State of New Mexico
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
and the
ENVIRONMENT DEPARTMENT

Electronic Transmission

November 8, 2024

Adam Offutt
Freeport-McMoRan Tyrone Inc.
P.O. Box 571
Tyrone, NM 88065

Re: Joint Agency Comments on the Emma Expansion Project – Updated Material Characterization and Handling Plan Draft Submittal for the Tyrone Mine, MMD Permit No. GR010RE and NMED DP-396

Dear Adam Offutt,

The Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD) and the New Mexico Environment Department (NMED) (collectively, the Agencies) have reviewed the Freeport-McMoRan Tyrone Inc. (Tyrone) December 22, 2023, submittal titled *Material Characterization and Handling Plan for Two Non-Discharging Facilities: Emma Project*, labeled draft (*Updated Material Characterization and Handling Plan*). The submittal complements an April 19, 2023, report titled *Geochemical Characterization of Emma Waste Rock Materials* (*Geochemical Characterization*) and is an update to the original submittal dated October 22, 2021, titled, *Material Characterization and Handling Plan for Two Non-Discharging Facilities: Emma Project*. This *Updated Material Characterization and Handling Plan* is incorporated into the larger Emma Pit Expansion Closure/Closeout and Operational Plan, which is currently under technical review by the Agencies. Tyrone held meetings with NMED on August 2, 2024, June 18, 2024, and May 15, 2024, to further discuss the submittals. A PowerPoint presentation was provided to the Agencies after the August 2, 2024, meeting. The *Updated Material Characterization and Handling Plan* was requested by the Agencies as part of two separate permitting actions to provide additional information for 1) Renewal and Modification of Ground Water Discharge Permit 396 (DP-396) and 2) Revision 21-1 to Permit No. GR010RE.

The Agencies request that Tyrone submit a revised version of the *Updated Material Characterization and Handling Plan* for agency approval with the following comments addressed:

1. Section 3.1. *Proposed Segregation Threshold.* In addition to employing total sulfur and Acid Base Accounting (ABA) material characterization analyses, please describe any other methods or material characterization and handling strategies planned to avoid and to minimize significant inclusion of PAG materials such as samples S-2.5-1, S-2.5-3, and S-5-1 described in the *Geochemical Characterization* report. Describe other aspects planned to safeguard or monitor the proposed Waste Rock Stockpiles (WRPs) such as ore control processes including continuous geologic mapping; blasthole logging, spacing, and sampling; interval testing; waste flagging and routing; and use of a GPS targeting system (if applicable).

2. Please specify the typical laboratory detection limits, laboratory turnaround times, and the laboratory or laboratories proposed for total sulfur and ABA analyses.

3. Section 4.0. *Discharge Demonstration* (with respect to lab testing and predictive mass-balance modeling).
    a. Figure 4 provides time-series predictions (mass-balance modeling) of sulfate concentration for both an assumed Base Case and a Conservative Case for the proposed 6HW and EMW conditionally exempt/Non-Acid Generating (NAG) WRPs.
        i. Please confirm that the following "input" data was employed in modeling and make any clarifications or edits as needed:
            1. Humidity cell testing results (HCT).
            2. Construction plan for the WRPs based on the expected progression of materials during mining. Describe deviations or simplifications.
            3. Construction plan: Regarding modeling of the conservative case, please describe the assumptions regarding inclusion of modest quantities of a higher weight percent (wt%) PAG material. Describe the assumed modeled quantities if relevant as a percentage of each lift of a pile and frequency of addition employed over model runs; describe any basis to support that the modeled inclusions are conservative. Describe merits of selection of the total sulfur wt% value for this assumed conservative material as based upon either of the PAG materials previously tested via HCT that demonstrated acid-generation; compare merits of modeling either 0.7 or 1.2 wt% total sulfur or the average of the two.
            4. Meteoric precipitation and any other meteoric site data (i.e., monthly rain/snow, pan evaporation).

