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

August 20, 2019

Jim Harrington
Colorado Legacy Land, LLC
4601 DTC Blvd. - Suite 130
Denver, CO 80237

Re: Schwartzwalder Mine, Permit No. M-1977-300, Technical Revision No. 28 (TR-28), Adequacy Review No. 4

Mr. Harrington:

The Division of Reclamation, Mining and Safety (Division) has reviewed your adequacy response submitted on August 6, 2019 for Technical Revision No. 28 (TR-28), and identified the following adequacy items that must be addressed before an approval of TR-28 can be issued:

1) Please address the adequacy items identified in the enclosed letter from Tim Cazier, P.E..

This completes the Division's 4th adequacy review of the materials submitted for TR-28. The decision date for TR-28 is currently set for **August 30, 2019.** 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

Amy Eschberger
Environmental Protection Specialist

Encl: Third Adequacy Review letter from Tim Cazier, P.E., DRMS, dated August 19, 2019

EC: Elizabeth Busby, Colorado Legacy Land, LLC
Paul Newman, Colorado Legacy Land, LLC
Tim Cazier, P.E., DRMS
Michael Cunningham, DRMS

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Date: August 19, 2019

To: Amy Eschberger

From: Tim Cazier, P.E.

RE: Schwartzwalder Mine, DRMS File No. M-1977-300;
Third Adequacy Review – TR-28, August 5, 2019 Revised North Waste Rock Pile Drainage Design Engineering

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The Division of Reclamation, Mining and Safety (DRMS) engineering staff has reviewed the August 5, 2019 response letter (from Colorado Legacy Land, received August 6, 2019) and six revised drawings (by Alexco Water & Environment) for Technical Revision No. 28 (TR-28). These drawings and the associated designs present a new open channel diversion concept, replacing the previously proposed pipe system. The August 5, 2019 response letter addressed each of the original 6 engineering staff comments in a "Comment and Response Summary Table" with the engineering staff. As this is a new design, the DRMS is no longer tracking comments from our initial engineering May 30, 2019 review of TR-28. The following comments are based on the new open channel design.

Letter:

1. Drainage Design. Table 1 indicates the flow depths for the flatter sections of the diversion channel are 25 and 24.4 inches for the upper and lower minimum slope sections, respectively. Based on the Division's research of the proposed Smartditch system, the maximum flow depth is 24.75 inches. Given the turbulent nature of the flow (Smartditch design guidelines indicate flow velocities exceeding 4 feet per second are turbulent), the Division expects some reasonable freeboard (half the velocity head $\{v^2/2g\}$ is a common approach). This is especially important where superelevation in the channel flow in the curve between approximately Sta. 4+75 and 6+30 would flow out on top of the waste pile without sufficient freeboard. Please propose a solution to address the lack of sufficient freeboard.
2. Drainage Construction.
    a. The DRMS engineering staff has experience with similar products and assumes the subgrade preparation is critical to the long term performance of the proposed Smartditch product. It is also our experience that manufacturer's representatives often prefer, or even require a presence on site during construction to ensure proper installation. Furthermore,

Note 8 on Drawing Sheet 2 states "Installation of Smartditch shall adhere to manufacturer's specifications". Will a manufacturer's representative be on site during construction?

b. As this diversion channel is intended to protect a DRMS designated environmental protection facility (EPF), the DRMS is required to perform inspections during the construction. We have identified the following phases of construction to be inspected by the DRMS prior to construction proceeding. Please commit to providing the DRMS with a construction schedule and providing updates to us 24-48 hours prior to beginning the next phase.

    i. Inspection of water capture structure concrete seal trench prior to placing concrete,

    ii. Inspection of Smartditch trench(es) prior to/during installation of the Smartditch product and edge protection,

    iii. Smartditch installation completion.

c. As this diversion is considered an EPF structure, pursuant to Rule 7.3.1(4), a construction Quality Assurance / Quality Control certification (prepared, signed and stamped by a registered professional engineer in the state of Colorado) is required to be reviewed and approved by the DRMS, pursuant to Rule 7.3.2. Please contact the DRMS if there are <u>any</u> questions regarding requirements for the QA/QC certification report.

Drawings (Sheets 1 through 6):

3. <u>Sheet 5</u>. Water Capture Structure Details:

    a. The details show a riprap wingwall. The purpose of the wingwall is to direct water into the Smartditch flared end section. Riprap is highly porous. How will porous riprap wingwalls be effective in directed stormwater runoff to be captured into the flared end section?

    b. The front and side views show the concrete seal in contact with the bedrock, but gives a maximum depth of 4 feet. What happens if 4 feet of depth is insufficient to reach and provide good contact with the bedrock? The drawing must include notes to address this contingency.

    c. The front view appears to show #6 rebar tying the concrete seal to bedrock. How long is the rebar? What is the development length? Will the rebar be epoxied into the bedrock?

    d. The front and side views show the concrete anchors attaching the flared end section to the concrete seal. Are these embedded anchors? Are they water tight? What is the anchor material and how long is the design life?

4. Additional Details. Details need to be provided to convey the design proposed to address the freeboard solution in Comment #1 above.

Post Construction Monitoring:

5. Please provide a monitoring and inspection plan for the Smartditch diversion channel to address inspection frequency and criteria for what damage or observed irregularities require maintenance and/or repair.

SUMMARY

These comments are based on Rules 3.1.5, 6.4.21 and 7.3.1 which in aggregate compel the Division to approve designs that will ensure the protection of environmental protection facilities (EPFs) with minimal maintenance. The Division has concerns related to freeboard, water capture structure construction, construction quality assurance, and long term monitoring and maintenance.