Stillwater Mining Company – East Boulder Mine
MPDES Permit Number MT0026808
Response to Public Comment

On May 8, 2023, the Department of Environmental Quality (DEQ) issued Public Notice MT-23-02. The Public Notice provided the tentative determination to issue a wastewater discharge permit renewal to Stillwater Mining Company for their East Boulder Mine under the Montana Pollutant Discharge Elimination System (MPDES) permit MT0026808. The notice included the draft permit, Fact Sheet, and Environmental Assessment (EA). The notice required that all written comments be received or postmarked by June 8, 2023.

DEQ received written comments from three parties:

A. U.S. EPA Region 8 – Montana Office, received June 7, 2023.

B. Stillwater Mining Company dba Sibanye Stillwater, received June 8, 2023.

C. Good Neighbors - Northern Plains Resource Council and Cottonwood Resource Council, received June 8, 2023.

DEQ has considered these comments in preparation of the final permit. A summary of the comments and DEQ's responses are as follows. **This Response to Comments supplements the administrative record and supersedes the Fact Sheet to the extent specific changes to the permit or clarifications are discussed herein**. Copies of the comments listed above are available upon request from DEQ.

Comments and Responses:

A. U.S. EPA Region 8

Comment #A-1. 40 CFR § 122.47(a)(1) requires compliance schedules to lead to compliance "as soon as possible." Interim effluent limits for total nitrogen (TN) must begin at the 'cap at current' value of 14.0 lbs/day, rather than at the historical permitted value of 32 lbs/day. Revise the compliance to start with the 14.0 lbs/day TN effective immediately, followed by further reductions in the future.

Response #A-1: DEQ considered EPA's comment that the immediate TN permit limit should be at the 'cap at current' value that was proposed beginning Year 2, rather than maintain the existing limit of 32 lb/day TN [40 CFR 122.47(a)(1) and ARM 17.30.1350(1)(a)]. DEQ considered the following main points:

- The mine has recently improved their wastewater treatment plant (WWTP). The most recent upgrade to the WWTP was completed in March 2021. The facility continues to optimize the upgraded WWTP to remove nitrogen; however, there is still considerable variability in the WWTP monthly average TN concentrations and the resulting loads; requiring immediate improvement is unreasonable under the circumstances.
- Effluent data for this renewal was based on a limited period of record ('POR,' April 2021-December 2022, or 21 months) compared to the preferred three to 4.5 years of data. Notably, the month following the POR (January 2023) the effluent concentration was the highest since the upgrade: 5.7 mg/L resulting in a 13.1 lb/day load.

- Like domestic sewage treatment plants, the removal efficiency of the WWTP has seasonal fluctuations, mainly dependent upon temperature.
- Unlike domestic sewage treatment plants, the amount of water inflow into the WWTP cannot be accurately predicted or controlled.

For the reasons stated above, the proposed timeline for compliance is appropriate. No change will be made in response to this comment. Also see the response to Comment #B-4 and #C-1.

Comment #A-2. The following standard conditions and definitions in the draft permit should be reviewed for clarity.

a. Duty to Comply (section III.A [page 21] of the draft permit):

i. This last sentence is not part of the "Duty to Comply" requirement in 40 CFR § 122.41(a) or ARM 17.30.1342(1). It is a repeat of the language in the "Anticipated Noncompliance" section (see section IV.B [page 25] of the draft permit. Therefore, the entire last sentence of the "Duty to Comply" section could be removed.

ii. The same sentence suggests the permittee may contact the Regional Administrator, *rather than* the Department, when notifying the regulatory authority of planned changes. Since the NPDES program has been delegated to the state of Montana and EPA would not be directly involved in any planned changes at the facility, EPA recommends removing "or the Regional Administrator" from this sentence, if the entire sentence is not removed per comment (i) above. EPA also notes that this is the only usage of the term "Regional Administrator" in the permit; if this was removed, the definition of Regional Administrator (section V.22) is no longer needed.

b. Twenty-four Hour Notice of Noncompliance Reporting (section II.I.1.a [page 19] of the draft permit): The regulations at 40 CFR § 122.41(l)(6)(i) and ARM 17.30.1342(12)(f)(i) require reporting of "any noncompliance which may endanger health or the environment." The draft permit adds the qualifier "any noncompliance which may ***seriously*** endanger health or the environment." The word "seriously" should be removed from this standard condition, as it is not used in state or federal regulations and may lead to ambiguity about what constitutes required noncompliance reporting.

c. Definition of "Director" (section V.13 [page 31] of the draft permit): EPA does not have a Water Management Division. The NPDES regulatory authority in Region 8 resides within the Water Division. EPA recommends this definition be revised to "Director means the Director of the United States Environmental Protection Agency's *regional* Water Division."

Response #A-2: DEQ agrees and has corrected the final permit's standard conditions as suggested.

Comment #A-3. Effluent limitations for TN and total phosphorus (TP) may be expressed in units of concentration. The NPDES regulations at 40 CFR § 122.45(f) require that effluent limitations be expressed in terms of mass unless one of three exceptions is met. One of the three exceptions is where applicable standards or limitations are expressed in other units of measurement. In this case, the applicable water quality criteria for both TN and TP are expressed

in concentration units; therefore, EPA recommends that effluent limits for nutrients be expressed in units of concentration (e.g., mg/L) in addition to units of mass (e.g., lbs/day).

Response #A-3: DEQ understands that mass-based limits are not specifically required in this circumstance. Nonetheless, there are several reasons to maintain a mass-based limit for nutrient discharges from the East Boulder Mine.

