

**STATE OF  
COLORADO****Renfro - DNR, Joel** <joel.renfro@state.co.us>

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## Cogburn Adequacy Review #2 Technical Review Memos

1 message

**Renfro - DNR, Joel** <joel.renfro@state.co.us>

Mon, Nov 10, 2025 at 8:36 AM

To: Garrett Varra &lt;gvarra@raptormaterialsllc.com&gt;, Robert Haun &lt;rhaun@eaglematerials.com&gt;

Cc: Peter Christensen &lt;Peter.Christensen@respec.com&gt;, Jenna Lohmann &lt;Jenna.Lohmann@respec.com&gt;, Amy Eschberger - DNR &lt;amy.eschberger@state.co.us&gt;, Ben Hammar - DNR &lt;ben.hammar@state.co.us&gt;, Patrick Lennberg - DNR &lt;patrick.lennberg@state.co.us&gt;

Good morning,

On Friday I spoke with Peter for a bit regarding the review timeline for the Cogburn New Permit Adequacy review letter #2. The main review of the application is taking me much longer than I had initially anticipated. My review team, Patrick and Ben, have fully completed the Technical Review Memos for the areas I requested their assistance with. Per Peter's request, I am sending those review memos for your review and response.

Please find those memos attached to this email. If you have any questions, please feel free to reach out to me.

Best,

**Joel Renfro****Environmental Protection Specialist****COLORADO**  
Division of Reclamation,  
Mining and Safety  
Department of Natural Resources

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### 2 attachments

**BEH Cogburn Sand and Gravel Geotech Review 2.pdf**

261K

**Memo\_M2025016\_Ad#2.pdf**

307K



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

**Date:** October 15, 2025

**To:** Joel Renfro, DRMS

**CC:** Amy Eschberger, DRMS

**From:** Ben Hammar, DRMS

**RE:** Cogburn Sand and Gravel and Reservoir Project, File No. M2025016  
New 112c Application

Joel,

As requested, I have reviewed the geotechnical-related sections of the adequacy response provided by the operator for the Cogburn Sand and Gravel Reservoir Project application, DRMS permit No. M2025016, created by American Water Services, LLC (AWS) on behalf of Raptor Materials, LLC (Operator). Much of their geotechnical exhibit remains the same, and so only the remaining sections which require clarification and the additional exhibit provided in their response will be addressed in this memo. Questions and comments regarding the requested sections meant to ensure all Rules and requirements are satisfied will be summarized at the end of this memo.

**Additional Geotechnical Analysis Overview**

As noted earlier, this memo will address the sections of the Cogburn Sand and Gravel Reservoir Project adequacy response requested by Joel Renfro, the additional geotechnical analysis associated with the currently proposed reclamation plan for the Cogburn Project. A summary of the new reclamation plan is included to provide context for the broader discussion of the analysis.

Per information provided by in the operator's adequacy response, the Operator has amended their reclamation plan to adhere to a maximum slope of 1.25H:1V on slopes less than 23 feet below the ground surface, and 3H:1V below 23 feet. These slopes will then be lined with a clay liner to support the planned post-mining land use of a developed water resource. These slopes are the subject of the provided geotechnical analysis.

AWS provided an additional slope stability analysis in response to the Division's comments, which primarily used material property information generated by a 2023 geotechnical study performed by Engineering Analytics, Inc.

PC-STABL, a typical geostability analysis software, was used to perform the additional slope stability analysis. One additional case was studied, which represented 3H:1V and 1.25H:1V conditions. The provided case assumes 20 feet below ground surface (bgs) of 1.25H:1V slope underlain by 30 feet of 3H:1V slope. The simulation assumed a seismic acceleration factor of 0.075 based upon the requirements of the Universal Building Code, a standard set of Civil Engineering guidelines used throughout the US



and the appropriate reference for this case. The factor of safety found with these conditions was approximately 1.26

