FRONT RANGE AGGREGATES

David W. Bieber
Manager of Geology/Survey

December 10, 2021

Tim Cazier
Colorado Division of Reclamation, Mining and Safety
1313 Sherman Street
Denver, Colorado 80203

Re: Parkdale Quarry, Permit No. M-1997-054; Response to Third Adequacy Review for 112 Construction Materials Reclamation Permit Amendment Application (AM-02),

Dear Mr. Cazier.

Front Range Aggregates, LLC. received a copy of the Division of Reclamation, Mining and Safety's (DRMS) third adequacy review for our 112 Construction Materials Reclamation Permit Amendment Application (AM-02) for the Parkdale Quarry, Permit No. M-1997-054 dated December 7, 2021. Please see the following responses, and the referenced supporting documentation for our responses.

6.4.6 EXHIBIT G – Water Information

23. Groundwater: The DRMS has the following comments based on the revised Exhibit G submitted on November 16, 2021.

    A. General Comments:

        i. Surface water monitoring locations on Currant Creek and Tallahassee Creeks are inconsistently named with respect to upstream and downstream locations. In order to avoid future potential confusion, please rename/renumber the locations such that they consistently increase in the downstream direction.

Response: The monitoring location numbers on Tallahassee Creek have been changed in Table 8, Table 9, on Figure 7, and in Section 5.1 to match those on Currant Creek such that the upstream monitoring locations are CC-1 and TC-1, and the downstream locations are CC-2 and TC-2.

        ii. Please provide a basis for the "apparent" groundwater flow directions shown in Figure 5. (Based on our December 6, 2021 telephone call the DRMS understands the flow direction is based on both well data and surface topography. Perhaps this should be titled "assumed" and stated as based on surface topography).

Response: Figure 5 has been retitled "Assumed Groundwater Flow Direction within the Granite in the Parkdale Quarry Area Based on Well Data and Surface Topography". The figure title and Section 4.2 have been amended to clarify the basis for the interpretation of groundwater flow directions.

        iii. Any changes made to the contents of Tables 7 through 10 should be accurately reflected in the text of the plan where necessary.

Response: Changes made to the contents of Tables 7 through 10 are accurately reflected in the text of the plan where necessary.

    B. Table 7 Comments:

        i. Title contains statement "(Reported Levels are Totals verses Soluble)" Why? All metals are specified as dissolved concentrations – which is appropriate.

Response: The "(Reported Levels are Totals verses Soluble)" statement was a carryover from a previous table

1627 Cole Boulevard, Suite 200, Lakewood, CO 80401
t. (720) 245-6423 m. (916) 870-6635
e. david.bieber@martinmarietta.com

and has been removed.

ii. Why is there a superscript "4" by all well names? This doesn't seem to correlate with the footnotes for the table.

Response: The superscript "4" by all well names was a carryover from a previous table and has been deleted.

iii. Chromium values should be specified as "all forms" to indicate that the value shown is a combined total of trivalent and hexavalent forms as specified by Reg 41, not "total" which would imply that the data is for a total metals analysis, not dissolved metals. (This comment also applies to Table 9.)

Response: Chromium values in Table 7 and Table 9 have been changed to "all forms" to indicate that the value shown is a combined total of trivalent and hexavalent forms as specified by Reg 41.

iv. Standards shown for Mn and Se are incorrect: Mn=0.05mg/l, Se=0.02mg/l. This (This comment also applies to Table 9.)

Response: Standards shown for Manganese and Selenium in Table 7 and Table 9 have been corrected. (Mn=0.05mg/l, Se=0.02mg/l)

v. Standard for U should also show the MCL for U of 0.03mg/l, this range should be appropriately footnoted as in Reg 41. (This comment also applies to Table 9.)

Response: The standard for Uranium in Tables 7 and Table 9 has been corrected to also show the MCL for U of 0.03mg/l, and this range is appropriately footnoted as footnote 3 in each table to read "Whenever a range of standards is listed and referenced to this footnote, the first number in the range is a strictly health-based value, based on the Colorado Water Quality Control Commission's established methodology for human health-based standards. The second number in the range is a maximum contaminant level, established under the federal Safe Drinking Water Act that has been determined to be an acceptable level of this chemical in public water supplies, taking treatability and laboratory detection limits into account."

vi. Please acknowledge (in the footnotes) that the analyte list in Table 7 for historic data is missing several required parameters from Table 9.

