



STATE OF
COLORADO

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C1980007, West Elk Mine, TR-152, Adequacy Review

1 message

Simmons - DNR, Leigh <leigh.simmons@state.co.us>
To: "Wilczek, Jessica" <jwilczek@archrsc.com>

Tue, Dec 12, 2023 at 10:57 AM

Jessica,

The Division's initial adequacy review letter for TR-152 is attached.

Leigh Simmons
Environmental Protection Specialist



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

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TR152_Adequacy_1.pdf
990K



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

December 12, 2023

Jessica Wilczek
Mountain Coal Company, LLC
5174 Highway 133
Somerset, CO 81434

Re: West Elk Mine (Permit No. C-1980-007)
Technical Revision No. 152, (TR-152)
Initial Adequacy Review

Dear Ms. Wilczek,

The Colorado Division of Reclamation, Mining and Safety (Division) has completed a review of materials submitted by Mountain Coal Company, LLC (MCC) in support of the TR-152 application. Please respond to the adequacy items below.

Rules 2.05.2 & 2.05.3 Operation Plan

1. Please update Section 2.05.2 of the Permit Application Packet (PAP) with a detailed description of the mining method proposed with TR-152. Please include a reference in the text to the Agapito study (which should be included as an Exhibit in the PAP).
2. Please review and update the discussion of Recovery Rates and Recoverable Reserves in Sections 2.05.2 and 2.05.3.
3. Please update Tables 28, 29 and 32, to reflect the current Mine Plan.

(In your response to items 2 and 3, please ensure that the increase in coal production associated with the mining method proposed with TR-152 is discussed explicitly. Although it may not seem to be directly related to TR-152, a discussion of the adverse mining conditions in panels SS-1 through SS-4, and the subsequent reduced production compared to what had been anticipated and approved, will be helpful for reviewers)

Rule 2.05.6(6) Subsidence Survey, Subsidence Monitoring, and Subsidence Control Plan

4. Section 2.05.6(6) of the PAP contains a thorough discussion of subsidence at the West Elk Mine. Please review and update as necessary all of Section 2.05.6(6), with particular attention to the text on and following Page 2.05-120, where subsidence and subsidence-like features over development workings are discussed. The currently approved text refers to Exhibit 60E, Appendix A, for a minimum depth of cover over development workings. An



expansion of this analysis would be appropriate with TR-152 (since the mining method proposed is neither longwall mining, which has been extensively discussed, nor traditional room-and-pillar mining). In the text, either directly or by reference to an exhibit, please provide a commitment to a depth-of-cover range outside of which pillar extraction would not be considered.

(Items 5 and 6 are taken from Zach Trujillo's review of the Agapito study. His full review memo is included as appendix to this letter)

5. Two different in-situ coal strength values were used in the Agapito study. An in-situ coal strength of 900 psi was used in the empirical modeling while a value of 1,180 psi was used in the numerical modeling. Please provide the Division with additional rationale on why two different in-situ coal strength parameters were used in the modeling process.
6. It was observed within the LaModel results that one section along the route of the life-of-mine roadway appears to show SF range of 0 – 0.5 along adjacent pillars which would indicate failure (see Figure 1 of the attached memo). Please ensure the pillar extraction design maintains the integrity and safety of the proposed life-of-mine roadway or provide additional clarification regarding the modeling results for this section of the Sunset Mains South.

The decision due date for TR-152 is 1/12/2024.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Leigh Simmons', with a stylized flourish at the end.

Leigh Simmons
Environmental Protection Specialist

Enclosures:

- Appendix 1 - Trujillo Review Memo

Appendix 1 - Trujillo Review Memo



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

Date: December 12, 2023

To: Leigh Simmons

CC: Amy Eschberger

From: Zach Trujillo

RE: West Elk Mine, DRMS File No. C-1980-007
Geotechnical Assessment for the Purpose of Pillar Extraction Review

Leigh,

As requested I have reviewed the provided geotechnical report, “Geotechnical Assessment for the Purpose of Pillar Extraction between 2 and 30 Crosscuts in Sunset South Mains” (Report), conducted by Agapito Associates, Inc. (AA) on behalf of Mountain Coal Company (MCC) for proposed Technical Revision No. 152. The purpose of this memo is to summarize AA’s Report methodologies, analyses and recommendations in relation to the Rules and requirements of the Division. Questions and comments regarding the Report to ensure all Rules and requirements are satisfied will be summarized at the end of this memo.