This analysis is generally acceptable; however, a few discrepancies were found in the response provided. In their response to the Division's previous comment requesting a seismic case study, the applicant states: "The 25 foot simulation was ran with a seismic acceleration factor of 0.075, which is the value the Universal Building Code has specified for the Front Range area. The predicted factor of safety for fifty-foot simulation was 1.11." This response makes it unclear which of the previously provided cases was used to attain the 1.11 FoS, as the applicant states two different depths in reference to the case studied. The proposed new maximum depth for 1.25H:1V slopes also does not match the case studied, with the new maximum depth being 23 feet and the case studied being 20 feet bgs. A depth of 23 feet compared to 20 feet likely won't result in a FoS less than 1.15, however the geotechnical analysis provided should still match the proposed final reclamation slopes. In this instance, due to small difference in cases, a statement by the operator that the analysis performed by the operator is not significantly different from the final reclamation slope conditions

In addition, the applicant appears to have only performed an analysis on the case where the maximum mining depth falls below their slope transition depth of 23. No seismic case was provided for an entirely 1.25H:1V slope. As this was directly requested in the Division's original comment, this missing case should be provided.

Lastly, the applicant's statement that they took unit weight values for the overburden clay and bedrock layers from values reported by the Division should be addressed. The Division has no formal list of average material properties, and so this information likely came from another source. This source should be adequately cited in the operator's analysis.

### **Recommendations**

In general, the analysis performed by AWS was performed using acceptable assumptions for the case that was studied. Some clarification should be requested to confirm their case is adequate to meet the FoS requirements of the MLRB. As such, the following comments should be integrated into an adequacy letter:

1. Per Rule 6.5(3), please provide an additional slope stability analysis which demonstrates an adequate Factor of Safety under seismic conditions for an entirely 1.25H:1V slope up to the proposed maximum depth of approximately 23 feet bgs. Per the policies of the Mined Land Reclamation Board, a factor of safety of 1.15 under seismic conditions is the requirement for this case.
2. On page 3 of the original Geotech section, the applicant states that the unit weight values provided for the overburden clay and bedrock layers were reported by DRMS. Please provide more information about the source of the unit weight values for these layers, as the Division does not have a formal database of material properties.
3. In the provided response, the applicant states that "The 25 foot simulation was ran with a seismic acceleration factor of 0.075, which is the value the Universal Building Code has specified for the Front Range area. The predicted factor of safety for fifty-foot simulation was 1.11." The case which initially led to the FoS of 1.11 is unclear, as both 25 feet and 50 feet are stated to have been run using the conditions described but only a 50 foot depth case is provided. Please provide additional information which clarifies the inconsistency mentioned.
4. In the additional seismic analysis provided, the applicant uses a maximum depth of 20 feet of 1.25H:1V slope to attain the FoS of 1.26. The newly proposed maximum depth of 1.25H:1V slope of 23 ft appears to be less conservative than the case provided. Please provide either a new case which uses the 23 feet depth or a statement which adequately explains why those cases may be used interchangeably.

This concludes my review of the requested sections of the Cogburn Sand and Gravel Reservoir Project application, created by AWS on behalf of Raptor Materials, LLC. If you have any questions, feel free to contact me at the information listed below.

Sincerely,

A handwritten signature in blue ink, appearing to read "Ben Hammar". The signature is fluid and cursive, with the first name "Ben" being more prominent than the last name "Hammar".

Ben Hammar  
Environmental Protection Specialist  
(720) 793-2988  
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**Date:** October 15, 2025

**To:** Joel Renfro, DRMS

**From:** Patrick Lennberg, DRMS

**RE: Cogburn Sand, Gravel, and Reservoir Project, New Permit Application,  
Adequacy Review No. 2 Review Memo, File No. M2025-016**

On April 17, 2025, I was requested to review Exhibits C through G of the Cogburn Sand, Gravel and Reservoir Project new permit application, file no. M-2025-016. On September 12, 2025, the Applicant submitted their responses to the Division's Preliminary Adequacy Review. Below are follow-up questions that should be addressed.

