STATE OF COLORADO

DIVISION OF RECLAMATION, MINING AND SAFETY
Department of Natural Resources

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MEMORANDUM

To: Dustin Czapla

From: Tim Cazier, P.E.

Date: April 9, 2013

Re: C-LP-21 Mine Drainage Design Plan – General Stormwater Comments, Permit No. M-1977-305 / AM-01

The Division of Reclamation, Mining and Safety (DRMS) engineering staff has reviewed the September 5, 2012 Drainage Design Plan (Engineered Stormwater Management Plan) for the LP-21 Mine prepared by O'Connor Design Group, Inc. The following comments are posed to ensure adequate engineering analyses and design practices are implemented to eliminate or reduce to the extent practical the disturbance to the hydrologic balance expected by the mining operation with respect to water quality and quantity in accordance with Rules 3.1.6(1), 6.4.21(10) and 7.3.1. Please note, as this site is a designated mining operation (DMO), compliance with Rule 7.3.1 is applicable, thus requiring certified designs and specifications for engineered elements associated with the environmental protection plan (EPP).

1. Page ESWMP-4, Section 7.1 – Engineering Approach. The last sentence implies the improvements discussed in the drainage plan are recommended. The Operator needs to commit to implementing the improvements in the drainage plan and as modified pursuant to the comments by the DRMS in this and subsequent adequacy reviews.
2. Page ESWMP-5, section7.2. The NOAA Atlas 2, Volume III charts provided in the attachments are illegible due to the small scale. Please state the specific design storm depths used for runoff analyses for both the 10-year and 100-year, 24-hour design events.
3. Page ESWMP-5, section7.3.
    a. The second paragraph states the surface soils at the site are considered Hydrologic Soils Group (HSG) B. However, the second paragraph on page ESWMP-3 states the soils trend to a clay loam. Furthermore, satellite images suggest subbasins OFF 10 and OFF 20 contain significant rock outcrops, which is additionally supported by the soil survey map on Figure U3 indicating most of subbasin OFF 20 consists of SMU 88 – "Rock Outcrop-Orthents Complex". This evidence suggests HSG "D" might be more representative for runoff analyses for OFF 10

and OFF 20. Please revise the selected curve numbers (CN) to reflect HSG D (CN = 89 – poor), or provide documentation to substantiate the claim of HSG B.

b. Please provide some narrative supporting the selection of HSG "B" for the onsite subbasins (ON 30 and PN 40).

4. Page ESWMP-6.

   a. Peak flow summary table: no PondPack results are provided for the Q_{100} for subbasins Offsite 10 and Offsite 20 in the Attachments. Please provide the computer model results for these two subbasins.

   b. Second paragraph and FlowMaster output pages. A Manning's n = 0.035 is used for the design analysis. However, no rationale is provided for the selected roughness coefficient, which implies a rough cut in bedrock or rock in the channel. Because channel roughness is seldom uniform, the DRMS requires channels be evaluated for both stability and capacity, i.e., minimum and maximum expected roughness, as well as minimum and maximum design slopes. For example, an excavated earth channel, after weathering would be expected to have a minimum n = 0.018 (use to evaluate stability or maximum expected velocity); and a maximum n = 0.025 (use to evaluate capacity). In addition, the DRMS requires channel freeboard be evaluated: channels shall be designed with a minimum of 0.5 feet of freeboard unless the velocity head ($v^2/2g$) is significant, then the minimum required freeboard is half the velocity head, or $v^2/4g$.

   c. Please provide a rationale for the selected roughness coefficients, and evaluate each designated channel/ditch design slopes (minimum and maximum) for both capacity and stability.

   d. Please design all the ditches with the appropriate freeboard and provide channel design depths for construction.

5. Page ESWMP-6, second paragraph and Retention Pond 50: Grading and Details (Sheet 5 of 5).

   a. The 100-year, 24-hour runoff volume criteria used for sizing storage in the pond is acceptable. However, a spillway is necessary to pass runoff from successive storms as there is no way presented in the Retention Pond design plan to drain the pond via gravity. As such, the emergency spillway for the pond needs to be designed to convey 100-year peak flow, assuming the ponds are full (to the spillway invert elevation) at the onset of the design storm. Please provide analyses and designs to demonstrate the spillway has the capacity to pass the peak flow resulting from the 100-year, 24-hour design storm. (*NOTE – The DRMS checked with the Colorado Division of Water Resources District 60 water commissioner (Aaron Todd) regarding the status of the San Miguel River appropriations. Mr. Todd stated that the San Miguel River is not <u>currently</u> over appropriated and as such, DWR has no current requirement to release retained stormwater within 72 hours. He also indicated this is subject to change.*)

   b. Page ESWMP-21 and Retention Pond 50: Grading and Details (Sheet 5 of 5). The areas listed for each elevation in PondPack table on page ESWMP-21 are larger than what DRMS measured on Sheet 5, leading to a greater available

storage volume estimate. Please re-check the input to the PondPack input table and ensure the rounded corners of the proposed pond are considered.