First, nutrients do not cause an immediate impact on the receiving waterbody. The growth of algae and the resulting negative impact on waterbodies takes time and tends to occur downstream of the site of discharge. Because nutrients do not directly cause an acute or chronic impact, limiting the load of nutrients is more appropriate.

Second, as the facility is currently designed (with all discharge first infiltrating the soil and traveling with ground water), there is a long lead time and dispersed nature for the pollutants reaching the surface water. This allows time for mixing and dampens any temporal changes in concentration. Likewise, the future direct discharge through Outfall 001 is predicated on having a properly designed and operated diffuser which will allow discharge to have near instantaneous mixing with the river.

Lastly, nutrients were permitted as loads in the 2015-issued permit; to change to concentration at this point would be a significant deviation and would require an additional public notice.

Therefore, the concentrations of TN or TP in the discharge are best regulated as mass-based load limits for this facility. No change will be made in response to this comment.

Comment #A-4. Fact Sheet: Section 4.2 (Anti-Backsliding) – The anti-backsliding analysis should further explain how the proposed limits satisfy the requirements in 40 CFR § 122.44(l)(1). With some exceptions, when a permit is renewed or reissued, the effluent limitations must be at least as stringent as the final effluent limitations in the previous permit. EPA notes the final effluent limitations for iron and chromium in the 2020 permit have been removed. The facility was upgraded in 2021 and this may be the reasoning behind the removal of effluent limits; however, EPA recommends MDEQ provide further discussion in this section on how the anti-backsliding requirements were met in this case. If the removal of the limits cannot be justified under 40 CFR § 122.44(l)(1), these limits must be added to the permit.

Response #A-4:

The upgraded wastewater treatment and addition of the surface water mixing zone satisfies 40 CFR 122.44(l)(1) and allows for removal of the iron and chromium limits, because the circumstances on which the previous permit was based have materially and substantially changed since time the permit was issued and would meet the causes for modification under 40 CFR 122.62(a)(1) and (2). This justifies the application of less stringent effluent limits.

(1) Alterations. In 2021, SMC upgraded the WWTP by installing a thickener before the clarifier and adding a 10-micron filter system. Due to this plant upgrade, the discharge concentrations of both iron and chromium have been significantly reduced and are approximately 1/3 of the previous discharge concentrations. As a result, there is no RP to

exceed chromium nonsignificance levels for either outfall or RP for iron to exceed the nonsignificance level for Outfall 001.

(2) Information. With the new ambient receiving water information provided by SMC (allowing better characterization of the receiving waters), DEQ also granted a new surface water mixing zone for Outfall 002. The new mixing zone, combined with the improved removal efficiency, resulted in no RP for iron at Outfall 002.

Based on the above, DEQ finds the removal of the effluent limits for chromium and iron will not result in a violation of a water quality standard or any related nondegradation requirement.

DEQ finds the removal of the chromium and iron effluent limits meets the modification requirements under 40 CFR 122.62(a)(1) and (2) for the reasons described above and satisfies the anti-backsliding requirements in 40 CFR 122.44(l)(1). In addition, DEQ finds the removal of the limits is consistent with 33 U.S.C. § 1342(o)(2)(A). The facility-wide iron load limit based on the TMDL will remain in the permit.

No change will be made in response to this comment.

Comment #A-5. Fact Sheet: Appendix 4 – Nutrients need further clarification to help follow the rationale behind the development of nutrient permit conditions.

a. Table 4.A (page 73; Appendix 4) of the fact sheet states that the mixing zone starts at EBR-004A and ends at EBR-005. According to Figure 6, the distance between these two sampling locations is two to three miles. However, in section 3.7.1 (Mixing Zone Determination), the fact sheet states that the regulatory mixing zone for Outfall 001 will extend no more than 100 feet downstream. Please clarify this discrepancy.
b. Table 4.C (page 75) of the fact sheet has two values separated by a 'slash' in the final column ("2023 Cr (after mixing)"). It is unclear how both of these values could represent the critical downstream concentration. Please clarify these values.

Response #A-5:

The clarifications desired here reflect concerns regarding the Fact Sheet. DEQ agrees clarification is needed as follows:

a. **Table 4.A**. "Outfall 002" was inadvertently omitted from the monitoring sites descriptions. The East Boulder River Monitoring sites should have read:
    - EBR-004A (start of Outfall 002 mixing zone)
    - EBR-005 (end of Outfall 002 mixing zone)
b. **Table 4.C**. The 2023 calculated concentrations after mixing should have been further defined with ("Outfall 001" / "Outfall 002 current").

B. Stillwater Mining Company (SMC):

Comment #B-1. *Key Comment I.* The method used to develop permit limits for the "Future Scenario" is a deviation from previous permits and does not consider the possibility that the discharge could be distributed to the outfalls at different rates other than the maximum design or maximum average monthly rates. The current draft permit as written is complicated and provides little to no flexibility in mine water management.

An approach similar to how total nitrogen limits are applied to the 2015 permit and facility-wide limits are applied in the 2023 draft permit would provide more flexibility in water management for the site, protect beneficial uses, and maintain the high quality of the receiving waters when one or all outfalls are in use. SMC requests the Department make the following changes with regards to Current and Future Scenarios:

a. Remove all "Future Scenario" effluent limits (Table 5 of draft permit and Table 20 of Fact Sheet and remove all references and accompanying text referencing "Future Scenario").
b. Add SUM of all outfall limits (not included in Tables 17 and 18) that are equal to the current load limits for Outfall 001 in the event that Outfalls 001 and 002 are operational at the same time.
c. Add language to the Fact Sheet that describes that all load limits in the permit are based on established TMDLs and/or concentration limits based on nondegradation criteria or water quality standards as applicable.

