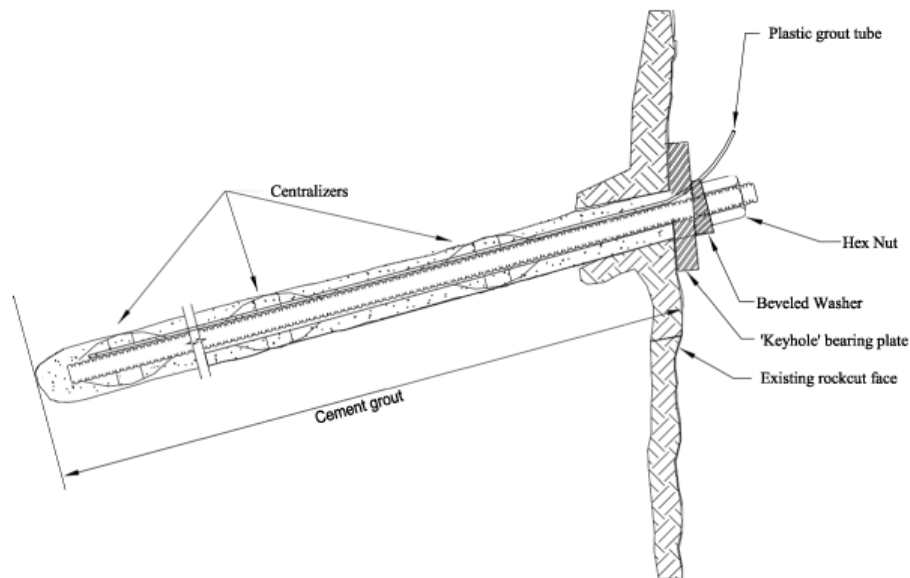
Geotechnical Stability Related Comments

1. Rock Anchors: The response was not adequate. Additional clarification is required. There are numerous references to the 2008 Kleinfelder report in TR-05 which provided two options for stabilizing the dacite highwall: backfill or install rock bolts/anchors and shotcrete. The adequacy response infers a third option, not included in the Kleinfelder report using wire mesh in lieu of shotcrete. This approach is not explicitly stated (mentioned only in technical specification 31 72 16), nor is there any design analysis provided to demonstrate wire mesh is an acceptable alternative to the previously proposed shotcrete. The DRMS understands detailed design of the proposed rock anchor system will not be completed until the rock scaling phase of the construction is finished. Please address the following:
 - i. Analysis: Provide an analysis or critical narrative demonstrating wire mesh is a feasible alternative to the Kleinfelder shotcrete option.
 - ii. Wire mesh substitute: Section 5.1, Item 7, Ground Control needs to be revised to explicitly state wire mesh is to be substituted for shotcrete.
 - iii. Welded wire: Other engineering applications using wire mesh, such as gabion basket construction, generally prefer twisted wire mesh over welded wire mesh due to the potential for welds to break. Why in this case is welded wire (specification 31 72 16) indicated over twisted wire?
 - iv. Welded wire cost: Item 7.2 in the Exhibit L table provides a unit cost of \$7,000 per installed anchor. Does this cost include the wire mesh?
 - v. Rock scaling: As rock scaling is an integral part of the reclamation plan, it would seem appropriate to include notes to perform rock scaling in



accordance with project specifications on Sheet 01C-02, Site Grading Plan and/or Sheet 01C-03, Sections C, D and E.

- vi. Rock anchors: The new note on Sheet 01C-02 does not completely reflect the inferred intent. The drawing note "Area to receive rock anchors as needed" should be revised to "Area to receive rock anchors as determined by engineer after rock scaling is completed and in accordance with project specifications". A callout referencing the new as yet unnamed detail on Sheet 01C-07 (Detail 6?) should also be added.
- vii. Final configuration of highwall: Section 5.1, Item 7 states "Details C, D and E show the proposed final configuration of the dacite highwalls" on Sheet 01C-03. These three sections are of a small scale using a dashed line and do not differentiate between the Fountain formation sandstone and the dacite. The "Remaining High Wall" should be revised to "Remaining Dacite High Wall" with references to "See Note 1" addressing the rock reinforcement.
- viii. Rock anchor Bolt Split Set & Wire Mesh Detail: As stated in Comment vi above, this detail on Sheet 01C-07 should be labeled as Detail 6(?) and provided with the proper symbology indicating it is called out from Sheet 01C-02.
- ix. Anchor bolt detail: The DRMS would expect a rock anchor detail is not premature at this time given the stereonets and rock strengths in the Kleinfelder report. An additional detail similar to the FHWA detail below should be included as well



2. Site Grading Plans: The response was not adequate. Additional clarification is required with respect to maintenance. Given wire mesh is inferred to be substituted for shotcrete, the DRMS and the landowner should be made aware of the rock anchor system inspection points and potential for maintenance of the same. Please address the following:
 - a) A long-term catchment berm maintenance plan: Please update the Lyons Quarry Catchment Basin Operation and Maintenance (O&M) Plan to include the rock anchor system; addressing inspection points in Table 2-1, estimating the expected Life Span in Section 2.5, and other sections as appropriate.
 - b) Determination of the responsible entity... The DRMS understands this entity to be Aggregate Industries until we release the permit and Boulder County thereafter. If this is the case, no additional response is necessary.
 - c) Areas that will be reinforced... the incorporation of Comments 1.i through ix should address the remaining concerns with respect to the grading plan and reclamation plans.
3. Northeast Highwall Catchment Berm: The response was adequate.
4. Catchment Berm Stability: The response was adequate.
5. Increasing Berm Functionality Factor of Safety: The response was adequate.

Stormwater Related Comments

6. Swale Berm Culvert: The response was adequate.
7. Quarry 2 Swale: The response was adequate.
8. Northwest Highwall Catchment Berm: The response was adequate.

Additional Comments

9. Drawings and Maps: Pursuant to Rule 6.2.1(2)(b), all drawings and maps are required to be signed and dated. Please sign and date revised drawings and maps.
10. Professional Engineer Seal: As part of the review of the response, it was noted the original hard copy professional engineer seal for Andrew Little in Attachment F, Grading Plan Verification Letter was signed but not dated. Pursuant to Rule 1.5.A.3 - 4 CCR 730-1, the signature and date of signature shall appear through the seal. Please resubmit the letter in accordance with Colorado rules governing professional engineer seals.
11. Rock Anchor Inspections: This is a reminder the DRMS will periodically inspect the rock anchor system and catchment berms until the Lyons Quarry (M-1977-141) is released from reclamation liability. No response is necessary.