Response: A footnote has been added to Table 7 noting that historic data is missing several required parameters from Table 9.

vii. The way the Radionuclide data is presented and footnoted is very confusing:

a) Text in footnotes 4 (now footnote 5) and 5 (now footnote 6) seems to conflict

Response: The text in the referenced Table 7 footnotes (now footnotes 5 and 6) has been corrected to clarify the data. Footnote 5 now reads "This is the United States Environmental Protection Agency maximum contaminant level (MCL) for combined radium 226/228, there is currently no domestic water supply standard for radium." and footnote 6 now reads "The sum of radium 226 and 228 for the sample exceeds the maximum contaminant level (MCL) per the 2000 EPA radionuclides rule."

b) Perhaps 2 lines for "adjusted gross alpha" would be more appropriate – one that is adjusted as needed to compare to the standard shown – footnote as needed

Response: Since radon analysis was not performed on the samples, an adjusted gross alpha value relative to the drinking water standard cannot be derived. However, the drinking water standard for adjusted gross alpha has been added to the standard column in addition to the MCL and footnote 2 has been edited to clarify the values,

as follows: "The adjusted gross alpha level is the gross alpha level corrected for the uranium concentration. The water quality standard is based on Gross Alpha less Uranium and Radon. Radon analysis was not performed on the samples, so a result relative to the drinking water standard in not available."

c) Perhaps a "total radium" line would also be useful for comparison to the standard in footnote 5 (now footnote 6).

Response: A "total radium" line has been added for comparison to the standard in the referenced footnote, now footnote 6.

C. Table 8 Comment: Third column: Monitoring frequency for all field parameters and analytes shall be quarterly for all locations unless approved by DRMS in a future TR.

Response: Monitoring frequency for all field parameters and analytes has been changed to quarterly for all locations unless approved by DRMS in a future Technical Revision.

D. Table 9 Comments:

i. Table would be more appropriately titled Surface and Groundwater Monitoring Parameters and Applicable Standards.

Response: Table 9 has been retitled "Surface and Groundwater Monitoring Parameters and Applicable Standards."

ii. Why are field parameters being collected from the on-site springs and who will this data be reported to? It doesn't appear that there are any applicable standards, and these springs are stated to be eliminated by future mining activity.

Response: Since there are no applicable water quality standards, and the springs will be eliminated by future mining activity, monitoring of the springs within the permit boundary has been deleted and the report text in Section 5.1, Figure 7, Table 8, and Table 9 has been edited accordingly.

iii. Point of Compliance (POC) locations vs. internal or background locations can be identified in footnotes and text – separate columns in this table are not necessary. This may allow the table to be simplified to consist of only surface water, and groundwater columns (maybe springs?).

Response: In Table 9, the Point of Compliance (POC) locations vs. internal or background locations are now identified in footnotes and text. Footnote 1 addresses the groundwater monitoring and footnote 2 addresses monitoring of surface water in Currant Creek and Tallahassee Creek. The separate columns for background sample locations and springs have been deleted to allow the table to be simplified to consist of only surface water, and groundwater columns.

iv. It can also be specified in text or footnotes that applicable standards are only applied to POC sampling locations for enforcement purposes.

Response: The comment that applicable standards are only applied to POC sampling locations for enforcement purposes has been added to footnotes 1 and 2 in Table 9.

v. Why is Cu specified as dissolved and in micrograms/l for Surface Water Quality Discharge Std.? Please also explain 30 day vs. maximum daily average for this standard and how this data is obtained.

Response: The water quality standard shown for copper for surface water discharge is as listed in the Colorado

Department of Public Health and the Environment surface water discharge permit for the Parkdale Quarry. The data is obtained as part of our current sampling procedure when water is discharged from the quarry to a surface water body at one of our approved discharge points.

vi. Why are some Surface Water Quality Standards shown as TVS or TVS/WS and not numeric standards? Are these hardness based standards, and if so, how are they calculated and reported?

Response: The Surface Water Quality Standards shown as TVS for ammonia is from Colorado Code of Regulations 5 CCR 1002-31 and 5 CCR 1002-32 for the mainstream of Tallahassee Creek. A numeric or applicable formula has been added to the table for the other parameters. The standards are hardness-based as noted in the applicable formulas..

vii. See Table 7 comments above (7.B.iii, iv and v) for Cr, Mn, Se and U groundwater standards.

