STATE OF COLORADO

DIVISION OF RECLAMATION, MINING AND SAFETY
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COLORADO DIVISION OF RECLAMATION MINING & SAFETY

DATE: August 15, 2013
TO: Tyler O'Donnell, DRMS
FROM: TC Wait, DRMS
SUBJECT: West Farm Pit (M-2008-078) TR-2
Geotechnical Review of Stability Report (3/21/13 by Cesare, Inc.)

Per your request, I have reviewed the slope stability memo for the West Farm Pit prepared by Darin Duran of Cesare, Inc. dated March 21, 2013. This stability report was prepared as part of the Techincal Revision No. 2 Request. The comments below should be considered as part of the adequacy response for DRMS.

- The TR-2 request included changing the mining plan from a vertically mined highwall to mining at a slope of 3H:1V and controlling seeping using a slurry wall. It is my understanding that the final land use will include 2 reservoirs that will be approximately the same level as the native groundwater. The stability report addressed the slope stability for the pits during the proposed mining activity described in the TR.

- There are a number of overhead utility lines and a roadway in the vicinity of the proposed mining areas. It is my understanding that there are no structure agreements in place for any of these items, and that there are no underground utilities in the vicinity of the mining areas.

- No stability cross-sections, section locations, or data runs from the analysis were included in the report. It is difficult to fully understand the geometry of the section being analyzed and the subsurface characteristics being evaluated without this data. Please provide a cross section location map, cross sections, and evaluation data for this analysis.

- One are of concern for analysis is the area between the two pits, both during and after mining operations. Please provide discussion regarding the potential stability issues for mining both sides of this road and utility corridor.

- The trenching system being proposed for the slurry wall installation will use a one-pass trencher method to construct a slurry wall approximately 18 inches thick and a minimum of 3 feet into "unweathered bedrock". Of the seven borings drilled on the site, all but one boring indicated that slightly weathered bedrock was encountered to the total depth of the hole. Please provide the criteria for determining the surface of "unweathered bedrock" for the slurry wall anchor depth.

- The water level used in the analysis is stated as being at an elevation located at the top of the gravel/sand layer" for the analysis. The borehole logs indicate the water level

(August 2010) is approximately 7-15 feet below the ground surface, in some cases several feet above the top of the sand/gravel layer. This water level may also not incorporate a seasonally high water level that would be expected during spring conditions, or with adjacent irrigation. Please address the adequacy of the stability analysis to model the seasonally high water level for this site.

- The material properties used during the analysis, shown in Table 3, differ somewhat from the values used during previous stability analyses done in 2009 and with those used by DRMS. Please provide the basis for why these values were modified for this analysis.

- The analysis focuses on conditions during active mining, while the pits are dry. Please provide analysis regarding the post-mining scenario where the pits are flooded, particularly on the area between the two pits.

- Will there be any monitoring of slope stability during operations? What will that entail?