STATE OF COLORADO

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

Cogburn Sand, Gravel, and Reservoir Project Adequacy Review Memos

1 message

Renfro - DNR, Joel <joel.renfro@state.co.us> Tue, Jun 24, 2025 at 2:30 PM
To: Robert Haun <rhaun@eaglematerials.com>, Garrett Varra <gvarra@raptormaterialsllc.com>, Quentin Borum <qborum@raptormaterialsllc.com>
Cc: Amy Eschberger - DNR <amy.eschberger@state.co.us>, Patrick Lennberg - DNR <patrick.lennberg@state.co.us>, Ben Hammar - DNR <ben.hammar@state.co.us>

Good afternoon,

The Division is nearing the end of its preliminary adequacy review for the Cogburn Sand, Gravel, and Reservoir Project (M2025-016) new permit application.

Considering the nearing decision date of June 26, 2025, I am forwarding the additional items requested within the technical review memos I received from Patrick Lennberg and Ben Hammar for you to review. Please treat these memos as an adequacy review, with the understanding that the preliminary adequacy review is forthcoming.

Since the decision date is soon, the Division understands that additional time may be needed to respond to this review. Please request an extension to the application decision date no later than the close of business on June 26, 2025.

Please let me know if you have any further questions.

Best,

Joel Renfro
Environmental Protection Specialist

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

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M2025-016 Cogburn SGRP Adequacy Review - Technical Review Memos.pdf
921K

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

June 24, 2025

Bob Haun
Raptor Materials LLC
8120 Gage Street
Frederick, CO 80516

Re: Cogburn Sand, Gravel, and Reservoir Project, File No. M-2025-016, New Permit Application, Preliminary Adequacy Review

Dear Bob Haun:

The Division of Reclamation, Mining and Safety (Division) is reviewing your 112 Construction Materials Reclamation Permit Application submitted for Cogburn Sand, Gravel, and Reservoir Project in Weld County. The Division filed the application on March 28, 2025. The current decision date for the application is set for June 26, 2025.

On April 17, 2025, Division staff Ben Hammar was requested for a technical review of engineering aspects in the application. Additionally, Patrick Lennberg was requested for a technical review of the groundwater information presented in the application. In those technical reviews, the Division has identified the following adequacy items in the application which require clarification or additional information:

1. Please review and respond to the adequacy items provided by Patrick Lennberg, DRMS (see enclosed letter).

2. Please review and respond to the adequacy items provided by Ben Hammar, DRMS (see enclosed letter).

The preliminary adequacy review of this application is forthcoming and will be sent to the applicant at a later date than this letter. In the meantime, please review the enclosed technical review memos and respond to the follow-up questions detailed in those letters.

The application decision date is currently set for June 26, 2025. Please note, your application may be determined as inadequate, and the application may be denied on the decision date, unless the above-mentioned adequacy items are addressed to the satisfaction of the Division. For the Division to approve the extension of the decision date, please submit a decision date extension request prior to the close of business on June 26, 2025.

This letter shall not be construed to mean that there are no other technical deficiencies in your application. The Division will review your application to determine whether it is adequate to meet the requirements of the Act after submittal of all required items.

If you require additional information, or have questions, please feel free to contact me by phone at (720) 812-2002, or by email at joel.renfro@state.co.us.

Sincerely,

Joel Renfro
Environmental Protection Specialist

Encl: Adequacy Review Letter from Patrick Lennberg, DRMS
Adequacy Review Letter from Ben Hammar, DRMS

Cc: Amy Eschberger, DRMS
Patrick Lennberg, DRMS
Ben Hammar, DRMS

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

Date: May 23, 2025

To: Joel Renfro, DRMS

From: Patrick Lennberg, DRMS

RE: **Cogburn Sand, Gravel, and Reservoir Project, New Permit Application, 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, and below are follow-up questions that should be addressed.

Exhibit C

1. The Pre-Mining, Mining, and Reclamation Plan maps need to be updated to accurately show the monitoring well locations associated with the proposed application.