Response #B-1:

The draft permit and Fact Sheet address the water quality impacts that could occur in the future; if SMC installs and operates a direct discharge to the East Boulder River at Outfall 001, then Outfall 002/003 would require more stringent limits. This is because a direct discharge upstream of the contribution from Outfall 002/003 (which enters the East Boulder River through groundwater), would use up much or all the assimilative capacity in the river and would not allow much or any dilution allowance for Outfall 002/003.

Adequately addressing the potential water quality impacts when both outfalls are operational involves a complex scenario. If DEQ were to consider permitting in the way SMC has requested for the future scenario (Outfall 001 concentration-based as well as facility-wide load limits), then additional review would need to occur, and if found acceptable, additional public input would be required. This would need to be accomplished through a permit modification.

The "future scenario" limits would not be effective until Outfall 001 is constructed after DEQ reviews and approves the use of a properly designed port diffuser. Until Outfall 001 is installed, and its use is authorized, the "future scenario" limits would not be effective. Notably, anti-backsliding requirements do not apply to revisions of effluent limits made before the scheduled date of compliance (which, in this case, would coincide with the installation of Outfall 001 and DEQ's authorization to use the same). No change is made in response to this comment.

Comment #B-2. *Key Comment II*. Section 4 of the 2023 fact sheet uses anti-backsliding as a basis for the effluent limits for total recoverable copper and total nitrogen (Table 17), and total phosphorous (Table 19). This basis is not valid for the following reasons.

a. Although the current (2015) permit has a total recoverable copper load limit for the sum of Outfalls 001 and 002, it does not have a facility wide load limit for total recoverable copper as drafted in the 2023 draft permit and fact sheet and therefore anti-backsliding should not apply to this new limit.

b. The total nitrogen limit set in the 2015 permit was based on a variance and the interim limit in the 2023 permit should be based on the continuation of that limit. In addition, Table 17 and Appendix 2, page 2-3, last main bullet, 3rd sub-bullet should remove the anti-backsliding discussion pertaining to the 2015 permit.

c. The effluent limit for total phosphorous in the 2015 permit is set at 12 lb/day compared to the decreased limit of 0.6 lb/day for the final effluent limit in the 2023 permit. This is a significant decrease in load limit and therefore anti-backsliding should not be a basis for the limit as listed in Table 19 of the Fact Sheet.

Anti-backsliding provisions apply to TBEL limitations (33 U.S.C. § 1342(o)(1)), however, the limits set for total nitrogen, total phosphorous, and total recoverable copper are based on water quality standards and nondegradation criteria and therefore are not subject to anti-backsliding provisions.

SMC provided the additional characterization of the effluent and receiving waters (ground water and surface water) to DEQ on May 13, 2019. Based on language contained in the 2015 Fact Sheet, it is SMC's opinion that these effluent limits should be modified without consideration of anti-backsliding for the following reasons:

- new information on effluent and receiving water characteristics are now available that were not available at the time of the 2015 permit issuance (Section 402(o)(2)(B)(i) of the CWA), and
- SMC has installed the required upgrades to the water treatment plant and the effluent limit for the copper concentration has not been met by the upgraded treatment facility (Section 402(o)(2)(E)).

Based on anti-backsliding exceptions provided in Section 402 of the CWA, any modification to effluent limits requested in the 2019 modification application should be reassessed for reasonable potential (RP). Accordingly, SMC requests that a new reasonable potential analysis be conducted based on the new information submitted to the Department. If reasonable potential exists per a new analysis with the new water quality characteristics, only then should a new effluent limit be developed.

Response #B-2:

See the end of this document for a revised Fact Sheet **Tables 17, 18 and 4.E**.

a. *Copper.* After consideration, DEQ agrees with this comment. The 2015 proposed copper load limit did not include Outfall 003 as it does in the current renewal and, thus, the

"facility-wide" impact changed. Furthermore, the 0.061 lb/day copper limit has not yet become effective; it was scheduled to become effective September 1, 2023.

For these reasons, anti-backsliding does not apply to the facility-wide copper load limit and "anti-backsliding" is not a proper basis for this limit. Similarly, both iron and lead load limits based on the TMDL were never effective; these are new limits.

The Fact Sheet **Tables 17** and **18** have changed in response to this and other comments; DEQ has placed this revised table at the end of this Response to Comments. No change is made to the Final Permit in response to this comment.

b. *Total Nitrogen*. The Outfall 001 & 002 SUM limit of 30 lb/day plus the Outfall 003 limit of 2.0 lb/day was based on the historic load limit from the 1992 FEIS set in the 2000-issued permit. As part of the 2015 renewal, DEQ calculated a variance load of 90 lb/day TN and found that the variance was less stringent than the existing load; therefore, DEQ maintained the more stringent, historic, load of 30 lb/day industrial and 2 lb/day sanitary TN (see 2015 Fact Sheet Table 8 and page 28).

The continuation of the 32 lb/day facility-wide TN limit as an interim limit for two years as proposed in the draft permit was based on anti-backsliding under CWA 402(o) (see 2023 Fact Sheet Section 4.2, page 3 of Appendix 2, and page 2 of Appendix 4). The application of anti-backsliding provisions is not limited to TBEL limitations.

No change has been made as a result of this comment.

c. *Total Phosphorus*. The 2023 Fact Sheet **Table 19** correctly indicates that the 0.6 lb/day TP load limit for Outfall 001 is based on anti-backsliding. SMC was limited to 0.1 mg/L (equivalent to 0.6 lb/day) based on nondegradation in the 2000-issued permit. Subsequently, the 2015-issed permit renewal included the Outfall 001 TP load limit of 12.0 lb/day based on the nutrient variance (Circular DEQ-12B). As part of the 2015 renewal, DEQ failed to consider the 2000-permit TP limit and the anti-backsliding requirements.

