ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

Katie Hobbs
Governor

Karen Peters
Director

Comprehensive Request for Additional Information

February 27, 2023

Via Electronic Mail

Copper World, Inc.
Attn: Mr. Javier Del Rio, Vice President
5285 East Williams Circle, Suite 2010
Tucson, AZ 85711

Re: Copper World Project
New Aquifer Protection Permit #P-513690, LTF #90620

Dear Mr. Javier Del Rio**:**

The purpose of this letter is to formally inform you that the Arizona Department of Environmental Quality (ADEQ) does not have all of the information required to grant your permit and may deny the permit if this information is not received. We received the above-referenced application on September, 21, 2022. At this time, the application is in the Substantive Phase of the Licensing Timeframe (LTF) for this application, however, this letter suspends the review timeframe.

Required Information

The following information is required to lift the suspension of the timeframe and continue the processing of this application as per Arizona Revised Statues (A.R.S.) § 41-1075:

General Items

1. Submit a revised closure and post-closure cost estimate that includes the following items as required by Arizona Administrative Code (A.A.C.) R18-9-A201 (B)(5):
    a. Please update the closure and post closure cost estimate tables, and provide the required APP closure costs. The materials cost for the process ponds and tailing storage facilities (TSFs) is $0, the revegetation and stabilization costs (labor, equipment, materials) for the discharging facilities is $0. These items are part of the APP closure requirements. ADEQ understands that some of these closure activities may be completed under a separate program.

b. The cost of materials for monitoring for 30 years is $167,810. The materials cost for the Heap Leach Facility (HLF) is $5,850. These two cost estimates do not appear to be sufficient. Please provide justifications.

c. Based on a post-monitoring period of 30 years, the monitoring costs of $70,113 do not appear to be sufficient. Please update these costs, or provide more information on the original cost estimate.

d. In Section 6.2. Summary of Closure and Reclamation Costs, it seems to imply that the closure cost estimate has been approved by ADEQ. Please clarify this statement as APP closure costs are still under review.

e. Provide cost estimates for surveillance, satellite imagery, and other routine inspections for the TSFs and HLF.

f. Explain how reclaim seepage return from drain-downs of the TSFs and HLF will be managed in post-closure. If evaporation ponds are used, provide the related closure costs.

g. Provide information on the unit rates used in closure cost estimate.

h. Provide an analysis of the drain-down time-frame of the TSF and HLF to determine the duration closure and post closure period.

2. Contingency Plan: Pursuant to A.R.S. §§ 49-243(A)(10), -243(K), and A.A.C. R18-9-A202(A)(5),(11) -A204, provide the following:

a. As part of the contingency plan, the permittee shall provide an Emergency Preparedness and Response Plan (EPRP). The EPRP should be a site-specific plan. The EPRP shall be prepared as part of a community focused planning process and contain an impact assessment that will identify ways to prevent, minimize and mitigate any potential environmental and social impacts to the project affected stakeholders, and those vulnerable (neighbors, highways, ranches, habitat) and procedures that will be followed in case of a potential TSF/HLF failure.

b. Pre-defined levels for performance criteria that are based on the risk controls and critical controls of the proposed facilities. The performance levels should be developed based on the risk management plan. The plan should describe actions to be taken if performance levels are exceeded to prevent a loss of control.

c. The plan should identify capacity and any necessary coordination with off-site emergency responders, local communities and public sector agencies.

3. Operation, Maintenance and Surveillance (OMS) Plan: Pursuant to A.R.S. § 49-243(A)(10), A.R.S. § 49-243(K), and A.A.C. R18-9-A204, A.A.C. R18-9-A206, and A.A.C. R18-9-A202(A)(5),(9),(11) provide an operation, maintenance, and surveillance plan for the TSFs and HLF. The OMS plan should describe practical plans and procedures for all aspects of operation, maintenance, and surveillance activities associated with the proposed facilities. The plan should include the following:

a. Monitoring systems and methods for each discharging facility.

b. Early detection monitoring to detect failure.

c. Underdrain monitoring to ensure they are performing as designed.

4. Pursuant to A.R.S. § 49-243(N) and A.A.C. R18-9-A202(B), provide an organizational chart for the operation, surveillance, closure, and post-closure of the proposed discharging facilities.