2. Please provide a Table of the locations of each monitoring well (MW-1 through MW-4) in decimal degrees along with ground surface and top of casing elevations.

Exhibit D

3. On page 6 the Applicant states that extraction will not occur in the P-125C area and portions of the P-125B area until approval of a Technical Revision. The Division will require approval of an amendment to the permit prior to mining P-125C because no mining or reclamation details are included in the application for this area. Because a more robust mining and reclamation plan is needed to address P-125B being within floodplain the Division shall be consulted prior to submission of a revision to determine the appropriate level of revision. Response required.

Exhibit E

4. The Reclamation Plan needs to be updated to be consistent with the initial area of extraction, to exclude areas that are not approved to be mined with approval of this application.

5. Reclamation Plan needs to be updated to address plugging and abandoning the monitoring wells, please note the Reclamation Cost Estimate will need to be updated accordingly.

Exhibit G

6. Please commit to providing a copy of the approved SWSP allowing for the exposure of groundwater once it is approved.

7. There is a Seep Drainage Ditch located on the east side of P-125A. Please provide additional information on this structure, where the seep is located, what the seep's source is, how does it impact the model for the site and how will it be maintained or mitigated?

8. Please provide a discussion regarding the ephemeral drainage and how Regulation 87 – Dredge and Fill Control Regulation may impact the proposed work around the drainage.

9. Please comment on item #3 of Acord's Objection (May 16, 2025) which states "Upon information and belief, Acord alleges that any excavation of the proposed mine will drain subsoil moisture from Acord' s property which will kill Acord's trees, permanent improvements of material value, and without being able to discern the actual location of Raptor's proposed mining operation, Acord cannot provide further information to the Mined Land Reclamation Board as to what trees of Acord will be killed by such draining of subsoil moisture from Acord' s property."

Groundwater Monitoring Plan Review

10. In the Introduction, Figure 1 needs to be updated to include the proposed permit boundary.

11. Section 1.2, Figure 2 needs to be updated to label the individual wells (MW-1, MW-2, etc.), including the major permit structures, e.g. clay-lined walls, and settling ponds.

12. The permit acreage needs to be updated to be consistent with the acreage on the application.

13. Section 2.1, were the monitoring wells constructed using artificial filter pack or was the surrounding formation allowed to collapse around the screen? Additionally, were the monitoring wells developed after installation?

14. Section 2.2, groundwater level measurements will be collected monthly throughout the life of mine and those results will be included as part of the quarterly report to be submitted to the Division.

15. In Section 2.2 it is stated that groundwater levels have been collected monthly since August 2024. Please provide a table with the following information for each monitoring well; top of casing elevation, ground surface elevation, depth to groundwater from top of casing, and distance from ground surface to groundwater surface.

16. Please provide a time series line graph that depicts depth to groundwater from the ground surface for all wells since August 2024.

17. Please provide quarterly potentiometric maps that show the direction of groundwater across the site.

18. The proposed groundwater monitoring plan is not consistent with the Division's Groundwater Monitoring: Sampling and Analysis Plan Guidance Construction Materials and Hard Rock Sites (July 2024). A copy has been attached for your reference. The proposed plan needs to be updated to include the analyte list found in Appendix A of the guidance document.

19. Pursuant to Rule 3.1.7(7)(b)(iv) please provide a description of the quality control and quality assurance methods (e.g. duplicate samples, rinsate samples) to be used during quarterly sampling.

20. Please commit to providing the quarterly baseline groundwater monitoring results along with the monthly level measurements by the following deadlines:

    - First quarter report due by May 1st of every year.
    - Second quarter report is due by August 1st of every year.
    - Third quarter report due by November 1st of every year.
    - Fourth quarter report is due February 1st of the following year.

    At the end of five quarters of baseline monitoring the Applicant will have to submit a Technical Revision providing a detailed description of the groundwater quantity and quality conditions at the site and formally designate a point of compliance for the permit, in accordance with Rule 3.1.7(6). The Applicant may include within that Technical Revision, or another Technical Revision, a request to reduce the analyte list and frequency of monitoring with sufficient justification.