5. First Flush data.
6. Please describe if any other material characterization data such as results from the meteoric water mobility testing or XRD analysis was incorporated into the modeling.

ii. For the 6HW WRP, Figure 4 shows predicted results that start at Month #12 (and end at Month #36) while it shows results for EMW running from Month #Zero to Month #48. Table 5 seems to be the opposite showing that construction of the 6HW would take approximately five years and start before the construction of the EMW which is shown to be built over only approximately three years. It seems that the designations of 6HW and EMW have been mixed up either in Figure 4 or Table 5. Please review and correct as applicable.

iii. Please provide example calculations to exemplify how model inputs are employed to estimate some sulfate result(s) graphed in Figure 4. Include the following calculations and discussion topics:

1. "Mass release rates" are described on page 26 of the *Geochemical Characterization.* Please include at least one example sulfate calculation for a material type. Also include release rate answers for all types.
2. Description of methods to scale results from the HCT tests to conditions modeled in the proposed WRPs (e.g., meteoric precipitation, preferential flow, effective material size, contact time).
3. A table of input values used in the model, as described in the previous question (see part "i") over the predicted model periods.
4. Provide example calculations to relate to at least one numerical model base case and its corresponding conservative case calculation.
5. As needed, for supplementing descriptions please reference:
    a. Previous Tyrone reports such as *Geochemical Characterization report's Figure 13 titled "Sulfide Surface Area versus Cumulative Released Sulfate Mass."*
    b. Peer-reviewed literature
    Note: Please provide a copy of at least *Lapakko and Antonson (2002)* and *Price* (1997). Note that "Price (1997)" was referenced but not included in the bibliography of the *Geochemical Characterization* report.

6. Please describe the basis and the assumptions used for the Conservative Case.
7. Please describe why the modeled result values in Figure 4 generally downtrend over the modeled period.
8. Please describe why the Discharge Demonstration model only contemplates sulfate generation and does not evaluate other potential water contaminants listed in Section 20.6.2.3103 NMAC.

4. Section 4.0. Confirm that the proposed use of total sulfur analyses is intended to augment the more traditional process of employing fewer static ABA samples. Confirm that Tyrone anticipates that the many proposed additional total sulfur analyses in this case are anticipated to enhance material characterization through significantly increasing the frequency of sampling materials. In addition to 80-90 ABA samples, NMED understands that approximately 5,000 total sulfur waste rock samples will be analyzed if 10 million US tons of NPAG waste rock (and a smaller quantity of PAG) are generated from mining the Emma Pit. Please confirm that using total sulfur analyses will also enable real-time analysis that will better correspond with actual operational WRP handling.

5. As discussed in meetings, a data gap was recognized from the current material characterization study. To date, no samples have been found that contain total sulfur in the range of 0.0575 wt% to 0.248 wt%. Therefore, a correlation between total sulfur and NPR or NAG pH has not yet been confirmed. NMED requests that Tyrone discuss this data gap and propose how this data gap can be addressed through additional characterization work in the next revision to the *Updated Material Characterization and Handling Plan.* NMED asks that Tyrone prioritize performing NPR and NAG pH analyses of any future samples identified to be in this total sulfur range.

6. Appendix 1. *Sampling Methods and Testing*. Sampling frequency should be increased to match the same sampling frequency (one sample for every 150,000 tons of waste rock) as proposed in Section 5.2 of the *Updated Material Characterization and Handling Plan*, at a minimum.

7. Appendix 1. *Sampling Methods and Testing.* Tyrone should consider collecting bulk samples for each lift of the stockpiles to capture sample variability across the pile by depth.

8. Appendix 1. *Soil suitability testing parameters and methods for Emma EMW and 6HW stockpile samples*. Recommend adding base saturation to the list of parameters to test.

Please submit a revised version of the *Updated Material Characterization and Handling Plan*, for Agency approval, with the above comments addressed within 60 days of this letter (by January 7, 2025). Please contact respective MMD and NMED points of contact DJ Ennis at (505) 372-8634 and Brad Reid at (505) 372-8533 with any questions regarding permitting issues for the Tyrone Mine.

Sincerely,

Brad Reid Digitally signed by Brad Reid
Date: 2024.11.08 10:54:52 -07'00'

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Mining Environmental Compliance Section
Ground Water Quality Bureau - NMED

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