RESOURCE HYDROGEOLOGIC SERVICES

April 17, 2023

File #: 2023-013-016-1

Ms. Amy Veek
GCC Rio Grande, Inc.
3372 Lime Road
Pueblo, CO 81004

Attn: Amy Veek
Environmental Engineer

Dear Ms. Veek,

Re: Review Response 2022 Annual Groundwater Report, M2002-004

This letter addresses comments from the Division of Reclamation, Mining and Safety (Division) from Mr. Patrick Lennberg, Environmental Protection Specialist, dated March 21, 2023. For ease of review, each Division comment has been restated in italics immediately followed by the corresponding response.

1. *In the Groundwater Monitoring Data Collection section, it is stated that all wells were sampled according to the methods in the approved TR-11. A review of the field sheets in Attachment 1 indicates there is information missing that demonstrates stability was achieved when three consecutive measurements did not vary more than 3% for conductivity and temperature, +/- 10 millivolts for ORP and +/- 0.1 standard units for pH and well purging was done at the lowest rate on the order of 0.03 to 0.1 gpm. Please provide information that demonstrates the stated conditions were met. If sampling deviated from the approved methods, please provide an explanation.*

   All wells were in fact sampled according to the methods in the approved the TR-11 Sampling and Analysis Plan (TR-11 SAP). Per Section 3.3 in the TR-11 SAP, "The final field water quality parameters will be recorded in the mobile field form (Appendix A)." Those final field parameters are given for each sampling event in each respective field form, as shown in 2022 Annual Groundwater Report as Attachment 1. While the TR-11 SAP Section 3.4 discusses the well purging methodology which includes a demonstration to the sampler of field parameter stability when three consecutive measurements do not vary more than 3% for conductivity and temperature, +/- 10 millivolts for ORP and +/- 0.1 standard units for pH, only the final parameters are to be recorded on the mobile field form. For GCC's internal QAQC use, as well as for potential data requests such as this, all field water quality measurements are data logged at 20-second intervals by the sampling team using their In-Situ

AquaTroll 400 water quality sonde, which are time/date-stamped by location. Collectively these individual data log files represent a large data set that is processed only on an as-needed basis. If that level of detail is required to satisfy this Division comment, the full compilation of field water quality data log files, or a sample subset, can be provided electronically upon request.

Additionally, the purge and sampling flow rate (both the same for low-flow groundwater sampling) is already given in the mobile field forms under the Sampling Details → Sampling section with the Flow Rate (gpm) question.

2. *Table 2 needs to be updated to bold the sample results that exceed the standard, e.g. Fluoride, Arsenic, Cadmium, Cobalt, Lead and Selenium all have exceedances that need to be revised.*

   The Table 2 lab sample analyte exceedances have been updated to be shown in bold type, with a footnote for that designation.

3. *Table 2 needs to be updated to show the standard each analyte is compared to.*

   Table 2 analyte standards (CDPHE Regulation 41 Table 3), where applicable, are already shown on the bottom row.

4. *Footnotes need to be added to Table 2 for Boron to show applicable standard for boron is 5.0 mg/L (footnote "g" from Regulation 41.8 Table 3) and the TDS standard is <10,000 mg/L.*

   Footnotes have been added to Table 2 to indicate that the applicable standards for boron is 5 mg/L and TDS is less than 10,000 mg/L.

5. *In Table 2, analyte results from samples that exceeded hold times need to be clearly indicated, e.g. 1Q2022 nitrite and nitrate/nitrite in MW-7 and MW-13, and TDS values for MW-9, MW-13, and duplicate for MW-7.*

   Analyte results from samples that exceeded lab hold times have been shown as underlined in the updated Table 2, with a footnote for that designation.

6. *Please provide a general stratigraphic column for the site.*

   The site general stratigraphic column used as Figure 2 in the TR-11 SAP has been added to the updated 2022 Annual Groundwater Report as Figure 15.

