

October 30, 2023

Mr. Ardeshir Sharifabadi Project Manager APP Unit, Groundwater Protection Value Stream Water Quality Division Arizona Department of Environmental Quality 1110 W. Washington Street Phoenix, Arizona 85007

RE: Copper World Project – Aquifer Protection Permit Application – Response to "Follow-up Questions" on September 20, 2023 to Inadequate Response to a Comprehensive Request for Additional Information" – Clarification Requested Via Email on October 11, 2023

Dear Mr. Sharifabadi:

This letter transmits responses to the Follow-up Questions received via email from the Arizona Department of Environmental Quality (ADEQ) on October 11, 2023. These questions were in relation to the submittal to ADEQ dated September 20, 2023. This submittal was titled "Copper World Project – Aquifer Protection Permit Application – Response to a Comprehensive Request for Additional Information", dated June 23, 2023

An application for an area-wide aquifer protection permit (APP) was submitted to ADEQ by Copper World, Inc. (Copper World) on September 21, 2022 for the Copper World Project (Project). Following technical review of the application, ADEQ issued a Comprehensive Request for Additional Information (RAIS) letter to Copper World on February 27, 2023. On April 21, 2023, Copper World submitted a response to ADEQ's RAIS letter. ADEQ issued another information request on June 23, 2023. Copper World responded to this information request on September 20, 2023.

This letter provides responses to ADEQ's October 11, 2023 clarification request. Additionally, questions also arose during discussion with ADEQ regarding the water balance. Clarifications on these water balance questions are also presented herein.

ADEQ's requests are repeated below along with responses. Responses are either embedded entirely in this letter or summarized, with details provided in separate attachments.

## **General Items**

## Item 1: (Closure & Post-Closure)

1.i. The Closure Costs include a cost for placement of "topsoil" vs a "cover". Please indicate a closure strategy including information such as overall thickness, lifts, etc. related to placement of cover on the TSFs and HLF. If the placement of a low permeability cover is contemplated and it is not the same as the topsoil, then the costs may not be adequate. If necessary, provide updated closure and post-closure costs. (ADEQ clarification email dated October 11, 2023)

Response: For purposes of the Closure Plan and geotechnical investigation/design, the term cover and topsoil are synonymous. For closure of the TSFs, approximately 18 inches of growth media/topsoil would be placed on the top surface in single lift and dozer tracked, i.e., limited compaction. Additionally, two feet of growth media will be placed on the slopes of the TSF, also in a single lift and dozer tracked. The surface would be ripped/scarified as needed during revegetation activities.

The growth media cover would act as a store and release cover. Precipitation falling on the TSF would either runoff or infiltrate into the growth media for use by vegetation and/or be evaporated. This would minimize infiltration into the underlying tailings. Precipitation that does reach the tailings would eventually report to one of the sulfate reducing cells along the perimeter of the TSF that will be constructed during post-closure activities. Infiltration modeling will be conducted during operations to determine the amount of infiltration that will reach the tailings. Adjustments can be made to the conceptual closure plan based on the results of that infiltration modeling.

As a note, the cover design planned for the Copper World Project TSFs is similar to that proposed in the APP application for TSF4 at the Pinto Valley Operations. That design called for 12 inches of cover on the surface and 2 feet of cover on the slopes. The APP application for Pinto Valley was approved with this cover design.

1.ii. The closure and post closure cost as per R18-9-A201(B)(5)(a) required to be prepared by engineer, controller, or accountant. Please provide credentials of the person who prepared the closure and post closure cost Technical Memorandum, and have an Arizona licensed engineer seal the document if applicable. (ADEQ clarification email dated October 11, 2023)

Response: Resumes for Richard Weber, Peter Yuan and Todd Minard are provided in Attachment 1 of this clarification response letter (Note: Resumes were also provided in the September 2022 application). Each prepared a portion of the closure and post-closure cost Technical Memorandum and or reviewed/approved the document (see Attachment 1 of the September 20, 2023 response to ADEQ's comments). Bios for Peter Yuan, Todd Minard and Richard Weber are also provided below.