5. Consider a Compliance Schedule Item (CSI) for periodic Tailings Dam Safety Reviews (every ~5yrs) throughout the life of the facility from operations through the post-closure period, to include Independent Technical Review Board (IRTB) and Tailings Review Board (TRB) findings and recommended actions, and updated investigation results on critical cross-sections to provide ADEQ with an update on stability conditions and critical state of the tailings dam to demonstrate that the stability and performance is consistent with design stability.

6. Provide a figure that shows the footprint and boundary comparison of the discharging facilities covered under the older APP from 2012 (INV 106100, LTF 49639) and the new APP application (INV 513690, LTF 90620). Are there shared areas between the previous APP and the new proposed APP for the Rosemont pit?

Engineering Items

7. The application asks for exemptions (per A.R.S. § 49-250 (B)(22)) for the following facilities: ND-PS-20-Bulk Cu/Mo thickener, ND-PS-23-Tailings Thickeners, and ND-PS-26-Concentrate Leach Fine Grinding Plant. These facilities have the potential to overflow or discharge. Please provide more information about these facilities and their operations. Consider providing BADCT for these facilities. Also, the ND-PS-39-Solvent Extraction Plant and ND-PS-42-Ammonium Nitrate Storage were listed for exemption per A.RS. § 49-250(B)(21)-(22). Per A.R.S. § 49-250(B)(21), structures should be designed and constructed so as to allow for visual inspection for leakage. Does the design meet ADEQ's Tank Exemption Policy? Please provide more information.

8. Based on the information provided in the application, Helvetia Smelter Slag Pile (HSSP) is a closed facility pursuant to A.R.S. § 49-250(B)(11). How do you ensure that disposing Waste Rock (WR) on the HSSP will not produce leachate that could negatively impact the aquifer? Please consider Synthetic Precipitation Leaching Procedure (SPLP) testing for the slag material.

9. The WR Facility (WRF) will have three types of materials: Non-acid generating (NAG), potential acid generating (PAG), and acid generating (AG):

    a. Please provide more information regarding the placement of the NAG on the outer slopes, PAG on the interior, and encapsulating the AG.

    b. During the operation, Acid-Base Accounting (ABA) analysis will be done, but not the Humidity Cell Testing (HCT) analysis or similar kinetic tests. How will you ensure that the AG/PAG material will be characterized during operations? Please

include Kinetic testing in the characterization plan or provide justification for not including it.

10. Based on the Preliminary Geologic Hazards Assessment report (Appendix B), the size of the underground features and extent of underground workings is not included in the AML data base. The report says that "adits and mine shafts may contain underground features of unknown size (USGS, 2021)" and "some extensive developments may be present on both the eastern and western flanks of the Santa Rita Mountains such as underground mine workings and waste rock dumps which may require further investigation and mitigation such as backfilling, to reduce risks." Historic mine workings should be further investigated and engineering designs for mitigation will be required where historic workings are located within the foot print of the permanent or temporary infrastructure.
11. Preliminary geologic hazards assessment reports state that based on the FEMA flood zone maps, most of the project site is located in Zone D which is defined by FEMA (as of 2021) as an area with potentially moderate to high risk of flooding, for which the probability of a flood has not been determined. How do you ensure that planned stormwater controls will effectively protect the process ponds, HLF, TSFs, and other discharging facilities? Please provide more information.
12. Water in the upstream stormwater collection gallery will be conveyed under the HLF and TSF in a solid 36-inch pipe to a downstream stormwater collection gallery. Provide information on methods to prevent the clogging of pipes. Has there been any successful implementation of this method? Please provide more information.
13. In the Site Water Management report, section 4.7.1: "the permanent diversion channels will be completed by year 5 of operations." Please explain how you will manage the non-contact stormwater in the first 5 years of operations.
14. The property boundary and TSF footprints are directly adjacent to State Land, and federal Bureau of Land Management (BLM) property, and private property. Please provide operational, closure and post-closure plans to ensure that the TSF operations will not disturb neighboring lands outside of the property boundary.
15. Calculate the magnitude of sulfate impacted water that will be discharged to the groundwater during the lifetime of the facility. Calculate the total mass loading of sulfate that will be discharged to the aquifer.
16. Please provide the followings regarding the tailings stacking height:
    a. What is the stacking rate?
    b. What operational best practices will be followed to minimize high internal pore pressures?
17. Provide an estimate of water content during tailings placement. Also provide a plan and method to reduce water content during placement.
18. Provide an analysis discussing if the tailings (and HLF, and WRF) composition is expected to degrade or become chemically altered, weathered, and aged.