7. *Please provide a more detailed discussion on how impacts from mining may or may not be the cause of exceedances seen at the site. Include in this discussion how current mining activities are being conducted to leave a limestone floor behind rather than removing material into the sandstone and beneficially reusing CKD as backfill during reclamation. The discussion should include details of how groundwater flows across the site.*

Discussion as follows has been added to the updated 2022 Annual Groundwater Report Groundwater Quality, Trace Element Chemistry Trends subsection. Also, to specifically address the Division comment regarding current mining activities, a limestone floor is not being left behind, per TR-05.

The installation of six wells in 2021 has improved the understanding of groundwater flow and chemistry in each of the relevant hydrogeologic units present at the site. However, the source and distribution of constituents exceeding the standard, such as cobalt and nickel at MW-6, is not well defined and remains as a gap in the dataset.

8. *Please provide a discussion of how the stormwater detention basin and leach field may or may not be impacting MW-13 and 14.*

   Discussion as follows has been added to the updated 2022 Annual Groundwater Report Groundwater Quality section under a new subheading Facility Stormwater Detention Basin and Leach Field.

   The Facility stormwater detention basin and leach field were constructed with a maximum disturbance depth of ten feet below ground surface in unconsolidated surficial sediments. Exploratory drilling conducted nearby to construct MW-13 and MW-14 at a distance of approximately 3/8-mile to the northeast of these structures documented the subsurface hydrostratigraphy. Per the GCC Pueblo TR-08 MW Installation Report (RHS 2022), silty soils containing limestone gravels are present from ground surface to approximately 12 feet depth. From 12 feet to 132 feet depth (120 feet thickness) is the Smokey Hill Shale, which was found to be completely dry. From 132 feet to about 176 feet is the mined Fort Hayes Limestone, which is an aquifer documented with 19 feet (8.2 PSI) of confined pressure at MW-13. This indicates that the first water below ground surface, the Fort Hayes Limestone aquifer at 132 feet to 176 feet, has an upward groundwater flow gradient but is confined by the Smokey Hill Shale. Based on these findings, the Smokey Hills Shale immediately underlying the stormwater detention basin and the leach field is a prolific aquitard at the base of these structures which prevents vertical hydraulic communication and thus prevents potential impacts to the MW-13 monitoring well from these structures, as well as the MW-14 monitoring well that is completed in the Codell Shale underlying the Fort Hayes Limestone completion interval of MW-13.

   The source and distribution of fluoride at MW-13 and MW-14 is not well understood and remains as a data gap. However, there are supporting data and literature to suggest that fluoride is naturally more mobile under the geochemical conditions observed at these locations. Continued monitoring is recommended to further characterize concentrations of fluoride at these downgradient locations.

9. *A section needs to be added that discusses any site data gaps that have been identified, if any, that need to be addressed to help refine the current site model. At this time the Division anticipates additional monitoring wells need to be installed both upgradient and downgradient of mine panels that have not yet been affected by mining and wells to better quantify background/baseline groundwater conditions. Finally, a discussion about a new point-of- compliance well(s) needs to be included.*

Discussion as follows has been added to the updated 2022 Annual Groundwater Report in a new section titled Groundwater Conceptual Model Data Gaps.

Expanded groundwater exploration in 2021 and subsequent initial monitoring of six new wells in 2022 at the Facility has significantly improved the groundwater conceptual model and thus the understanding of the groundwater flow regime. That phase of monitoring well installation has allowed identification of groundwater data gaps to be addressed in the next phase of hydrogeologic characterization drilling and monitoring well installation. High accuracy surveying of all Facility monitoring wells' elevation, latitude and longitude now allows plotting of groundwater potentiometric levels in order to more accurately predict groundwater flow direction and the groundwater gradient. The now greater spatial distribution of Fort Hayes and Codell monitoring wells across the Facility has improved confidence that the groundwater flow direction for both of these intervals is to the northeast at an approximate bearing of 45° generally with strata dip direction. Based on 2022 data the initial calculation of groundwater gradient is approximately 3.4% (2.0°) in the Fort Hayes and 2.5% (1.4°) in the Codell.