21. Appendix B needs to be updated to include the frequency and collection of field parameters during well purging, parameter stabilization, along with the completion of field forms to document that the wells were sampled according to the approved plan. Completed field forms are to be submitted as part of the quarterly monitoring reports.

Groundwater Model Review

22. Introduction, the proposed permit boundary is missing from Figure 1, please update.

23. The permit acreage needs to be updated to be consistent with the acreage on the application.

24. The average saturated thickness of the aquifer within the mine boundary is stated to be 35 feet, but a review of the boring and well construction logs from the Groundwater Monitoring Plan indicates that the average saturated thickness at the site is 23 feet. Please clarify this discrepancy and update as needed for consistency.

25. Please provide an explanation of why the developed water resource lakes are being modelled to leak. Routinely, the Division observes the lined lakes as being modelled as no-flow boundary conditions.

26. The hydraulic conductivity of St. Vrain Creek has been assigned a hydraulic conductivity of 4 feet/day. Please provide more information on how this value was derived, it appears it may be too conservative of a value.

27. Please provide a discussion on how the ephemeral drainage is being modelled and a summary of its impact on the model.

28. The seep drainage channel does not appear to have been included in the model. Please provide an explanation for leaving it out, if it was inadvertently omitted, please include it.

29. Please submit a new groundwater study and model that demonstrates disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area will be minimized both during and after mining operations and during reclamation activities. The study needs to include proposed developed water resources and structures, approved and proposed, located immediately adjacent to the proposed permit boundary. Permits include Kurtz Resources (M1999-006), Nix Sand and Gravel (M2001-046), P122 (M2015-033), Heintzelman (M2009-018) and Firestone Gravel (M1996-052). Include in the submittal a demonstration of the effectiveness of any proposed mitigation measures.

    Please note in certain areas of the South Platte River Basin, staff of the Division of Water Resources, have observed groundwater problems that appear to be related to the lining of gravel pits located near streams, and in particular, these problems occur when multiple liners are located adjacent to each other. The Division of Water Resources requests operators consider the siting and design of lined gravel pits to ensure that they will not individually, or cumulatively, result in impacts to the timing and quantity of groundwater flow from upgradient locations back to the stream system (mounding and shadowing analysis). In addition to impacts to property, such as flooding upgradient and reduced water levels downgradient of the liner, there are decrees of the court that specify the timing, quantity and amount of water depleted from the streams by wells and accreted to the stream through recharge operations. The installation of a gravel pit liner should not result in changes to the timing, location, and amount of groundwater flow.

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

Sincerely,

Patrick Lennberg
Environmental Protection Specialist

Attachment: Groundwater Monitoring: Sampling and Analysis Plan Guidance Construction Materials and Hard Rock Sites (July 2024)

cc: Jared Ebert, DRMS

Attachments

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

Groundwater Monitoring: Sampling and Analysis Plan Guidance Construction Materials and Hard Rock Sites

July 2024

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Introduction

This document is intended to provide guidance to permittees of Construction Materials or Hard Rock mines, on the typical requirement of a groundwater sampling and analysis plan, where the proposed operation has the potential to adversely impact the prevailing hydrologic balance of the affected land and of the surrounding area, with respect to the quantity and quality of water in groundwater systems. It is intended to supplement the Groundwater Monitoring and Protection Technical Bulletin of November 19, 2019, and is an attempt to provide more detailed and specific guidance to permittees in an area where the Division has found approaches to compliance have varied widely.

Sites where mining will not expose groundwater, e.g., dry sites or sites where mining will not be near the water table, are not required to submit a groundwater sampling and analysis plan.

A Sampling and Analysis Plan should be tailored to the specific site to which it applies, but this guidance document does not take site-specific factors into account.

The remaining sections of this document are organized under the same headings that the Division would expect to see in a typical groundwater sampling and analysis plan.

As described in the Technical Bulletin, the Division of Reclamation, Mining and Safety (DRMS/Division) has statutory mandates to monitor groundwater and protect the hydrologic balance during and after mining operations under the Colorado Mined Land Reclamation Act (C.R.S. Title 34, Article 32), and the Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. Title 34, Article 32.5). The Division is requiring groundwater monitoring throughout the life of mine to demonstrate compliance with these statutes for mines that have, or potentially will affect the hydrological balance.