Haiming (Peter) Yuan, P.E. (Arizona Civil #58253), PhD. - Dr. Yuan currently serves as a Geotechnical Engineer with WSP USA Environment & Infrastructure Inc. He has over 20 years of geotechnical and civil consulting experience. He is specialized in soil mechanics, foundation engineering, and surface mine facility design. Dr. Yuan's project experience includes design of tailings storage facilities, heap leach pads, and other mine waste disposal facilities; infrastructure foundations; seismic design and liquefaction analysis; slope design, remediation, and monitoring instrumentation; construction monitoring and quality assurance/control; and geotechnical numerical modelling. His experience also includes studies from scoping levels to closures and involves projects located in North America, South America, and Asia. Dr. Yuan has authorized and co-authored more than 20 technical papers published in engineering journals and conference proceedings on slope design, lined facility design, soil liquefaction and ground damage, and other geotechnical engineering topics. Dr. Yuan has worked closely with Mr. Richard Weber for about 10 years on many mining projects, including the Copper World Project.

**Todd Minard, PE** - Mr. Minard is a registered civil engineer in California (C57795) and Nevada (13199) with 30 years of experience specializing in leading large multi-disciplined design projects supporting the mining industry, primarily with tailings storage facilities (TSF), heap leach facilities (HLF), ponds and haul roads. He manages all aspects of project development, from siting, preliminary economic assessments, pre-feasibility,

feasibility, detailed design, permitting, construction, operations, and reclamation. Mr. Minard has performed all aspects of civil design, layout, water balances, hydrology, hydraulics, geomembrane liner, and gravity pipeline design. He has global experience designing mine waste facilities and leach pads in Nevada, Arizona, Australia, Africa, Turkey, Serbia, China, Panama, Mexico, Peru, and the Dominican Republic.

**Richard Weber, CEM** – Mr. Weber has more than 33 years of diverse experience focusing on environmental permitting and compliance, closure and reclamation planning, NEPA compliance, baseline surveys, environmental audits, site investigations, remediation, and wildlife mitigation. His focus has been on permitting and closure/reclamation plan development for the mining industry. He has developed reclamation and closure plans throughout the US and internationally. He is currently the closure study manager for three mining projects (US, Mexico and Ghana). In addition, Mr. Weber has been using the SRCE model since the initial model development in Nevada, where he spent 15 years of his career. He has worked with clients and regulatory agencies to obtain a variety of permits for water use, water discharge, underground injection control, stormwater discharge, air emissions, mining and reclamation, dredge and fill of wetlands, road construction, and local special use permits.

 Table 1-2 there is no cost to cap the pond for the primary settling pond as mentioned in the conceptual closure plan "Capping of the pond area with a low permeability cover" (ADEQ clarification email dated October 11, 2023)

Response: As indicated in the Closure Plan, Section 3.1 (Appendix M, 2022 APP application) and as provided in the closure strategy (ARS 49-243.A.8) for a Prescriptive BADCT Process Solution Pond, "Capping of the pond area with a low permeability cover may also be part of the closure strategy if it will achieve further discharge reduction to maintain compliance with AWQS at the POC wells." This closure method is provided as an option if needed.

Because the planned closure strategy for the ponds is to remove residual solutions, remove sludge, remove the liner, test soils, and remediate the soil if necessary and then backfill, there would be minimal or no potential for the pond areas to negatively impact water quality at the POC wells. Thus, the option for capping with a low permeability cover was deemed not necessary.

1.iv. Clarify if the Contingency Costs are included in the line for Indirect Costs in Table 1-2 (see Attachment 1, PDF page 10). The Contingency Cost (\$3,010,892) appears to only account for 4% of the closure and post-closure cost (\$75,272,310). ADEQ has consistently seen 10% to 20% in Contingency Cost in most applications. Please revise the closure costs appropriately. (ADEQ clarification email dated October 11, 2023)

Response: The SRCE model has a built-in contingency factor that is used and approved by the Bureau of Land Management (BLM). The contingency amount is based on the total closure cost. For closure costs greater than \$50 million, the contingency cost is 4%. The percentage for contingency is increased as the cost of reclamation and closure decreases (10% at \$500K, 8% at \$5 million, 6% at \$50 million, and 4% at greater than \$50 million). In addition to the built-in contingency factor within the SRCE model, the BLM as a federal agency requires additional indirect costs such as Engineering, Design and Construction Plan, Insurance, Performance Bond, Contractor Profit, Contract Administration, and Government Indirect costs. These costs have been included in the overall closure cost estimate. The total indirect cost equates to 29% of the closure cost. The total indirect cost would therefore be an overall contingency to the closure and post-closure cost and is approximately \$21,855,000.