Due to regulatory changes since the 2015-permit renewal, a general nutrient variance is no longer available. In response to this comment, DEQ evaluated the interim TP limit for Outfall 001 considering anti-backsliding requirements under CWA 402(o) and concluded:

- The proposed TP limit for Outfall 001 is based on the 2000-permit TP limit of 0.6 lb/day and anti-backsliding. Although the mine cannot achieve this limit (their maximum was 4.0 lb/day with their current treatment (see **Table 4.B** in the 2023 Fact Sheet)), there are additional technologies designed to remove TP from wastewater. Since Outfall 001 has not been designed or constructed, it is reasonable to provide this stringent limit as an interim limit.

DEQ has determined that the Outfall 001 interim TP limit is reasonably set at 0.6 lb/day monthly average, during the months of July, August, and September, based on anti-backsliding. No change has been made as a result of this comment.

Comment #B-3. *Key Comment III*. The copper limits for Outfall 001 and 002 in the Draft Permit and associated Fact Sheet are not in accordance with MCA 75-5-703(6), which states (emphasis added):

(6) After development of a TMDL and upon approval of the TMDL, the department shall: …

(b) incorporate the waste load allocation developed for point sources during the TMDL process into appropriate water discharge permits; and

The fact sheet did not include a reasonable potential analysis for copper. However, based on our reasonable potential analysis using the effluent concentrations provided in the May 25, 2022 Addendum, it is SMC's conclusion that the change in copper water quality associated with this discharge are below the trigger value and therefore per ARM 17.30.715(2)(c), the discharge is nonsignificant and per 17.30.715(2) are not required to undergo nondegradation policy (MCA 75-5-303) review. Therefore, the Department should apply the TMDL WLA as the permit limit for copper.

SMC requests that the Department revise the Draft Permit and associated Fact Sheet to incorporate the WLA in the TMDL to this permit as required by MCA 75-5-703(6).

Response #B-3:

In developing the Fact Sheet, DEQ chose not to conduct a copper RP analysis because this parameter is regulated as a TBEL. In EPA's NPDES Permit Writer's Manual Section 6.2.1.1, two options are given for parameters with TBELs: (1) proceed to calculate the WQBEL, or (2) assume the maximum daily TBEL is the maximum discharge concentration in the RP analysis. DEQ used the first option. In responding to these comments, DEQ conducted an RP analysis for all of the metals with TBELs using the second option. This option still provided RP for copper (see updated RP calculations in Attachments #5.B, 5.C, and 5.D).

If there is RP to exceed a standard, DEQ develops WQBELs to compare against the TBELs and incorporates the most stringent as a permit limit. However, in this case, there is also the Boulder River Watershed TMDL, September 11, 2009 (2009 TMDL) Wasteload Allocation (WLA) for copper of 0.061 lb/day that was included in the 2015-permit as a final limit.

As part of the permit development, DEQ incorporated the 2009 TMDL copper load limit into the Mine's permit as an interim limit and calculated a more stringent copper load limit as a final limit. However, based on review of this comment, DEQ determined it is appropriate to maintain the 0.061 lb/day copper limit for the life of the permit consistent with MCA 75-5-703(6) and the federal regulations at 40 CFR 122.44(d)(1)(vii)(B), which have been adopted and incorporated into state law at ARM 17.30.1344. The final copper limit developed as part of the draft permit will be removed.

DEQ also reviewed lead and iron limits. The updated WQBEL calculations for lead and iron provided less stringent limits than the 2009 TMDL and therefore the 2009 TMDL WLA load limits will be maintained.

Comment #B-4. *Key Comment #4. Nutrient Standards*. It is not known at this time whether the final limit effective ten years after the permit's effective date is achievable.

SMC has already completed significant treatment optimization and further optimization results are not easily predicted. **SMC requests that the proposed 2-year and 4-year compliance limits be removed from the permit and rather add a requirement that they are defined and scheduled within the compliance plan**. DEQ will have to approve the compliance plan and any associated permit modifications (i.e. different or additional treatment works) in support of these progressively lower limits.

Finally, on page 16 of the Permit and page 46 of the Fact Sheet indicate that the Nutrient Compliance Schedule requires the permittee to evaluate "all feasible alternatives for improving the water quality for the East Boulder River." Requiring water quality improvement beyond SMC's discharge and operations goes beyond the authority of the MPDES permitting program. SMC requests the phrase be deleted from the final Permit and final Fact Sheet.

Response #B-4:

Please also see responses to comments #A-1 and #C-1.

Interim Limits

DEQ understands the constraints on the optimization of the WWTP and minimization of the volume of wastewater discharged. However, there needs to be some increased stringency for nutrient limits, which was the intent of having two- and four-year interim TN limits. Furthermore, the removal of these interim limits would be a major change from the draft permit and would require public input. After consideration, the following changes will be made to the interim limits:

- The methodology for capping the two-year TN load limit at the maximum observed will be maintained, but the total load will increase to 15.1 lb/day, based on the January 2023 load of 13.1 lb/day from Outfall 002 plus the 2.0 lb/day from the domestic sewage (Outfall 003).
- The methodology for capping the four-year TN load limit at the average observed will be maintained, but the total load will increase to 10.8 lb/day, based on updated average loads through April 2023 (8.8 lb/day) from Outfall 002 plus 2.0 lb/day from the domestic sewage (Outfall 003).

Final Limits

DEQ is required to include the final nutrient limits in the permit.