Overview

MCC is proposing pillar extraction mining which is the process of extracting coal from the remaining pillars created during the mining development process. Using site specific information from MCC, AA has conducted a pillar stability assessment for the E-seam in the Sunset Mains South between crosscuts 2 and 30. Site specific information analyzed as part of this Report includes (but not limited to) geological and geotechnical information, borehole logs of the propose pillar extraction area, geological structure drawings, surveyed mine plans and overburden depths. With this information AA was able to assess current pillar stability using the standard empirical pillar design formula and criteria along with the creation of a plan for extraction which ensures a degree of stability for safety. Since the extraction process will cause subsidence, surface subsidence modeling was also discussed and provided along with the Report. Additionally, as noted by AA, that in order to maintain a bleeder system around the gob as well as access for site inspection needs, a life-of-mine roadway must remain in place and is taken into consideration as part of the extent of proposed pillar extraction.

Existing and Retreating Pillar Stability

As stated earlier in this memo, AA used site specific information to assess the current stability of the existing pillars. This is used as a baseline assessment for the pillar extraction process recommendations as well as safety and retention of necessary support facilities such as a life-of-mine roadway. The area of the Sunset Mains South that is being proposed for pillar extraction is broken into seven zones in the stability analysis based upon the differential depths of the mains and associated loads applied based upon those

West Elk Mine TR-152 Geotechnical Review Memo

December 12, 2023



depths. These zones are used to assess pillar loading conditions during pillar extractions based upon the range of parameters determined by existing conditions and AA. Modeling input parameters used are summarized in Table 4-1 of the Report. Based upon these parameters, AA is able to calculate a range of Safety Factors (SF) for the current conditions for each associated zone and is summarized on Table 4-2 of the Report. The range of SF for all zones indicate stability for the current pillar conditions.

Based upon the existing conditions just outlined in this Memo, pillar extraction was empirically analyzed by AA in each zones to ensure the existing last line of pillars behind the extraction area can support the retreating abutment loads and vertical loads. The minimum calculated SF is 1.4 and is associated with Zone 5. This value is acceptable as it indicates stability and the extraction process is not designed to ensure long term stability as normally seen within the Division's SF standards due to the nature of this mining method.

In order to confirm results AA's empirical pillar stability assessment, numerical modeling was conducted as well using LaModel software. LaModel software is used to model the stresses and displacements on thin tabular deposits such as coal seams. Parameters used in the empirical model are based on previous calibrations taken from in-mine E-seam related instrumentation, most notably in-situ coal strength. It is stated by AA in the Report that the in-situ coal strength is appropriately conservative however, it is observed by the Division that a different in-situ strength was used during AA's numerical assessment which appears to be more conservative. It is unclear on why there is a difference in coal strength properties used between the two assessments.

LaModel results are provided under Section 6 of the Report. Multiple scenarios were ran which represent progression of pillar extraction throughout the seven zones. The models show the amount of load in which pillars will experience as well as an associated SF most notably with pillars along the proposed life-of-mine roadway and existing last line of pillars behind the extraction area. The results of these SF generally show above 1.5 and are summarized by AA under Section 6 of the Report for each zone. However, when reviewing the LaModel results, it appears there is one section of along the route of the life-of-mine roadway that show a SF within the range of 0 – 0.5 which would indicate a failure. Based on the Pillar Safety Factor results, there are two pillars that are between the proposed life-of-mine roadway and the gob that aren't shown or appear to be represented as the color gradient for the SF range discussed. For additional clarification on the area, please see Figure 1 of this memo.

Subsidence Analysis

Additionally, AA has provided a subsidence analysis summarized under Section 6.2 of the Report. Based upon site specific information along with empirical parameters, AA used the software Surface Deformation Prediction System to assess the maximum subsidence from the proposed pillar extraction process. Results of the modeling indicates a maximum subsidence of 3.5 feet most nobly along the centerline of the pillar extraction area. Results are displayed on Figure 6-8 of the Report.

Summary – Division Comments and/or Questions

The following is a summary of the Division's comments/questions discussed and observed during the previous sections of this Memo:

Existing and Retreating Pillar Stability

- When reviewing the input parameters for both AA's numerical and empirical modeling, it was observed that two different in-situ coal strength properties were used. An in-situ coal strength of 900 psi was used in the empirical modeling while a value of 1,180 psi was used in the numerical modeling. Please provide the Division with additional rational on why two different in-situ coal strength parameters were used in the modeling process.
- It was observed within the LaModel results that one section along the route of the life-of-mine

roadway appears to show SF range of 0 – 0.5 along adjacent pillars which would indicate failure (see Figure 1 of this Memo). Please ensure the pillar extraction design maintains the integrity and safety of the proposed life-of-mine roadway or provide additional clarification regarding the modeling results for this section of the Sunset Mains South.

This concludes my review of the provided geotechnical report, “Geotechnical Assessment for the Purpose of Pillar Extraction between 2 and 30 Crosscuts in Sunset South Mains”, Agapito Associates, Inc. on behalf of Mountain Coal Company (MCC) for proposed Technical Revision No. 152.. If you have any questions feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Zach Trujillo', with a stylized, cursive script.

Zach Trujillo
Environmental Protection Specialist
(303) 866-3567 ext. 8164
Zach.Trujillo@state.co.us

Figure 1.