Hyperlinks are included in the document text for convenience, and a full list of references is given at the end.

1 Background Information

1.1. Site Description

The Site Description should include the following:

- Name of the site or sampling area. Also include the name or abbreviation (e.g., "the Site"), if any, that will be used throughout the plan.

- A general description of the region in which the site or sampling area is located. Include the street address, city, state, and postal code, if appropriate.

- A detailed description of the physical geography of the site or sampling area. Include a description of the topography, land use/surface cover, any relevant physical features, past and present activities, existing structures. Give the area in acres.

- A description of the geology of the area, including lithology and stratigraphy. Give the composition, thickness and extent of each formation. Identify any faults or other major structural features in the area. Diagrams are often a helpful addition to a geologic description.

- A description of the hydrogeology of the area. Identify each aquifer underlying the site. Characterize each aquifer (hydraulic conductivity, isotropy, confined/unconfined, recharge zones, groundwater flow direction) and describe how the characterization was made. Identify aquitards/confining layers.

- At least two maps:
  - A vicinity map that shows the permit area within its geographic region.

  - A Monitoring Well Location map that shows the sampling sites or sampling areas within the local area. Scale criteria need not be followed for this map. The map should include a layer of projected potentiometric contour lines for each identified aquifer, or a groundwater directional flow arrow (if appropriate). All permitted wells within the map extent should be shown – this information is available from the Division of Water Resources (DWR). All sampling locations (historic, active and planned) should be shown. All springs and seeps should be shown. The outcrop of any geologic formations should be shown. Other physical features and man-made structures may be included for clarity.

  All maps should include a title, legend, North arrow, scale bar, date, and section lines/marks. All maps must be prepared and signed by a registered land surveyor, professional, engineer, or other qualified person.

1.2. Baseline Groundwater Characterization

A Sampling and Analysis Plan will be informed by a baseline characterization of groundwater at the site, but may also need to include a plan to collect the data that will allow the initial characterization to be made. Applicants are encouraged to utilize information available from the public domain literature

and private sector data in developing their baseline groundwater characterization. These data sources will not require a Notice of Intent (Rule 5) to perform exploration operations. Private sector sources will likely include environmental site assessments performed as part of land acquisition.

Baseline sampling must be sufficient to allow the Division to assess the impacts of the future mining operation on the prevailing hydrologic balance. Sampling locations shall be established upgradient and downgradient of the proposed operation, the number of sampling locations is not specified since it depends greatly on the site, (a minimum of three data points are needed to establish groundwater flow direction). Unless otherwise approved by the Division, all groundwater monitoring wells should be within the permit area. The screened intervals of groundwater monitoring wells should be sufficient to monitor each identified aquifer that maybe impacted by the mining operation. Samples should be taken with sufficient frequency to capture site-specific temporal variability. The duration of the sampling period should be sufficient to identify seasonal trends. The minimum sample location, frequency and duration requirements for baseline groundwater characterization are summarized below:

- Upgradient and downgradient sampling locations in each identified aquifer.
- Samples taken quarterly for analytical analysis.
- Water level data for all wells should be collected at least monthly.
- Five consecutive quarters of data, plus additional quarters up to two years may be required and utilized if site activity is delayed.

A table should be included with a row for each sampling location. Each point should have a unique identifier. The table should include the location (Lat/Long), land surface elevation, top of casing elevation, total depth, screened interval, and completion date. The latitude/longitude could be shown in decimal degrees showing five places to the right of decimal, e.g., 39.73934, -104.98486.

It should be noted that once site groundwater characterization commences, it will be required that groundwater monitoring will continue for the life of the mine. Any modifications to the approved water monitoring plan must be made through the technical revision process with appropriate justification provided by the operator. Analytical sampling frequency will not be reduced to less than a minimum of twice yearly (high flow and low flow data with a collection interval of 5-7 months). Analytical and water level monitoring will not be suspended due to delay in site activity, or placing the site into temporary cessation unless approved by the Division.