Please note there was an error in the draft permit package final limit tables. The correct final TN effluent limits based on nonsignificance were provided in the Fact Sheet on the 4th page of Appendix 4, "2023 Proposed Nutrient Permit Limits:"

- Current Scenario (Outfalls 002/003): 0.27 lb/day
- Future Scenario (Outfalls 001/002/003): 2.3 lb/day

Please see the revised Fact Sheet **Tables 17, 18,** and **4.E**. at the end of this RTC for the interim and final TN limits. The Final Permit **Tables 2** and **3** have also been changed.

DEQ recognizes that these calculated final TN loads, which are based on nonsignificance values, are extremely stringent. Note that anti-backsliding requirements do not apply to revisions of effluent limits made before the scheduled date of compliance.

For the last part of this comment, DEQ hereby corrects the statement on page 46 of the Fact Sheet: "Stillwater Mining Company will submit a Compliance Plan and schedule that evaluates all feasible alternatives that the Mine can take to ~~for~~ improve~~ing~~ the water quality for the East Boulder River …" The statement has been corrected on page 16 of the Permit.

Comment #B-5. *Key Comment #5. Technology-Based Effluent Limitations*. Section 2 of the Fact Sheet, p. 9.

SMC agrees that TBELs and WQBELs may be applied to groundwater discharges when those discharges are hydrologically connected to a surface water and the discharge is the functional equivalent of a discharge to surface water. However, it is SMC's understanding that formal functional equivalent analyses have not been conducted for discharges from Outfalls 002 and 003 at this time. As such, it is suggested that language be included to the effect, "For this analysis, DEQ takes a conservative approach by presuming a hydrologic connection exists between ground and surface water sufficient to base WQBELs on surface water quality standards."

The discussion concerning CORP Drawing No. 19 in Section 2.2, page 10 and 11, is not pertinent to this permit renewal. SMC has not requested a change to the source water. A small amount of residual mill water has always resided within our tailings backfill underground. This *di minimus* amount of residual mill water has always been included within our mine water quality characterization; therefore, it is and has always been appropriately considered in this permit's effluent limitations. Further, the draindown of mine water from the sand tails mixes with adit water and is sufficiently changed in character such that it does not have characteristics of process waters. Since SMC has not requested process water to be included in the MPDES permit and the backfill of sand tails is permitted under an Operating Permit from DEQ and the USFS, is used underground, and is different from process waters, we request that any discussion of such discharge and ELGs pertaining to process waters be removed from the Draft Fact Sheet and permit, including pages 1 and 10-11 of the Fact Sheet.

Response #B-5:

This Response to Comments supplements the administrative record and supersedes the Fact Sheet to the extent specific permit changes or clarifications are discussed.

TBELs are the minimum treatment requirements that must be included in all MPDES permits (see ARM 17.30.1203).

For WQBELs, the discharge from Outfall 002 has long been treated as the functional equivalent of a direct discharge to the East Boulder River and has been permitted as such in previous MPDES permits. MPDES permits are for discharges to state surface waters and must consider the surface water quality standards (in this case nonsignificance). SMC's permit application states that the synoptic monitoring indicate that ground water mixed with effluent from Outfall 002 discharges to the East Boulder River.

Furthermore, after clarification from SMC that the mine does not return mill wastewater to the treatment system, DEQ agrees to revert to the original Effluent Limitation Guideline (ELG). The CORP Drawing #19 depicted a possible scenario for the Hard Rock Mine Operating Permit that is not in use and the change to 40 CFR 440.113(b) was not requested. Therefore, the ELG is 40 CFR 440.113(a) and the less stringent zinc limits of 0.75 mg/L (750 µg/L) average monthly and 1.5 mg/L (1,500 µg/L) maximum daily are the appropriate TBELs. However, the WQBELs based on nonsignificance are the limiting effluent limits.

No change will be made in the final permit.

Comment #B-6. *Key Comment #6.* Total recoverable metals limits for Outfall 002 are not appropriate as the suspended solids associated with total recoverable metals will be filtered out as the effluent migrates through the bottom of a percolation pond, through a >100 feet unsaturated zone, 6,000 linear feet of travel through glacial and alluvial sands, gravel, and cobbles, and finally through the streambed of the East Boulder River. This multitude of filtration steps between the percolation pond and the East Boulder River assures the metals that may be discharged to the river are of the dissolved fraction. This is a conservative assumption because the dissolved fractions are almost certainly attenuated in the unsaturated zone and within the groundwater aquifer. Therefore, SMC is requesting DEQ apply metal limits in the permit and fact sheet based on dissolved metals as opposed to total recoverable metals in the effluent given the multiple media that will filter out the suspended solids associated with the total recoverable fraction.

Response #B-6:

The regulations for MPDES permits under ARM 17.30.1345(5) require that metals limits in MPDES permits be expressed as total recoverable unless the standard is for the dissolved form (aluminum). No change is made to the permit in response to this comment.

Comment #B-7. *Key Comment #7.* The 2023 Fact Sheet states that there is reasonable potential for the narrative standard for total nitrogen and total phosphorus due to the downstream reaches being impaired for chlorophyll-*a.* However, it is noted that the actual section of East Boulder River receiving the discharge, is not listed as impaired, and therefore indicates that there is not reasonable potential for the chlorophyll-*a* narrative standard to be exceeded. DEQ has not done an evaluation of the cause of the impairment and it is possible that the impairment is due to multiple additional variables including downstream sources of nutrients, water temperature, flow patterns (i.e. low flow from stream diversions), light levels, and grazing on algae and plants by fish and aquatic insects.

