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

March 16, 2020

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. 5

Mr. Harrington:

The Division of Reclamation, Mining and Safety (Division) has reviewed your adequacy response submitted on February 25, 2020 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., DRMS.

This completes the Division's 5th adequacy review of the materials submitted for TR-28. The decision date for TR-28 is currently set for **March 31, 2020.** 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: Adequacy Review letter from Tim Cazier, P.E., DRMS, dated March 16, 2020

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

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Date: March 16, 2020

To: Amy Eschberger

From: Tim Cazier, P.E.

RE: Schwartzwalder Mine, DRMS File No. M-1977-300;
Adequacy Review – TR-28, February 20, 2020 Revised North Waste Rock Pile Drainage Design, Construction, and Schedule for Implementation

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The Division of Reclamation, Mining and Safety (DRMS) engineering staff has reviewed the February 20, 2020 response letter (from Colorado Legacy Land, received February 25, 2020) and six revised drawings (by Alexco Water & Environment) for Technical Revision No. 28 (TR-28). These drawings and the associated designs present another new open channel diversion concept, replacing the previously proposed smart ditch system with a geoweb/concrete design. As this is another new design, the DRMS is not following up on comments from our August 2019 adequacy review of TR-28. The following comments are based on the new geoweb/concrete channel design.

Letter:

1. Channel Design. P. 7, the fifth paragraph states "The HEC RAS model results are presented in Table 1. Note that the results are slightly different from those shown the hydraulic calculations (Attachment 2)." Please explain why there are differences.
2. Hydraulic Analyses. In Attachment 2, multiple hydraulic evaluations are presented assuming a Manning's roughness coefficient of 0.029 for what is essentially a concrete-lined channel. Standard references [Chow (1959), Van Haveren (1986), UDCFD (2008), etc.] list a Manning's n of 0.011 to 0.013 in general for concrete. The high Manning's n may mean the hydraulic energy dissipation basin on Sheet No. 9 is undersized. Please explain why a value nearly three times as rough as generally accepted was selected for all the hydraulic analyses (i.e., HEC-RAS analysis, and the Burns & McDonnell "Stormwater Management Calculation"). Please provide a demonstration justifying the selection of 0.029.
3. Seepage Uplift Pressure. Consistent with Urban Drainage and Flood Control District (UDFCD) design, uplift pressure and seepage relief considerations are extremely important to structural stability. There can be troublesome pressure differentials from either the upstream or downstream direction when there is shallow supercritical flow in the structure, as is predicted with this structure.

Per UDFCD guidance, high drops (i.e., > 6 feet), more than one row of weep holes may be necessary. The proposed design includes an upstream cutoff to partially mitigate this problem. However, seepage from the slope north of the diversion structure should be expected. Our review found no visible way to mitigate potential seepage build-up. Please explain how potential seepage uplift pressure will be mitigated.

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 hydraulic analyses, seepage uplift mitigation, and incomplete design.