Upon request, the Division is available for consultation during development of a Sampling and Analysis Plan.

1.2.1. Monitoring Well Installation

All monitoring wells should be:

- Permitted with the State Engineer's Office (SEO) Division of Water Resources (DWR); and

- Constructed (and later abandoned) according to the required SEO standards (see 2 CCR 402-2 Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction)

The well construction standards are designed to protect aquifer integrity and to ensure that constructed wells serve their purpose; in this case to provide representative, defensible data. Failure to follow the applicable permitting and well construction rules could result in unacceptable data; and failure to adequately protect groundwater resources could result in subsequent enforcement action as deemed appropriate by DRMS or the SEO.

All wells should be installed by a licensed contractor, as required by SEO. Site specific well placement and construction details should be recorded and approved by a qualified professional, before being submitted to DRMS.

The Division should be notified within 30 days if any groundwater monitoring wells are damaged or destroyed during the life of the permit. Damaged or destroyed wells should be appropriately repaired or replaced as soon as reasonably possible to preserve data comparability, and the Division notified when this is complete. The notification shall include details of any repairs or new well construction summary. If an existing monitoring well requires removal or relocation for any reason, the justification and proposed new well location should be provided to DRMS as a technical revision for approval prior to the removal of the existing well.

1.2.2. Baseline Groundwater Quantity

Baseline water level data should be recorded in a table, and a narrative description of how the data was collected should be provided. A graph of the water level against time at each monitoring point should also be included. In most cases a static water level can be measured using a depth gauge from the top of the casing, however if the aquifer is under confined conditions, and the pressure is such that the well is flowing, an alternative method will be necessary (for example: https://www.usgs.gov/media/videos/measuring-water-levels-a-flowing-well).

The potentiometric head at the well can be readily derived from the depth to water measurement and the casing elevation. Head measurements from three or more points may be interpolated to give a groundwater flow direction and an approximation of the potentiometric surface in the aquifer. In many cases it will be necessary to collect more data points to adequately characterize the pre-mining conditions.

Often a numerical model (for example: Modflow) will be an appropriate tool to characterize the hydrogeology of the site. In other cases, the Division acknowledges, routine one-dimensional groundwater equations may be appropriate to evaluate potential offsite hydrologic impacts. If a numerical model is used, it should be thoroughly documented, with all assumptions explicitly stated. The documentation should include:

- An explanation of the conceptual model, with assumptions explicitly stated
- A detailed description of the model grid, with figures

- A list of parameter values for boundary conditions and initial conditions
- Details of the model calibration

1.2.3. Baseline Groundwater Quality

A table should be provided with a complete list of water quality parameters to be measured. This will comprise both field parameters and laboratory analytes. The full parameter list should be based on Tables 1-4 from Regulation 41: The Basic Standards for Groundwater (Reg. 41). Selected parameters from these tables have been compiled in Appendix A for Construction Materials sites and Appendix B for Hard Rock sites. unless modifications are approved by the Division. It will be up to the Operator/Permittee to submit a Technical Revision with proper justification to reduce the analyte list.

The Division will entertain variances from the Reg. 41 list on a case-by-case basis, but any proposed variance must be justified.

Baseline groundwater quality data should be recorded in a table, with the sampling date. Minimum, maximum and average values for each parameter should be given and any exceedance of a standard shall be clearly identified.

2 Predicted Impacts to Hydrologic Balance

Following the characterization of baseline conditions a prediction should be made as to the possible impacts of the proposed mining operation on groundwater quantity and quality.

The prediction of likely impacts to groundwater quantity should include a prediction of the maximum spatial extent of drawdown caused by dewatering, or of mounding caused by impermeable cell liners/slurry walls, and the time-scale over which it will be observed. The extent and time to recovery to a steady-state following reclamation should also be predicted.