SMC requests that the downstream impairment for chlorophyll-*a* be removed as a basis for reasonable potential for total nitrogen and total phosphorus since the factors responsible for the downstream chlorophyll-*a* impairment have not been evaluated.

Response #B-7:

DEQ notes that the nutrient impairment status of the two downstream reaches (immediately past the initial stretch of the East Boulder River where the Mine is located) are based on old

and limited information. The 2009 Boulder River TMDL noted that the entire East Boulder River was listed as threatened in 1996 but delisted in 1997 due to a change in definition. Furthermore, the 2009 TMDL Section 4.4 included a discussion of the chlorophyll-*a* (algal growth) list status, which states in part:

> "Recent data collection and evaluation shows that segments MT43B004_141 and MT43B004_142 may be meeting the applicable narrative water quality standards for nutrients; therefore, DEQ is not proceeding with a TMDL at this time. . . Until such time as these segments are reevaluated following Montana's Assessment Methodology (SOP WQPBWQM-001), they will remain on the 303(d) list as impaired for nutrients. . .."

DEQ agrees that the exact proportion of TN from the mine versus other nutrient sources impacting the downstream water quality is not known. Ultimately, however, these two reaches have remained on the 303(d) list for chlorophyll-*a* since 1997, so DEQ believes it is appropriate to list this reason as one of the bases of identifying TN and TP as pollutants of concern. No change to the Fact Sheet will be made.

Comment #B-8. *Key Comment #8.* The reasonable potential analysis for dissolved aluminum and total recoverable antimony are based on one analytical value. SMC believes these metals are likely below the effluent limit. However, since these constituents were not required to be monitored in the 2015 MPDES permit, we are unable to evaluate the variability in the discharge and demonstrate our ability to meet the effluent limits in the draft permit and associated fact sheet. In addition, the lack of data points inflates the Critical Effluent Concentration in the reasonable potential analysis by a factor of 6.2, which almost certainly overestimates the concentration of both metals. As such, SMC requests that DEQ remove the effluent limits for both dissolved aluminum and total recoverable antimony and require monitoring to better assess the need for and appropriateness of future effluent limits for these constituents.

Response #B-8:

DEQ notes your comment regarding basing the RP evaluations on only one sample for aluminum and antimony. DEQ also notes the facility continues to optimize the WWTP with potential impact on metals concentrations. Effluent and ambient monitoring will be maintained, which will provide better effluent and ambient characterization. The effluent limits for aluminum and antimony will be removed.

Comment #B-9. *Key Comment #9.* Monitoring requirements for effluent and groundwater in the draft permit and associated fact sheet require Total Kjeldahl Nitrogen (TKN) and Total Nitrogen (calculated). However, as shown by the data in the renewal package and associated addendum, TKN is often below detect and the use of it to calculate total nitrogen results in the total nitrogen being biased high when the detection limit is used as the concentration of TKN. SMC requests the monitoring requirements for effluent be revised to remove TKN and replaced with the total nitrogen persulfate method to provide a more accurate characterization of total nitrogen in the effluent.

The draft permit and fact sheet also require monitoring and reporting of total inorganic nitrogen (calculated). The 2023 draft permit does not include effluent limits nor is there a state standard

for total inorganic nitrogen. Therefore, SMC requests that the Department remove all monitoring and reporting requirements for total inorganic nitrogen in the final permit and associated Fact Sheet.

Response #B-9:

Federal rules require effluent to be monitored using test methods established under 40 CFR 136 [40 CFR 122.44(i)(1)]. However, where no EPA-approved methods exist that are sufficiently sensitive, DEQ can select a method consistent with 40 CFR 122.44(i)(1)(iv)(B), which states:

> In the case of pollutants or pollutant parameters for which there are no approved methods under 40 CFR part 136 or methods are not otherwise required under 40 CFR chapter I, subchapter N or O, monitoring shall be conducted according to a test procedure specified in the permit for such pollutants or pollutant parameters.

DEQ recognizes two analytical methods for TN. These methods have different Required Reporting Value (RRV) in Department Circular DEQ-12A:

- TKN plus N+N = 0.245 mg/L (TKN = 0.225 mg/L plus N+N = 0.02 mg/L)
- Persulfate = 0.070 mg/L

The TKN plus N+N method for calculating TN is approved under 40 CFR 136. The persulfate method is not. In response to this comment, DEQ compared the expected concentrations for the three sample types, including SMC's lab Reporting Limit (RL) as well as the number of samples that were nondetect (ND), to recommend the appropriate analytic method for this permit cycle.

Sample Stream (mg/L)	SMC Data RL	Expected TN Range	Data	Appropriate Method
Effluent (002)	0.3	current < 0.3 to 5.3	Four of 39 samples ND for TKN	TKN + N+N
Ambient EBR	0.1 – 0.5	0.07 – 0.12	39 of 44 samples ND for TKN	Persulfate Method
WW-1 Ambient Groundwater	0.1 – 0.3	0.03 – 0.15	All samples ND for TKN	Persulfate Method

DEQ agrees that the persulfate method is appropriate for groundwater and surface water TN monitoring. However, it is not a 40 CFR 136 approved method for monitoring wastewater effluent. MPDES discharge monitoring requires the use of approved methods. If SMC wishes to switch to the persulfate method for effluent monitoring they may submit an Alternate Test Procedure application, subject to review and approval by the EPA.

DEQ has made the appropriate changes to monitoring tables 10, 11, and 12 in the Final Permit.

SMC also requested to remove all Total Inorganic Nitrogen (TIN) monitoring, and DEQ agrees. DEQ has removed TIN as well as TKN, and TN (calculated) monitoring requirements

from groundwater monitoring in the Final Permit Table 11 and downgradient monitoring in Table 12. Nitrate + Nitrite and Total Nitrogen (persulfate method) will remain.