1.v. Regarding "Process Ponds - Backfill and Growth Media Costs" presented in the SRCE table, what is the proposed thickness of growth media proposed for each pond to arrive at a Growth Media Volume of 1,111 cubic yards? Explain why there is no Growth Media proposed for the Primary Settling Pond, Pregnant Solution Pond, and the HLF North Stormwater Pond. (ADEQ clarification email dated October 11, 2023)

Response: The 25,628 cubic yards is the backfill volume for the pond. The growth media cover for the ponds includes six inches of alluvium from existing stockpiles. No low permeable cover would be necessary for closure (see Item 1.iii above).

 ADEQ will include the Compliance Schedule Item (CSI) that mandates the submission of the site-specific data during the operation for "HLDE Model Output for HLP" during updating the closure cost every 5 years. (ADEQ clarification email dated October 11, 2023)

Response: Copper World acknowledges that this item will be included as a compliance item. ADEQ does not require further comments on this item.

1.vii. Please provide a table with the original unit cost and the adjustments. (ADEQ clarification email dated October 11, 2023)

Response: The table below provides the specific costs that were adjusted for Arizona.

Cost Item	Southern NV Cost Default	Revised Cost for Arizona
Equipment Mob/Demob	Distance to site from Washoe County Courthouse or rental yard	Distance to site from Tucson, Arizona or rental yard assumed to be 50 miles one way
Off-Road Diesel	\$2.13 per gallon	\$4.43 per gallon
Labor Zone Adjustment	Distance from Las Vegas City Hall0-30 miles\$0.0030-50 miles\$0.00>50 miles\$0.00	Distance from Tucson City HallZone A\$0.00Zone B\$3.50Zone C\$7.50
Labor Indirects	Unemployment 3.00%	Unemployment 3.00%
	Retirement/SS/Medicare 7.65%	Retirement/SS/Medicare 7.65%
	Workman's Comp 12.0%	Workman's Comp 7.60%
	State Payroll Tax 0.0%	State Payroll Tax 0.80%

## Item 2: (Contingency Plan):

2.i. ADEQ will include the Compliance Schedule Item (CSI) that mandates the submission of an update for the OMS, ERP, and CQA. (ADEQ clarification email request dated October 11, 2023)

*Response:* Copper World acknowledges that this item will be included as a compliance item. ADEQ does not require further comments on this item.

## Item 3: (Operation, Maintenance, and Surveillance (OMS) Plan):

3.i. There appear to be area(s) of deep alluvium under the TSF2. Please justify why piping failure will not pose a stability issue for TSFs during the early years of operations. Please justify why there is no instrumentation for the area that has thicker alluvium. (ADEQ clarification email request dated October 11, 2023)

Response: The risk of subsurface erosion and foundation soil piping is considered low due to the following:

- General lack of highly problematic soils, such as dispersive clays, and poorly graded silt or fine sands as shown in the geotechnical investigation summaries (Wood, 2021 and WSP, 2023). Sherard et al (two papers published in 1976) as referenced in Fell R. et all (2005) (Geotechnical Engineering of Dams, Taylor & Francis Group Plc, London, UK, 2005) indicated that based on their tests, soils with less than 10% finer than 0.005mm may not have enough clay to support dispersive piping. The majority of soil samples tested and summarized in Wood (2021) and WSP (2023) contain less than 10% clay particles.
- The relatively flat hydraulic gradients present in the foundations of both TSF-1 and TSF-2 (as shown in the TSF Stability Analysis Memorandum provided in Appendix I.1 of the September 2022 APP application), indicate relatively low seepage forces and a low risk of subsurface piping.
- Installation of the TSF seepage underdrain collection system, including the perimeter seepage collection trenches, further mitigates the risk of foundation piping.
- No excessive erosional gullies and washes have been indicated over cut slopes of the existing road cuts and construction borrow areas within TSF-1 and TSF-2.