19. Provide more information on the materials that have been proposed for the cover of WRF and HLF.
    a. What is the source and what are the characteristics of the materials?
    b. Is there sufficient material to use for the cover?
    c. What are the infiltration rates?
    d. Is the material suitable for supporting vegetation growth?
20. Has the water management plan considered the effects of climate change in terms of both extremes: too much water, or too little water over the life of mine and post-closure?

Geotechnical Engineering Items

21. Potential Failure Modes (PFM)

    The probabilities of all types of credible failure modes have not been evaluated. Pursuant to A.R.S. § 49-243(K), and A.A.C. R18-9-A202(A)(5), -A204, provide a site-specific analysis for the proposed TSFs and HLF using a methodology that considers credible failure modes, site conditions, and the properties of the discharge. This analysis should be updated whenever there is a material change either to the tailings facility or the physical area impacted. Understanding the credible failure modes provides the basis for the contingency plan and OMS plan. Please consider the following when performing the initial analysis:

    a. The results of the analysis shall estimate the physical area impacted by a potential failure.
    b. The PFM should inform the monitoring and surveillance program.
    c. Consider inviting ADEQ to participate in the Failure Mode and Effects Analysis (FMEA) workshop.
22. Provide the reference material for following items:
    a. A detailed engineering and permitting design of a Dry Stack Tailings Storage Facility for the Rosemont Copper Project (AMEC, 2009).
    b. Geotechnical Study Report, presenting initial geotechnical site investigations conducted in 2006-2007 at the Rosemont Copper Project (Tetra Tech, 2007a) and an addendum to the 2007 Geotechnical Study Report (Tetra Tech, 2009).
    c. Call & Nicholas, Inc. (CNI), 2016. Feasibility-Level Geotechnical Study for Rosemont Deposit. Report prepared for Hudbay Minerals, Inc. May 2016.
23. Provide TSF deposition planning and material balance for every year for the first 5 years and every 5 years after that to satisfy the following:
    a. To justify maintaining the 400 ft beach distance and maintaining the downstream slope of 3H:1V during operation.

   b. To justify availability of enough sand material for building the centerline construction method.
   c. To provide access and maintenance roads for TSFs during the operation and for final configuration and closure.

24. Provide contingency plan for the centerline construction, in the event that sufficient cyclone tailings sand is not available during operation.
25. Provide information for the starter dam design:
   a. What kind of material will be used for the construction, rock or soil? Please specify and provide specification for material placement.
   b. Provide the source of the material that will be used for the starter dam construction.
   c. Provide the justification for placing the inclined chimney drain on the upstream side of the starter dam.
26. Provide a detailed stability monitoring plan for the TSF and HLF.
27. Provide the downstream sand placement methodology to minimize the static liquefaction.
28. Provide a plan for minimizing the risk of static liquefaction and monitoring requirement during the operation.
29. Provide the criteria for selecting the two cross sections used in evaluating the slope stability for the TSF.
   a. Include additional cross-sections in locations that are more critical for stability.
30. Provide justifications for using different return periods for TSF (return period of 10,000 years), HLF and Waste Dump (return period of 2,475).
   a. Justification for using various return period for TSF final height is around 200 ft and HLF is around 400 ft.
   b. Provide the procedure for obtaining 0.17g corresponding to a 10,000-year recurrence interval design earthquake.
31. Provide the justifications for including alluvial cutoffs and the design of the cutoffs at the starter dams.
32. Provide the plan view map for construction of alluvial cutoffs and seepage collection systems along the main drainages beneath both TSFs.
33. Provide a plan view map for the location of unsuitable material that will be removed underneath the TSF and HLF locations and include the following:
   a. Material characterization of the removed material.
   b. Garnet Skarn rock has residual value of approximately 24 degrees (Pre-Feasibility Level Pit Slope Design Study Page 91). In addition to the plan view map, provide assurance and justifications that no such material is underneath the TSF and HLF locations.