The prediction of impacts to groundwater quality should include a discussion of water quality parameters that may be elevated as a result of the proposed operation, and the likely spatial and temporal extent of the impact. It is noted here that HB 19-1113, which applies to Hard Rock Sites only and was signed into law on April 4, 2019, requires most reclamation plans to demonstrate, by substantial evidence, a reasonably foreseeable end date for any water quality treatment necessary to ensure compliance with applicable water quality standards.

If a numerical model is used to inform any of the hydrologic predictions the model should be thoroughly documented, as discussed in Section 1.2.2.

3 Groundwater Monitoring Plan

A monitoring plan sufficient to verify the predictions of hydrologic impacts should be proposed. The

locations of sampling points, and the frequency at which they will be sampled should be specified. A complete list of groundwater quality parameters to be sampled for should be given. A description of sampling methods should be included in sufficient detail to ensure that the procedure can be replicated throughout the life of the permit (Sampling Methods are discussed in more detail below).

A commitment should be made as to how the monitoring data will be reported to the Division. Typically monitoring data will be compiled into a report, to be submitted by a specified date, e.g. annually or quarterly.

The groundwater monitoring report will include:

- Tabulated data for all parameters
- Graphs/plots for selected parameters
- A narrative analysis of the data, with trends and anomalies identified
- A comparison of the observed data to the predictions **and** to the groundwater quality standards (see below)

The requirements of the groundwater monitoring plan may continue to apply until final bond release and termination of jurisdiction. Changes to the groundwater monitoring plan will require a Technical Revision to the permit.

3.1. Groundwater Points of Compliance

It is likely that one or more Groundwater Points of Compliance (POC) will be established, these are locations at which compliance with the applicable standard will be assessed. Detailed guidance on POCs has been given in the Groundwater Monitoring and Protection Technical Bulletin of November 19, 2019, and will not be repeated here. POCs should be identified in the groundwater monitoring plan.

3.2. Groundwater Quality Standards

As is discussed in detail in the Groundwater Monitoring and Protection Technical Bulletin of November 19, 2019, the Division does not have the authority to set groundwater quality standards, but it does have both the authority and the obligation to apply the standards set by the Water Quality Control Commission, (in practice, this often involves the determination of how the Interim Narrative Standard from Reg. 41 should be applied at a site). For the sake of clarity, the numerical values for groundwater quality parameters that represent the applicable standard should be agreed and recorded in a table at the same time the POCs are established.

4 Sampling Methods

The goal of sampling is to make accurate, repeatable field measurements and to collect representative groundwater samples for laboratory analysis. There is no single correct method to conduct groundwater

sampling, however there many incorrect methods. Follow accepted best industry practices to ensure that a representative sample is collected and analyzed. Applicable references include those from the US Environmental Protection Agency, and the US Geological Survey.

It is likely that the contracted analytical laboratory will supply detailed instructions for sample collection and handling.

Best practices for sampling:

- Details of sampling events should be recorded – documentation is critical for Quality Assurance
- All samples should be collected on the same day, if possible
- Sampling should occur in a progression from upgradient to downgradient wells
- Depth to water should be measured first
- Field instruments should be calibrated according to manufacturer's specifications prior to use
- Field parameters (temperature, pH, conductivity, dissolved oxygen) should be measured and recorded before and after each purge of the well
- A well should be purged at least three times before samples are collected for lab analysis; if field parameters vary by >10% between consecutive purges, purging should continue up to six times
- Samples should be collected in the appropriate container and handled in a manner appropriate for the analysis
- Manufacturer’s instructions for the correct use and disposal of equipment should be followed
- Ship samples well before the holding time is up; ideally, within 24 hours of sample collection
- Do not leave sampling devices in monitoring wells for reuse

References

DRMS Groundwater Monitoring and Protection Technical Bulletin: November 19, 2019
https://drive.google.com/file/d/121Uc_KmuAx7xhc8heQcROPnK_u-kcG-J/view?pli=1

Well Construction Rules
https://dwr.colorado.gov/services/well-construction-inspection

Modflow Documentation
https://www.usgs.gov/mission-areas/water-resources/science/modflow-and-related-programs

Water Quality Control Commission regulations
https://cdphe.colorado.gov/water-quality-control-commission-regulations