Response: See Table 7 responses above (7.B.iii, iv and v) for Cr, Mn, Se and U groundwater standards.

viii. Incorrect groundwater standards are also given for Cu, and Ag. Cu=0.2 mg/l, Ag=0.05mg/l

Response: The groundwater standard for copper shown in table 9 has been corrected to 200 µg/L (0.2 mg/L) and the standard for silver has been corrected to 0.05 mg/L,

ix. Fluoride should be included in the groundwater analyte list (for at least background sampling) if concentrations are elevated

Response: Fluoride has been added to the groundwater analyte list in Table 9.

x. Footnote notations for Adjusted Gross Alpha and Gross Beta do not match notes text following Table 9

Response: The footnote and footnote number for adjusted gross alpha has been corrected (see footnote 8). The footnote number for gross beta has been deleted, as it was a carryover from a previous table.

E. Table 10 Comment: Table 10 includes potential impacts to water quality and quantity of off-site springs, and states that a determination of impact may be based on 5 quarters of monitoring data compared to baseline values. However, these offsite springs are not identified or included in any of the discussed monitoring and sampling for the site in this plan – either to determine baseline, or for ongoing quarterly monitoring. Please clarify, provide data, and locations.

Response: Since FRA does not have access to springs outside of the permit boundary, and there is apparently limited information for those springs, monitoring of offsite springs has been deleted. Evaluation of impacts to springs has been added to the impact titled "Alteration of groundwater levels and water quality that affects availability or usability for groundwater users."

6.5 GEOTECHNICAL STABILITY EXHIBIT

34. Geotechnical Stability Exhibit: The DRMS has the following comments based on the Rule 6.5 Geotechnical Stability Exhibit dated November 15, 2021 submitted on November 17, 2021:

A. Stereonet Plot approach to stability evaluation: For the record, please clarify and elaborate on the approach using stereonet plots to demonstrate stability. The narrative should separate assumptions (intact rock mass vs. joint strength, etc.) and rationale (e.g., how observed joint spacing and length constrain potential failures,

etc.) for reclamation slopes (global failures) from bench slopes (local failures); describe how Table 1 data is represented on Figures 2A through 4; explain the difference between shaded and unshaded zones on Figures 5 – 26; describe the significance of the plotted points (poles) relative to their positions (e.g., unlikely sliding and toppling failures vs. potential block, slab and wedge failures) on the stereonet plots relative to shaded and unshaded areas; and elaborate on how this approach meets the intent of MLRB Policy No. 30, given the approach differs from the more conventional Factor of Safety approach.

Response: The requested explanation of the stereonet stability analysis method is summarized in the text and detailed in the RockPack III User's Manual, a copy of which is appended to the Geotechnical Stability Exhibit. An explanation of how the Table 1 data is presented on Figures 2A through 4 has been added. The significance of the plotted points (poles) relative to their positions (e.g., unlikely sliding and toppling failures vs. potential block, slab and wedge failures) on the stereonet plots relative to shaded and unshaded area has also been added, As explained in the text and detailed in the RockPack III User's Manual, the factor of safety calculation performed within the program follows the conventional Factor of Safety approach used to derive Factor of Safety values set forth in Mined Land Reclamation Board Policy No. 30.

B. RockPack III results: The bottom of p. 6 states RockPack III was used for stability analyses, followed by rock properties used in the software on the top of p. 7. The first paragraph on p. 8 summarizes the factors of safety found for multiple configurations of slopes, but no modelling results are included in the submittal. Please provide the model results referenced on the top of p. 8.

Response: An explanation of the Factor of Safety modeling approach and the modeling results have been added to the Geotechnical Stability Report and the modeling results presented in Tables 2 and 3.

C. Blasting Plan: The following required elements for the DRMS to approve a blasting plan were not included:

i. Limits on ground vibration (i.e., peak particle velocity),
ii. Limits on air blast (i.e., peak air pressure),
iii. Locations where blasting monitoring instruments are/will be set up,
iv. Commitment to generating and filing a blast report.

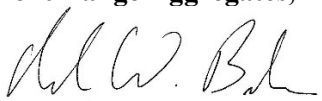
Please provide proposed blast monitoring limits, a map locating blast monitoring locations, and designate who generates and files the blast report.

Response: The blasting plan has been updated to include limits on ground vibration (i.e., peak particle velocity), limits on air blast (i.e., peak air pressure), a map showing the locations where blast monitoring instruments are/will be set up, a commitment to generate and file a blast report, and the designation of who generates and files the blast report.

If you have questions about this response, please contact me at (720) 245-6423 or e-mail at david.bieber@martinmarietta.com.

Sincerely,

Front Range Aggregates, LLC



David Bieber, PG

Attachments:

Exhibit G - Parkdale Groundwater Monitoring Mitigation Plan - 12102021
Rule 6.5 Geotechnical Stability Exhibit – 12102021
RockPack III User's Manual