c. The location of the disposal/use of this material

34. Annotate the cross sections with the available boreholes or test pits on cross-sections to justify the profile used for stability analysis.
    a. Foundation is assumed to be competent; provide the material and characterization of the foundation material.
35. Provide justification for the phreatic line for the TSF stability:
    a. Cyclone sand downstream placement will not be dry and will contribute to the Phreatic line.
    b. Provide data to support the permeability, or provide data for permeability (the tailing material has approximately 50 to 70 percent fines).
    c. The undrained shear strength of tailings is assumed to be 0.25. Provide a monitoring plan to confirm this is maintained during operations. Fine tailings and whole tailings are assumed to have the same undrained strength as shown in Table 4-4 on Page 11, and Figure 11-24 on Page 78 in the Stability Analysis Memorandum Tailings Storage Facilities Rosemont Copper World Project.
    d. Based on the gradation testing done by KP, the tailings material contains 50 to 70 percent fines. Provide justification for using the Phreatic Line from the seepage model.
36. Provide supporting data for the following statement on page 4 of the Stability Analysis Memorandum Heap Leach Facility (HLF) Rosemont Copper World Project: "Material properties used in the analysis were developed from the engineering material shear strength data based on the field and laboratory investigations, the literature, and Wood's experience with similar materials".
37. In the evaluation of the HLF, it is assumed "the foundation materials will remain unsaturated." (see Page 6 of Report Stability Analysis Memorandum (HLF) Rosemont Copper World Project).
    a. Provide justification for the assumption during the operations.
    b. Provide monitoring plan in order to confirm the assumptions and contingency plan if the assumption changes during operations.
38. The bench slope for HLF is around 39 ft with 1.3H:1V slope and it is more than the angle of repose of embankment fill. Provide the stability for bench slope.
39. Provide the data for the following statement found on Page 8 of Report Stability Analysis Memorandum Heap Leach Facility (HLF) Rosemont Copper World Project: "These interfaces were modeled based on previously performed testing on two different reinforced GCL products supplied by CETCO" (Tetra Tech, 2007b; 2009b).
40. Provide justification for using the circular failure for the HLF for some of the cross sections.

a. The interface of the liner and GCL has 16-degree friction angle and circular failure is not considered appropriate for this condition by ADEQ.

41. Provide justification for using foundation as competent material using 36-degrees friction angle. In the Waste Rock Facility Stability memorandum, it was mentioned that "The foundation material consists, in general, of alluvium (including GP, SP and SW soil types), highly to completely weathered rock, and moderate to slightly weathered rock."
    a. Update the cross sections with available boreholes and test pits.
    b. Provide the surface geology map showing the thickness of alluvium under the waste dump.
42. Provide supporting data for depositing the waste rock material using 37-degree friction angle for the stability.
43. Provide justification of not using the recent drilling program data for pit slope design study.
44. For joint structure evaluation, was the oriental directional drilling used or is the data based on outcrops?
45. Provide a report presenting the details of your investigation to obtain reliable data for the Rosemont Pit to clarify the following statement found on the page 18 of the Pre-Feasibility Level Pit Slope Design Study: "For this reason, independent interpretation of the stereonets shown by CNI may not be reliable."
46. Provide the details for any dewatering program proposed for the Rosemont pit found on the page 22 of Pre-Feasibility Level Pit Slope Design Study: "The stability analyses indicate that the slope have to be dewatered for approximately 300 feet behind the slope to achieve acceptable factors of safety in this configuration and overall angle."
47. Provide justification for using the Hoek-Brown Curve for PALEOZOICS (Figure E3, page 269), the drawn curve may not be representative of the sample points.
48. Provide QA/QC for all the discharging facilities. What practices will be maintained to ensure that design specifications are followed during construction.
    a. Sources of high pore pressure in the foundation of TSFs and HLF should be mitigated.
    b. Undrained stability should be mitigated.
    c. Containment: Critical components include stability failures, piping failures, overtopping, erosion, washouts around hard structures.