#### **General**

1. Monitoring well MW-6 is in an area that is to be backfilled. Please discuss how MW-6 will be maintained throughout the life of mine.
2. The analytical results provided are confusing. It appears that there were samples collected twice during the fourth quarter 2024. A primary and duplicate sample from MW-3 on 11/13/24 and there are field parameters for that day although it is unclear when these parameters were taken, at the beginning or end of purging, and the purge volume is not clearly indicated? Then there is another sample that was collected from P-125 on 10/31/2024 but there are no field parameters associated with this sample nor is there any indication where this sample was taken. A response is required.
3. For the 1Q2025 samples were collected from MW-2 and MW-3. While field sheets were partially completed the only field parameters provided appear to be from a notebook completed separately. The total purge volume for MW-2 was 3 gallons which appears to be correct for a 3 well volume purge. However, for MW-3 the purge volume was also 3 gallons for 3 well volumes but a review of the construction logs indicates that close to 4 gallons need to be removed to complete a 3 well volume purge. A response is required.
4. The field sheets for the 2Q2025 are not completely filled out. The sheets indicated field parameters are collected at the start of well purging yet the sheets show that 3 gallons have been removed, please clarify. Again, based on a review of the boring logs and well construction diagrams it does not appear that a sufficient well volume was removed from MW-3 to equal 3 well volumes. Typical volumetric well purging practices are to collect field parameters at the beginning of purging then



approximately every well volume, when three successive readings have reached stabilization, the sample(s) are taken. A response is required.

5. A summary table of sample results needs to be created that compares the analytical results to the relevant Regulation 41 standard and any exceedances highlighted. A review of the laboratory data supplied showed some exceedances of the relevant standards and it appears that Nitrite + Nitrate as Nitrogen was not sampled for.

### **Groundwater Monitoring Plan Review**

6. In Section 2.3 Chemical Analysis, the groundwater quality monitoring plan is only for one well, a compliance monitoring well, sampled five times on a quarterly basis, this is insufficient. The Applicant needs to collect groundwater quality samples from all site monitoring wells, 6 wells total, for 5 consecutive quarters prior to affecting groundwater. The Baseline Groundwater Quality Report shall be submitted as a TR to designate the point-of-compliance, revise the analyte list and the frequency of monitoring as needed.
7. Monthly groundwater levels, from all monitoring wells, will continue to be collected until the completion of reclamation when water levels will be collected quarterly.
8. Based on the submitted groundwater potentiometric maps, MW-3 sits at a high point in a groundwater divide where groundwater either flows to the north or to the south it does not appear to be a suitable location for a POC well. A response is required.
9. In Appendix B, QA/QC, it is stated that duplicates will be collected one per 20 samples. A duplicate is required one per event, please update.
10. The well purging procedure needs to be more descriptive to include, at a minimum, the frequency that field parameters will be collected, what the field parameter stabilization criteria is, and how the purge volume is calculated for a given location.
11. Completed field sheets need to be added to the list of items expected in the quarterly report.

### **Groundwater Model Review**

12. Why did the groundwater model exclude locations MW-5 and MW-6?
13. In Tables 1-4 additional explanation of the values are needed. The groundwater elevations shown for MW-3 are 11 feet lower than any level that has ever been recorded at the location. The elevations used for MW-4, calibrated and predicted, are two feet higher than the ground elevation surveyed at that location. In Table 4 it shows that at complete build out the water level at MW-3 will be 6 feet higher than surrounding ground surface at that location. Yet in the conclusion section it is stated that the effects of lining the mined out pits will not adversely affect the regional groundwater hydrology.

14. Please provide a discussion of possible mitigation measures that the Applicant could take in the event groundwater mounding or shadowing adversely affect the groundwater hydrology, include in the discussion the installation of underdrains and infiltration galleries.

If you need additional information or have any questions, please let me know.

Sincerely,

A handwritten signature in blue ink, appearing to read "Patrick Lennberg". The signature is fluid and cursive, with the first name "Patrick" written in a larger, more prominent script than the last name "Lennberg".

Patrick Lennberg  
Environmental Protection Specialist

cc: Jared Ebert, DRMS