6. Please address the reclamation/post mining plan for the retention ponds. The DRMS strongly encourages breaching the embankment upon closure unless the landowner has a use for the ponds (e.g., stock pond) and intends to maintain them.
7. Pages ESWMP-8 – 12, hydrographs. Peak flow computer software generated tables were not provided as was the case for M-1977-307, CM-25 mine. Please provide similar tabular input/output information.
8. Page ESWMP-15. The composite area weighted CN indicates subbasin ON 30 is 2.3 acres. Sheet 1, Future Onsite & Offsite Basins indicates it is 2.82 acres. Please revise the incorrect data and revise the runoff analyses as appropriate.
9. Pages ESWMP-15 & 16. The composite area weighted CN indicates both subbasins ON 30 and ON 40 are pinyon-juniper cover. The reclaimed area should be herbaceous cover only with a CN between 71 and 80 for HSG B (if substantiated) or between 89 and 93 for HSG D. Please correct the CN values for ON 30 and ON 40.
10. Page ESWMP-20. The 11-minute time of concentration (TC) for subbasin ON 40 appears high. All the conceivable hydraulic paths in ON 40 have significant slope lengths 4H:1V or steeper, yet the steepest flow segment is 9%. The DRMS expects the TC to be on the order of 5 to 6 minutes. Please re-check the TC calculation for ON 40.
11. Pages ESWMP-22 – 34, FlowMaster analyses.
    a. Referencing Comment #4b above, all engineered channels and ditches need to be analyzed for maximum and minimum design slopes and for both stability and capacity. Please provide the necessary analyses.
    b. Please identify which analysis applies to which channel/ditch using a naming convention consistent between the analyses and the drawings.
    c. ESWMP-34. The DRMS assumes the peak flow for this analysis was derived by adding the peak flows from ON 30 and ON 40. If this is the case, the design value should be 7.6, instead of 7.5 cfs.

Drawings:

12. Please stamp and sign all five drawings pursuant to Rule 6.4.21(10)(a).
13. Sheets 1 and 2, Future Onsite & Offsite Basins / Proposed Drainage Improvements:
    a. Please label all engineered channels, ditches and berms consistent with supporting stability and capacity analyses.
    b. On Sheet 1, there is "*NOTE" shown in subbasins ON 30 and ON 40 referring to TC flow paths on Sheet 2, but no TC flow paths are shown on Sheet 2. Please show the TC flow paths on Sheet 2.
    c. Sheet 2. The DRMS assumes the dark cobble-shaded linear structure on Sheet 2 is the proposed retention berm (Section B-B on Sheet 3). Please label this structure and reference the Section B-B on Sheet 3.
    d. Sheet 2. There are three areas associated with the east proposed retention berm that appear to be low spots (indicated below) that could retain stormwater and

overtop the proposed berm (note the intermediate contours do not show up on the scanned image below):

Please address this potential and address the grading plan appropriately.

14. Sheet 3, Drainage Channel Cross-Sections & Details:
    a. Section B-B. The proposed retention berm is to be constructed from onsite material. Depending on available material, large rocks and/or debris could be used in the construction, but should not. Please provide material and compaction specifications to limit rock size, preclude inappropriate debris, and ensure sufficient compaction for the berm.
    b. Section C-C. Please show the location of the proposed diversion ditch on Sheets 1 and/or 2 as appropriate.
    c. Section D-D:
        i. Please provide riprap specifications to include gradation, shape, specific gravity, and durability,
        ii. Please provide a minimum depth (from top of riprap in the invert to top or riprap armor on the side slope) dimension.
        iii. Please provide a filter layer specification for a piping barrier between the native soil and the riprap. (Note: geotextile fabric is not recommended for slopes greater than 10 %. A granular filter should be used for slopes ≥ 0.10).
15. Sheet 4, Portal Culvert Grading & Details. The retention berm callout references a "Detail" on Sheet 3. On Sheet 3 the retention berm is shown as a section. The Sheet 4 callout should be a section and reference Section B-B / Sheet 3.
16. Sheet 5, Retention Pond 50: Grading and Details:
    a. Please provide material and compaction specifications to limit rock size, preclude inappropriate debris, and ensure sufficient compaction for the embankment.
    b. Do the contours in the Rock-Lined Channel represent top of riprap or top of subgrade?
    c. The downstream end of the Rock-Lined Channel is at a 3H:1V (33.3% slope) below elevation 6417. The analyses show only the 5% grade. Please demonstrate the riprap is stable at 3H:1V.

d. Please provide spillway location, designs (sections and profile), and specifications sufficient to convey the design flow to the toe of the embankment.

General Comments:

17. Page ESWMP-5, third paragraph. The NRCS is referenced as the "National Resource Conservation Service". The "N" stands for "Natural", not "National".
18. The DRMS understands the portal is currently closed. Should the portal be re-opened, stormwater controls will need to be designed and implemented to control runoff from the portal area and roads utilized to transport ore to the ore pad from the portal such that potentially impacted runoff is directed to a retention pond.

If either you or the applicants have any questions regarding the comments above, please call me at (303) 866-3567, extension 8169.