EPA Groundwater Sampling Methodology
https://www.epa.gov/sites/default/files/2015-06/documents/Groundwater-Sampling.pdf

USGS National Field Manual for the Collection of Water-Quality Data
https://www.usgs.gov/mission-areas/water-resources/science/national-field-manual-collection-water-quality-data-nfm#overview

HB 19-1113: Protect Water Quality Adverse Mining Impacts
https://leg.colorado.gov/bills/hb19-1113

Appendix A: Full parameter list for Construction Material Sites (with Table Value Standards) from Regulation 41, Tables 1-4

Analyte	Table Value Standard (mg/L, unless other units given)	Reg. 41 Table Reference (1-4)
pH Field (pH unit)	6.50 - 8.50	2 and 3
TDS	400 mg/L, or 1.25X background	4
Chloride - Dissolved	250	2
Fluoride - Dissolved	2	3
Nitrate (NO3)	10	1
Nitrite (NO2)	1.0	1
Nitrite + Nitrate as Nitrogen	10	1
Sulfate - Dissolved	250	2
Aluminum - Dissolved	5	3
Antimony - Dissolved	0.006	1
Arsenic - Dissolved	0.01	1
Barium - Dissolved	2	1
Beryllium - Dissolved	0.004	1
Boron - Dissolved	0.75	3
Cadmium - Dissolved	0.005	1
Chromium - Dissolved	0.1	1 and 3
Cobalt - Dissolved	0.05	3
Copper - Dissolved	0.2	3
Iron - Dissolved	0.3	2
Lead - Dissolved	0.05	1
Lithium - Dissolved	2.5	3
Manganese - Dissolved	0.05	2
Mercury - Dissolved	0.002	1
Molybdenum - Dissolved	0.21	1
Nickel - Dissolved	0.1	1
Selenium - Dissolved	0.02	3
Silver - Dissolved	0.05	1
Thallium - Dissolved	0.002	1
Uranium - Dissolved	0.0168 to 0.03	1
Vanadium - Dissolved	0.1	3
Zinc - Dissolved	2	3

These analytes, at a minimum, will be tested for during the five (5) consecutive quarters, or more, of baseline monitoring. This analyte list will also apply to the subsequent groundwater monitoring for the life of the mine. It will be up to the Operator/Permittee to submit a Technical Revision with proper justification to reduce the analyte list.

Appendix B: Full parameter list for Hard Rock Sites (with Table Value Standards) from Regulation 41, Tables 1-4

Analyte	Table Value Standard (mg/L, unless other units given)	Reg. 41 Table Reference (1-4)
pH Field (pH unit)	6.50 - 8.50	2 and 3
TDS	400 mg/L, or 1.25X background	4
Chloride - Dissolved	250	2
Fluoride - Dissolved	2	3
Nitrate (NO3)	10	1
Nitrite (NO2)	1.0	1
Nitrite + Nitrate as Nitrogen	10	1
Sulfate - Dissolved	250	2
Aluminum - Dissolved	5	3
Antimony - Dissolved	0.006	1
Arsenic - Dissolved	0.01	1
Barium - Dissolved	2	1
Beryllium - Dissolved	0.004	1
Boron - Dissolved	0.75	3
Cadmium - Dissolved	0.005	1
Chromium - Dissolved	0.1	1 and 3
Cobalt - Dissolved	0.05	3
Copper - Dissolved	0.2	3
Iron - Dissolved	0.3	2
Lead - Dissolved	0.05	1
Lithium - Dissolved	2.5	3
Manganese - Dissolved	0.05	2
Mercury - Dissolved	0.002	1
Molybdenum - Dissolved	0.21	1
Nickel - Dissolved	0.1	1
Selenium - Dissolved	0.02	3
Silver - Dissolved	0.05	1
Thallium - Dissolved	0.002	1
Uranium - Dissolved	0.0168 to 0.03	1
Vanadium - Dissolved	0.1	3
Zinc - Dissolved	2	3
Cyanide - Free	0.2	1
Beta and Photon emitters	4 mrem/yr	1
Gross Alpha	15 pCi/L	1

These analytes, at a minimum, will be tested for during the five (5) consecutive quarters, or more, of baseline monitoring. This analyte list will also apply to the subsequent groundwater monitoring for the life of the mine. It will be up to the Operator/Permittee to submit a Technical Revision with proper justification to reduce the analyte list.