Comment #B-10. *Key Comment #10.* The WQBEL developed in the permit based on non-degradation criteria did not consider the two-step non-significance criteria per ARM 17.30.715(1)(c), which states discharges containing toxics are non-significant when:

- Discharge will not cause changes that equal or exceed the trigger values in Department Circular DEQ-7; or
- Whenever the change exceeds the trigger value, the change is not significant if the resulting concentration, outside of a mixing zone designated by the department, does not exceed 15 percent of the lowest applicable standard.

The WQBEL should be revised to assess change in water quality with respect to either the trigger value or 15% of the lowest applicable standard, whichever is greater, as both conditions must be considered to meet the non-significant criteria in ARM 17.30.715. SMC requests that the Department revise the WQBEL for cadmium and zinc based on the trigger value.

Response #B-10:

In order to see the impact this methodology would have, DEQ compared the current scenario's trigger values to the 15% nonsignificance standard levels for toxics for developing the WQBELs. The only metal that would see an increase in limits from changing this methodology would be cadmium; the limits would increase from 0.5 to 0.9 µg/L. However, this difference is irrelevant to SMC because the East Boulder Mine's effluent was consistently non-detect at the RRV of 0.03 µg/L (35 samples).

No change will be made to this comment.

Comment #B-11. SMC understands that the Department's past policy is to not change the Fact Sheet and rely on response to comments for any changes to the Fact Sheet. This policy causes confusion in the record and can lead to misunderstanding by the permittee and the public. As such, SMC requests that if the Department agrees to any of the requested changes, that those changes be made to the Fact Sheet and then reissued to limit future confusion.

Response #B-11:

A fact sheet is prepared for draft permits, not for final permits. The purpose of a fact sheet is to set forth the principal facts and the significant factual, legal, and methodological and policy questions considered in preparing the draft permit. [See ARM 17.30.1371(1)]. DEQ's response to comments supplements the administrative record and supersedes the fact sheet to the extent specific permit changes or clarifications are discussed therein.

DEQ can only revise a fact sheet if it finds that the public comment period has raised substantial new questions concerning the permit, such that a new draft permit or a revised fact sheet is required. Either finding would require the reopening of the public comment period. [ARM 17.30.1376]. In this case, DEQ does not find sufficient grounds to reopen the

public comment period and will not prepare a revised fact sheet. No changes will be made in response to this comment.

Comment #B-12 *Comments on the Environmental Assessment*. The Environmental Assessment (EA) should refer readers to the permit and fact sheet and specifically incorporate the reasonable potential analyses and water quality assessments supporting the mixing zone. The EA should point out that the permitted mixing zones comply with rules governing mixing zones in surface and ground water at ARM 17.30.501-518 and do not threaten or impair existing beneficial uses. Monitoring data has demonstrated assimilative capacity in the East Boulder River and the changes in water quality are nonsignificant at the boundary of the mixing zones. The mixing zone approved for Outfall 001 is nearly instantaneous, based on the operation of a diffuser. Outfall 002 and 003 discharge first to groundwater, then later into surface water in a diffuse manner along 10,420 feet of stream length. The surface and groundwater mixing zones for Outfall 002 (including any contributions from upgradient outfall 003 through groundwater) and for Outfall 003 have been analyzed and determined to be nonsignificant at the boundary of the mixing zone.

Throughout the EA, it refers to "protection of existing water quality" presumably based on the limits derived from non-degradation. Additional language should be added to clarify that the limits are well within the water quality standards that protect all beneficial uses, including aquatic life, wildlife and human health.

DEQ should add an additional paragraph to the Description of Project section explaining the status of Outfall 001, that it has not been constructed and is not currently discharging. Authorization of discharge through Outfall 001 is predicated on the installation of a properly designed and constructed diffuser. No direct discharge to surface water is allowed until a proposed diffuser is reviewed and approved by DEQ and is fully operational. Once the diffuser is approved and operational, the permit will allow a discharge of up to 500 gpm through the diffuser to East Boulder River. The discharge will be fully permitted under MPDES permit MT0026808 and subject to all necessary effluent limitations, WET testing, and monitoring requirements to meet nonsignificance levels.

Page 1 of the EA, in the third paragraph of "Description of Project", it should be noted that Outfall 002 discharges to an infiltration pond and groundwater and eventually to surface water.

Page 2 of the EA, first paragraph should note that SMC is not proposing any point source wastewater changes in Major Amendment 004.

Page 2 of the EA, the "No Action Alternative" should be expanded. In reality, if the permit is not reissued, the mine would cease discharge to the East Boulder River watershed and likely send treated water to the Underground Injection Control (UIC) well located at Boe Ranch. The East Boulder River is listed as being impaired for flow and studies by Boulder River Watershed Association and Montana Department of Natural Resources and Conservation have concluded that the East Boulder River is often dewatered later in the summer and flows are not usually sufficient to meet all irrigation demands. Cessation of discharge of treated mine water to the East Boulder River watershed would cause further flow impairment on the East Boulder River.

Page 3, the discussion of water quality should point out that total nitrogen and total phosphorus from the MPDES discharge are not confirmed causes of the downstream chlorophyll-a impairment and other causes, including downstream sources of nutrients, light, low flow, and temperature also exist. It should also note that there is no impairment in the reach of river the discharge is associated.

Item 16 should note that the Good Neighbor Agreement is a private agreement between a company and non-governmental organizations and is non-regulatory and not enforceable by DEQ.