UPGRADIENT GROUNDWATER MONITORING GAPS

During the 2021 TR-08 exploration drilling and monitoring well installation program an attempt was made to complete twinned Fort Hayes and Codell monitoring wells upgradient from planned mine panel four, which were to be the first upgradient monitoring locations. Unfortunately, the Fort Hayes Limestone was not found to be present during drilling at three exploratory locations in the permitted vicinity of the current MW-9 and MW-10 locations, so those are completed as Blue Hills Shale and Codell Shale wells, respectively. It is therefore recommended that two upgradient locations where the Fort Hayes is known to be present from past limestone resource delineation drilling be identified, in consultation to the GCC Quarry Geology Team. These areas are shown on **Figure 16** in broad blue-shaded areas pending further review of suitable locations. One location should be upgradient (southwest) of mine panels one or two in Section 24, on the north side of the Damian fault, with sufficient setback from the reclaimed highwall. The second upgradient location should be in mine panels four or five in Section 25 as near to the southwest permit boundary as possible, on the south side of the Damian fault. A minimum of two twinned upgradient Fort Hayes and Codell bedrock monitoring well locations are important to improve the current upgradient groundwater data gap as the numerous faults identified across the mine panels may create heterogeneous conditions which affect the site groundwater regime flow and quality.

DOWNGRADIENT GROUNDWATER MONITORING GAPS

As mining progresses to the southeast now entering into mine panel four, it is recommended that a pair of twinned Fort Hayes and Codell monitoring wells be installed downgradient

(northeast) of mine panels four, five, and six. This location would ideally be in Section 19 along the Blake Ranch access road at the GCC eastern property boundary, as shown in **Figure 16,** although this location is out of the permit area. This location could be moved closer to the mine panels (southwest) and sited inside the permit boundary if it is unacceptable to the Division to place any monitoring wells outside of the permit area. This location may prove to be suitable as a future Facility groundwater point-of-compliance for the south/southeast portion of the mine permit area, but will otherwise also allow refinement and improvement of the accuracy of the potentiometry, which is currently only projected in this area for the Codell. It will also serve as a true baseline location downgradient of planned future mining, to be installed and monitored ahead of such mining.

One pair of twinned Fort Hayes and Codell monitoring wells are recommended for installation downgradient of MW-6, MW-7, and MW-8, and thus downgradient of mine panel two, as shown in **Figure 16**. This location is proposed roughly half of the distance between the aforementioned wells and the MW-13/MW-14 location, and is downgradient of the plant footprint. This location is critical to understanding the groundwater chemistry and potentiometric differences identified between the two established monitoring locations (MW-6/MW-7/MW-8 and MW-13/MW-14) which is possibly related to the deepening of the dipping strata away from shallow recharge sources in the vicinity of the quarry, as well as potentially influenced by known faults mapped through the quarry which very likely continue on trend to the northeast. This location will assist with determining if the MW-13/MW-14 location is suitable as a potential Facility groundwater point-of-compliance location, a goal which should be attained going into 2024.

Finally, a pair of twinned Fort Hayes and Codell monitoring wells are recommended for installation in the area downgradient from mine panel one, preferably in an area west to northwest of the plant footprint, as shown in **Figure 16**. This location would provide direct downgradient groundwater chemistry monitoring for the reclaimed mine panel one, which is currently not possible. This recommended location will also refine the Fort Hayes and Codell potentiometry to improve accuracy of the Facility groundwater flow direction and gradient interpretation, as well as provide more insight into the hydraulic gradient between the Fort Hayes Limestone and underlying Codell Sandstone.

This concludes the response to the Division's review letter dated March 31, 2023. These comments have been incorporated into a revised 2022 Annual Groundwater Report, included with this letter. Please let me know if you have any questions.

Yours sincerely,

Resource Hydrogeologic Services, Inc.

Landon Beck
Principal Hydrogeologist

Enclosures/Attachments: Updated 2022 GCC Rio Grande Pueblo Plant Annual Groundwater Report
CC: None