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

Date: **May 30, 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 requested sections of 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). The purpose of this memo is to quickly summarize AWS' report methodologies, analyses, and recommendations in relation to the Rules and requirements of the Division of Reclamation, Mining & Safety (DRMS), and to address portions of their geotechnical analysis and reclamation plan which are inadequate based on Rules 3.1.5(3) and 6.5. 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.

Geotechnical Analysis Overview

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

Per information provided by Joe Renfro and the current proposed reclamation plan, the Operator intends to mine to a maximum depth of 35 feet, and following the completion of mining will adhere to a maximum slope of 1.25H:1V on slopes less than 30 feet below the ground surface, and 3H:1V below 30 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 a slope stability analysis on behalf of the Operator, which primarily used material property information generated by a 2023 geotechnical study performed by Engineering Analytics, Inc. AWS also stated that their unit weight for the overburden clay and bedrock material used in the analysis was taken from information generated by DRMS. As DRMS does not typically perform material property testing, more information regarding the source of these values should be requested.

AWS used four assumptions during their analysis, all of which were directly based on the planned reclamation plan. Their assumptions were as follows:

- The static depth to groundwater with no pumping influence is 6 feet below ground surface and the water table will intersect the pit bank just above the mine floor (seepage face) during steady state dewatering;
- The pit depth will vary between 23 and 50 feet below grade;
- The termination zone for the 23-foot simulation was placed 1.5 feet back from the crest of the mine wall as the model predicted sheet failure (raveling) for any termination zone beginning down the mine slope; During extraction activities the pit bank slope will vary between 1.25H:1V and 3 H:1V.

All assumptions appear to be reasonable and required to accurately depict the planned conditions.

PC-STABL, a typical geostability analysis software, was used to perform the slope stability analysis. Two cases were studied; one which represented worst-case conditions under only a 1.25H:1V slope and the other with a mix of 3H:1V and 1.25H:1V conditions. The provided cases appeared to be reasonable and representative of the site conditions, however, no cases were provided for the slopes under seismic conditions. Per Rule 6.5 and other considerations related to this to be discussed later in this report, DMRS should require additional cases showing an adequate factor of safety (FoS) under seismic conditions.

An additional point of discussion for this analysis is that of their chosen failure criteria, a FoS of 1.3. Per the requirements of the Mined Land Reclamation Board (MLRB), a FoS of 1.3 is required when a given site is located near critical structures such as utility lines, pipelines, infrastructure, etc. The FoS of 1.3 is allowable under the condition that material strength data was taken from lab testing of material obtained from the site. If assumed data was used, the required FoS is 1.5 for sites located within 200 feet of critical structure.

This creates reason to scrutinize AWS' analysis for two reasons. The first is that assumed values were used in their analysis which had a nebulous source. This could potentially be an issue, however the materials used with assumed values aren't likely to have a significant impact on the slope's stability. The overburden clay and bedrock layers are unlikely to be the locations of a significant slope failure in these cases, and so it is the opinion of the Division that a FoS of 1.3 is acceptable to use in this case.

The second issue is related to critical structures. While a FoS of 1.3 is acceptable for a site near critical structures or otherwise, is unclear if there are critical structures, primarily pipelines based on the information provided by the Operator, within 200 feet of the site. As this information has a significant effect on how conservative of a FoS must be used, it should be provided by the Operator.

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 cases are 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 both presented cases. 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. Per Rule 6.3.5(2)(e), please provide the location of any significant man-made structures within 200 feet of the permit boundary. This information should be used to assess if critical structures are near the permit and determine what Factor of Safety is adequate for the geotechnical analysis .

This concludes my review of the requested sections of the Cogburn Sand and Gravel Reservior 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,

Ben Hammar
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