Hydrogeologic Items

General Hydrogeology Items

49. The DIA based on the groundwater modeling indicates that extent of potential groundwater impacts from the discharging facilities will extend beyond the property boundary. Per A.A.C. A202(A)(8)(a)(i)-(ii), applicants must demonstrate discharges will not violate the

aquifer water quality standards (AWQS) at the points of compliance (POCs) or that discharges will cause additional degradation of the aquifer. Please provide a more detailed study of the potential impacts or provide detailed mitigation and contingency plans that address these potential off-site impacts.

50. Per A.R.S. § 49-244, the POC is defined as a vertical plane downgradient of the facility that extends through the uppermost aquifers underlying the facility. The applicant provides figures showing the POC well locations (for example, Figure 6.1 in Appendix F.2) and provides a brief narrative of the locations (page 57 of Appendix F.2). Based on this definition, the location of POC wells 1 through 6, as proposed, appear to be downgradient of discharging facilities. Please provide additional justification for the locations of POC wells 7 through 10, as it is not clear if these locations are downgradient based on the discharge impact analysis results or the particle tracking results. This justification should demonstrate these locations are downgradient of the facility. Furthermore, please propose estimated screened intervals for all POC wells, given that the actual screened interval will be determined during well installation.

Items 51 through 58 for individual discharging facilities are based on the geochemical modeling information provided in Appendix G.1 of the application.

51. TSF: The standard deviation sensitivity analysis shows the potential for selenium concentrations to be above the AWQS.

52. HLP: The composite seepage chemistry shows the potential for beryllium, cadmium, fluoride, selenium, and zinc concentrations to be above the AWQS.

53. Broadtop Butte Pit: The sensitivity analysis shows the potential for fluoride concentrations to be above the AWQS.

54. Copper World Pit: Simulated pore water chemistry shows the potential fluoride concentrations above the AWQS during the first five years of the mine life. The sensitivity analysis shows potential concentrations above the AWQS for antimony, cadmium, mercury, selenium, and thallium.

55. Heavy Weight Pit: The modeling results show concentrations above the AWQS for fluoride that remain for 10 years post-closure. The sensitivity analysis shows potential concentrations above the AWQS for antimony, cadmium, and thallium.

56. Elgin Pit: The modeling results show concentrations above the AWQS of fluoride that increase over time. The sensitivity analysis shows potential concentrations above the AWQS for arsenic, antimony, cadmium, and thallium.

57. Peach Pit: The modeling shows concentrations above the AWQS for fluoride that increase over time.

58. The facilities in items 51 through 57 are listed as discharging facilities and have the potential for discharges exceeding the AWQS for several constituents. Please provide adequate BADCT information for these facilities.

59. What is the buffering capacity of the formation downgradient of the TSF? A qualitative description will suffice. Please provide an estimate of the buffering capacity of the geologic units downgradient of the TSFs. A qualitative estimate will suffice.
60. Please demonstrate that the locations of the proposed POCs 1, 2, 3, and 4 are adequate given that they are coincident with the PMA boundary, the property boundary, and the boundary of the discharging facility (TSFs). The application assumes there will be seepage that occurs through the TSFs. It's expected that an exceedance of the AWQS at any of these POCs will indicate that the AWQS has been exceeded beyond the PMA due to the short transport distance.
61. The applicant has stated that the Rosemont Pit will not be a discharging facility as it will form a terminal pit and operate as a hydrological sink. Please provide a detailed monitoring plan to provide ongoing data that the pit is acting as a sink and no discharges are migrating beyond the property boundary.
62. Please provide a detailed summary that describes the mine pits. In the current application, the information describing the pits is found in numerous locations throughout the application. The review of the pits would be improved if all of the information was consolidated into one section or document. Please include: Figures showing the estimated pit configurations in plan view and cross section, which pits are to be backfilled and a description of the material used for fill, plan view and cross-sectional figures showing backfilled pit configurations, whether or not pits are flow-through or terminal, anticipated inflow or outflow rates, and estimated depths and surface elevations of pit lakes.
63. Per A.A.C. R18-9-A202(A)(8)(b)(vii) and (viii); please provide data/documentation assessing the extent and degree of any known soil contamination at the site and an assessment of the potential of the discharge to cause leaching of pollutants from surface soils or vadose materials.