Multiple piezometers have been planned to be installed in the foundation of TSF-2 as shown in the Tailings OMS Manual (submitted previously in the September 20, 2023 response to comments), including Piezometers T2-A-1, T2-A-2, T2-C-1, T2-C-2, T2-D-1, T2-D-2, T2-E-1, and T2-E-2. Piezometric levels can also be monitored in the perimeter collection trenches where the pumps are planned to be installed and operated. It is noted that the stability models presented in the TSF Stability Analysis Memorandum have assumed saturated foundation soils which is very conservative. Therefore, the instrumentation planned in the Tailings OMS Manual is considered sufficient.

3.ii. Please provide a plan view drawing that transports the solutions from the TSF to the Primary settling Pond. (ADEQ clarification email request dated October 11, 2023)

*Response: Drawing No. 9600-C-0019 in Attachment 2 of this clarification response letter presents a plan view of the proposed return pipe alignment from TSF-1 and TSF-2 to the Primary Settling Pond.* 

3.iii. Drawings in Attachment 7 are marked "PRELIMINARY". Please provide drawings which do not contain labels such as "Draft", "Preliminary", or "Not for Construction". (ADEQ clarification email request dated October 11, 2023)

Response: Figures provided in Attachment 7 of the September 30, 2023 submittal to ADEQ have been updated replacing "PRELIMINARY Not for Construction" with "ISSUED FOR PERMITTING". Revised drawings 9600-C-008 through 9600-C-0019 are provided (see **Attachment 2** of this clarification response letter).

3.iv. Attachment 7 Page 3 mentioned "The Native Low Hydraulic Conductivity Layer (if not bedrock) was interpreted based on in-situ characterization data collected from the geotechnical investigations which are representative of either dense to very dense or hard native soils with measured N values greater than 30". Please provide the justification for the relationship between SPT and permeability. (ADEQ clarification email request dated October 11, 2023)

Response: For both coarse-grained and fine-grained native soils, hydraulic conductivities are anticipated to decrease with increased density or consistency. Although there is no direct correlation between the SPT N value and permeability, in general higher N values indicate denser or harder soil. According to Burmister (1962; referenced as Figure 7-2 in Kulhawy and Mayne, Manual on Estimating Soil Properties for Foundation Design, *EL*-6800, by Kulhawy, F. H. and P.W. Mayne, Electric Power Research Institute, 1990), hydraulic conductivities (k values) decrease with increased relative densities. Selection of the criterion using an SPT N value is to ensure that the majority of the seepage that occurs flows laterally in the near-surface less dense or less hard zones and is recovered in the perimeter seepage collection trenches.

Additional characterization will be performed in future stages of the Project in order to confirm the target stratum/depth of the low hydraulic conductivity layer in order to achieve the required seepage recovery. Thus, final depths of the perimeter collection trenches will be verified during future stages of the Project and during

construction; if the hydraulic conductivity of foundation soil does not meet the Project requirements, the trenches will be deepened to underlying lower-permeable strata including the bedrock, or alternative mitigation measures will be implemented to achieve the target seepage recovery. Unless suggested otherwise by future characterization and modeling efforts, the perimeter collection trenches should end at a low-permeable native stratum with a saturated hydraulic conductivity (k value) at or lower than  $1.4x10^{-7}$  ft/s as stated in Appendix H.2 "TSF-1 and TSF-2 Seepage Analyses Memorandum" that was presented in the September 2022 APP application.

3.v. Attachment 7 Page 11, Please provide the profile for 125+00 to 183+95 (TSF2). (ADEQ clarification email request dated October 11, 2023)

*Response: A profile from 125+00 to 183+95 is provided, see attached Drawings 9600-C-0015 through 9600-C-0017 in Attachment 2 of this clarification letter.)* 

3.vi. Attachment 7 Page 7-13, Please provide the vertical elevation on the profiles.

Response: Vertical elevations at each pump location are provided on the profile drawings 9600-C-0009 through 9600-C-0011 and 9600-C-0013 through 9600-C-0017 in Attachment 2 of this clarification letter. Elevations of the nearest exploration borehole are also shown (with offset distance to profile alignment). (ADEQ clarification email request dated October 11, 2023)

3.vii. ADEQ will include the Compliance Schedule Item (CSI) that mandates any changes to the triggering levels would require stability update and if required, a permit amendment.