Discharge Impact Analysis - Groundwater modeling items

The following rules apply to requested items 64 through 71 based on the review of the groundwater modeling study that was used for the application:

A.A.C. R18-9-A202(A)(8): If required by ADEQ, a hydrogeologic study that defines the discharge impact area (DIA). The DIA is the potential areal extent of pollutant migration, as projected on the land surface, as the result of a discharge from the facility, for the expected duration of the facility.

A.A.C. R18-9-A202(A)(8)(a)(i): The hydrogeologic study shall demonstrate that the facility will not cause or contribute to a violation of an AWQS at the applicable point of compliance.

A determination by ADEQ that the applicant has satisfactorily defined the DIA and demonstrated discharges will not violate AWQS as outlined in the above rules requires additional information. Specifically:

64. In Section 3.3 (Model Calibration), page 26 of Appendix F.2 of the application, the report states "The model calibration was evaluated on the basis of its ability to:…Reproduce a global water balance that reflects Project site conditions." The ADEQ review did not find any reporting describing a model water balance. Please provide the model-simulated water balance of the calibrated steady-state model and the transient model that summarizes all inflows and outflows, including (but not limited to): general head boundary flux, drain flux, evapotranspiration, recharge flux, and groundwater flux across the domain. Please also provide model-simulated water balance snapshots at the TSFs, mine pits, and waste rock facilities. Please also compare the model-simulated budget to the conceptual water budget.

65. The predictive modeling that evaluates utilizes a transient model based on the steady-state calibration. Our review did not find documentation of a calibration or validation of the transient model prior to performing predictive simulations. Please provide information describing transient calibration or validation methods and results or provide a rationale as to why validation or calibration of the transient model was not needed prior to performing predictive modeling simulations.

66. Please provide a comparison between model-calibrated hydrogeologic parameter values and the conceptual (or starting) parameter values described in Appendices F.1 and F.2. Additionally, the ADEQ review of the report did not find a summary of a sensitivity analysis for the steady-state calibration. If the analysis was completed, please provide documentation describing the methods and results. If a sensitivity analysis was not performed, please provide the analysis or a rationale as to why one is not needed.

67. Appendix F.2 states that the use of steady-state targets from different temporal periods is acceptable due to the minimal variation of the target values over time (pages 28 and 29 of Appendix F.2). Please provide a more in-depth analysis as to why this assumption is valid. For example, the report states that "…an analysis of the available data show the groundwater levels in the eastern part of the Project model domain do not vary significantly over long periods of time." In this case, what criteria were used to determine the variation was not significant?

68. Please provide a figure showing the domain of the model presented in Appendix F.2 overlain over the domains of the original models (the TAMA (west) model and the Tetra Tech (east) model).

69. Please provide a more in-depth summary of the calibration process of the steady-state model, primarily the PEST (parameter estimation software) input information or text files.

70. Please provide additional particle tracking simulations that place the particle starting position at the boundaries of the pit outlines and at the entire boundary of the PMA. Alternatively, please provide an additional figure that overlays the simulated groundwater elevation contours on the particle tracking results in order to support interpretation of particle tracking results.

71. Please provide cross-sectional views of the model-simulated groundwater elevations and particle tracking results. In particular, provide these views for each mine pit and the TSF in an east-west orientation.

Consequences of Failure to Submit Required Information
Your response to the above listed items must be received by ADEQ on or before April 21, 2023. Failure to submit any of the above required information by the deadline may result in initiation of the denial process for this APP amendment application.

How to Submit

Please submit your response to this letter in electronic format to the ADEQ Project Manager; no hard copy is required.

E-mail to: peiravi.meisam@azdeq.gov
If document(s) are too large to email, notify ADEQ Project Manager to request a ShareFile link to upload document.

Thank you for your efforts to comply with Arizona's environmental requirements.

Should you have any comments or questions regarding this matter, please do not hesitate to contact me at (520) 628- 6724 or Peiravi.meisam@azdeq.gov.

Sincerely,

DocuSigned by:
Meisam Peiravi
59CCE296F5C0497...

Meisam Peiravi, Ph.D.
Project Manager
APP Unit, Groundwater Protection Value Stream
Water Quality Division

cc: Ethan Leiter, Manager, GPVS, WQD, ADEQ
Kyle Richards, APP Unit, GPVS, WQD, ADEQ