Response: Copper World acknowledges that this item will be included as a compliance item. ADEQ does not require further comments on this item. (ADEQ clarification email request dated October 11, 2023)

# **Engineering Items**

# Item 9: (The WR Facility (WRF)):

9.i. The Leach pad progression provided on the Attachment 8 has some area between north and south of the HLF that is not filled. During the meeting on October 11, 2023, you indicated that this area is where the pipes will be placed. Explain and show cross-sections and/or elevations. (ADEQ clarification email request dated October 11, 2023)

Response: The gap between the north and south waste rock base of the Heap Leach Facility is due to the grading configuration planned for the Heap Leach Pad (HLP) drainage system. (see **Illustration 9-1** below). The base for the leach pad is graded down to native ground with fill placed to the north and south of this central area. Plan and sections views were provided in Appendix I.8 Heap Leach Pad Pipe Settlement Analysis and Appendix I.10 Rosemont Copper World Technical Report Summary on PFS for Tailings Storage Facilities, Heap Leach Facility, and Waste Rock Facility (Dwg 104-2-007) of the September 2022 APP application. (ADEQ clarification email request dated October 11, 2023)



# Illustration 9-1 Heap Leach Pad (Dwg 104-2-007 from September 2022 APP Application, Appendix I.10)

9.ii. Response to Comment 9 indicates "there will be a minimum final 50 feet cover on top of any PAG or AG materials ". Explain what type of material will be used for the 50-foot cover. If appropriate, provide updated closure costs that incorporate the cost of placement of minimum 50 feet of cover. (ADEQ clarification email request dated October 11, 2023)

Response: The 50-foot cover over the PAG material would occur during operations and therefore would be an operational cost. Thus, closure costs for this item are not needed or anticipated. The closure cost provided for the Copper World Project in the September 2022 APP application and subsequent updates assumed closure at the cessation of operations. However, in light of ADEQ's concern regarding interim closure scenarios expressed during the October 11, 2023 virtual meeting, the waste rock sequencing was revisited with the goal of reducing exposed PAG materials on an annual basis. See Attachment 3 of this clarification response letter for an updated

annual waste rock placement sequencing plan. This replaces the sequencing plan presented in Attachment 8 of the September 20, 2023 response to ADEQ's comments.

As shown on the updated waste rock sequencing plan, limited exposure of PAG materials only occurs in Year 1 and Year 2. Based on an estimated cost of \$10/cu yd, the additional cost of rehandling and placing 50 feet of NAG material over these exposed areas would be under \$3 million. Since full development of the Project would not have occurred at that time, this cost would be offset by other closure costs based on reduced footprints, etc. Therefore, no adjustment to the closure cost is required. Additionally, closure cost updates are planned every five years during operations.

9.iii. ADEQ will include the Compliance Schedule Item (CSI) that provides the test results for the rock type, predicts PAG and NAG, and compares them to the model. If model adjustments are required, the frequency of sampling and waste rock placement will be changed. (ADEQ clarification email request dated October 11, 2023)

Response: Copper World acknowledges that this item will be included as a compliance item. ADEQ does not require further comments on this item.

### Item 10: (Based on the Preliminary Geologic Hazards Assessment report):

10.i. Please provide a detailed drawing accompanied by the design for typical closure of the adits and mine shafts. (ADEQ clarification email request dated October 11, 2023)

Response: **Figure 10-1** presents a typical adit and shaft mitigation detail (see **Attachment 4** of this clarification response letter).

### Item 16: (Please provide the following regarding the tailings stacking height):

16.i. ADEQ will include the Compliance Schedule Item (CSI) that mandates the submission of annual site investigation and instrumentation of the TSF. (ADEQ clarification email request dated October 11, 2023)

*Response:* Copper World acknowledges that this item will be included as a compliance item. ADEQ does not require further comments on this item.

## Item 17: (Please provide the following regarding the site wide water balance):

17.i. During the October 11, 2023 virtual meeting, ADEQ requested that in the tables titled "Water Balance Results Summary" for Average, Wet and Dry years (Attachments 1, 2 and 3 respectively) of the water balance technical memorandum provided as Attachment 19 in the September 20, 2023 response to ADEQ's comments, that the description of Flow ID 2 and 6 should be revised to match the site wide flow diagrams.

Response: Updated Water Balance Summary tables for Average, Wet and Dry Climate Conditions are provided in Attachment 5 of this clarification response letter. The attached tables will replace the tables presented in Attachments 1, 2, and 3 in the Technical Memorandum "Water Balance (ADEQ Comment Items 17 and 20)" dated September 18, 2023.

17.ii. During the October 11, 2023 virtual meeting, ADEQ also requested that the values for precipitation and evaporation (depicted by "P" and "E") be provided as identified in Attachment 4 Site Wide Flow Diagram (see technical memorandum provided as Attachment 19 in the September 20, 20203 submittal).

*Response: Additional Water Balance Summary tables are provided in Attachment 5 of this clarification response letter that presents inflow from precipitation and losses from evaporation that correspond to "P" and "E" in the site wide flow diagrams.* 

## General Hydrogeology Items

### Item 60: (Please demonstrate that the locations of the proposed POCs):

60.i. Please provide a plan view map that presents the distances from the property boundary to the POC wells (1, 2, 3, and 4), the proposed companion monitor wells, and the toe of TSF-1. (ADEQ clarification email request dated October 11, 2023)

Response: Companion monitoring wells, also termed sentinel or facility monitoring wells (FMW), will be installed in conjunction with each point of compliance (POC) monitoring well. The locations of these companion wells will be dependent on final facility footprints. POC wells will be located as close to the land boundary limit as practicable (approximately 10 to 15 feet) whereas the companion wells will be installed as close as possible to the edge of the nearest regulated facility.

The timing of the companion well installations would be part of a compliance schedule item (CSI). At a minimum of 30 days prior to installation, a plan shall be submitted to ADEQ for review and comment that highlights the following for each well: construction diagram, proposed location (latitude and longitude), and installation schedule. Submittals can be for each individual companion well or groups of wells. This submittal will be sealed by an Arizona-registered Professional Geologist or other qualified registrant. Companion wells will be installed prior to operation of the respective facilities.

With regard to POC wells associated with TSF-1, the April 21, 2023 response to comments noted that the generalized distances between the TSF-1 POC wells and the companion facility monitoring wells ranged from about 80 feet to 115 feet (see Table 60-1 and Figure 60-1 in Copper World's April 21, 2023 response letter to ADEQ showing the estimated distances). Based on these distances, the minimum lead time that each facility monitoring well could have prior to detecting potential groundwater impacts at a respective TSF-1 POC well was about 1.1 years.

As noted, the anticipated distance from POC-2 to its respective companion well is over 100 feet. The distance indicates that there will be a sufficient corridor between the features to allow access for construction and monitoring of the respective wells, in addition to the installation of pump back well arrays if required (see Item 49 of Copper World's September 29, 2023 response letter to ADEQ).

60.ii. ADEQ will include the Compliance Schedule Item (CSI) that indicates that there will be specific criteria that triggers the installation of the companion monitor wells for POC wells 1, 2, 3, and 4. These criteria will be specified in Section 2.5.3.6. (ADEQ clarification email request dated October 11, 2023)

Response: Once installed, the companion wells will be monitored at the same schedule and for the same constituents as the POC wells. These companion wells will provide advanced notification of groundwater quality changes that could affect compliance with AWQS at the corresponding POC well. As needed, detailed mitigation plans will be developed on a case-by-case basis based on monitoring and characterization data. These mitigation plans shall be provided to ADEQ for review and approval.

Please do not hesitate to contact me at (520) 495-3527 (office), (520) 260-3490 (cell), or via e-mail at <u>david.krizek@hudbayminerals.com</u> if you have any questions regarding these clarifications.

Sincerely,

David Krizek

David Krizek, P.E. Senior Manager, Environmental Manager, Environmental & Permitting

Attachments:	Attachment 1: Resumes associated with the closure costs estimate
	Attachment 2: Revised drawings 9600-C-008 through 9600-C-0019
	Attachment 3: Updated annual waste rock sequencing plan
	Attachment 4: Updated UG mine working closure methods
	Attachment 5: Updated water balance summary tables

Doc. No. 055/23-15.5.1.8