For Item 10 on page 4, please include a brief discussion of the value of returning water to the hydrologic system, specially by groundwater infiltration and the additional volume of water to surface water, ensuring critical water flows during the summer months. The Department may consider some of the language discussed in the comment on the No Action alternative for this discussion.

Response #B-12:

DEQ reviewed this comment and included many of the suggestions in the Final EA. Several of the requested inserts were already in the draft EA.

Comment #B-13 *Draft Permit*.

1. Footnote 1 in Tables 22 and 23 of the Draft Permit states:

   "In cases where the required reporting value (RRV) in DEQ-7 is greater than the effluent limit, analytical results less than or equal to the RRV will be considered to be in compliance with the limit."

   SMC agrees that this is appropriate language for constituents that have effluent limits that are lower than the RRV. However, it seems more appropriate for this footnote to be included in the tables that summarize the effluent limits, similar to what was done in the 2015 permit. SMC requests that the footnote be added to tables in the final permit that summarize effluent limits where one or more of them are below the RRV listed in DEQ-7.

2. Page 3, the groundwater Mixing Zone description for Outfall 002 refers to total recoverable antimony, but the final effluent limit for antimony for Outfall 002 is in terms of the dissolved fraction of antimony.

Response #B-13:

DEQ agrees to make the changes requested in the Final Permit.

1. This footnote was added to Tables 1, 4, and 5 of the Final Permit. It remained in Tables 6 and 7 of the Final Permit, as well.
2. Based on response to comment #B-8, the antimony and aluminum limits were removed and therefore these parameters were removed from the mixing zones descriptions.

Comment #B-14. *Fact Sheet*.

1. Section 1.1, the first sentence should be revised to clarify that the Jackpine Adit is not currently in use and instead, two twin tunnels are in use. SMC suggests the following revision: "The Facility was originally granted an MPDES permit in 1988 ~~for the Jackpine Adit~~. Operations commenced in 1999, and the Facility, which includes two access tunnels, first discharged in 2000."
2. Section 1.4, SMC suggests the last sentence on this page be replaced with the following text or similar: "At this time, the proposed changes in Amendment 004 do not include any changes to the water management plan that would require changes to the MPDES permit."
3. Section 2. Third Paragraph, last sentence - Groundwater that is hydrologically connected to state surface water is one basis, but the other basis is if the discharge is functionally equivalent to a direct discharge with respect to each TBEL. Suggest adding the underlined text, or something similar, to the referenced section: "…TBELs to outfall that discharge to ground waters hydrologically connected to state surface water and functionally equivalent to a direct discharge under the MPDES permitting program."
4. Page 17, paragraph above Table 8 - The values provided in the first paragraph appear to be groundwater travel times, not flow rates. Please verify and modify as appropriate.
5. Page 17, 2nd to last paragraph. 2nd sentence - Although this information appropriately describes the referenced report, more recent water level data shows that groundwater is below the East Boulder River downstream of EBR-003 and that groundwater does not discharge to the East Boulder River until just upstream of EBR-004A. SMC has attached an updated potentiometric map that shows how the groundwater is below the river in the referenced area and where it discharges to the river. Please revise the Fact Sheet to reflect that groundwater starts to discharge to the East Boulder River in the vicinity of EBR-004 and further downgradient.
6. Page 17, last paragraph, 1st sentence - This sentence is not correct as shown on Figure 6 of the 2023 fact sheet and is in conflict with the remainder of the paragraph. Suggest removing the sentence or revising it to state that only a minor portion of groundwater beneath the facility discharges to the East Boulder River at EBR-004.
7. Page 23, Outfall 003 discussion, 1st paragraph, 1st sentence - The standard mixing zone should be revised to 500-foot long, … not 500-foot wide.

Response #B-14:

As stated previously, DEQ cannot revise the Fact Sheet without issuing another public notice and the grounds for such a finding do not exist. Through this response to comments, DEQ agrees to supplement the administrative record with the following information:

1. The Facility was originally granted an MPDES permit in 1988 for the Jackpine Adit, originally proposed as an exploration adit. SMC did not construct the exploration adit. Instead, SMC constructed twin access tunnels that are part of the East Boulder Mine

today. Operations commenced in 1999, and the Facility, which included the two access tunnels, first discharged in 2000."

2. As to the statement regarding Amendment 004 in Section 1.4 of the Fact Sheet, DEQ agrees the statement should read as follows: "At this time, the proposed changes in Amendment 004 do not include any changes to the water management plan that would require changes to the MPDES permit. SMC is responsible for complying with the Planned Changes requirements in Part IV.A of the Permit and to provide notice to the Water Protection Bureau if applicable. The Water Protection Bureau will become actively involved when the design is final if ~~once~~ Sibanye-Stillwater submits a notification or an MPDES permit modification request."
3. As to the statement regarding the applicability of TBELs in Section 2 of the Fact Sheet, DEQ agrees the statement should read as follows: "It is appropriate to apply TBELs to outfalls that discharge to ground waters hydrologically connected to state surface water and functionally equivalent to a direct discharge under the MPDES permitting program."
4. As to the statement regarding ground water flow on page 16 of the Fact Sheet, DEQ agrees it should have stated: "Site-wide the ground water flow travel time ~~rate~~ ranges from 1 to almost 60 ft/day."
5. As to the discussion of facility groundwater on page 17 of the Fact Sheet, DEQ agrees the Fact Sheet should have stated as follows:

   The facility's ground water table is below the East Boulder River along most of the hard rock operating permit boundary. There is some discharge of ground water into the East Boulder River starting at ~~EBR-003 through~~ EBR-004A, but influx is limited by low permeability. See **Figure 7** (Hydrometrics, April 2019) and the updated potentiometric map provided on July 11, 2023.

   Although t~~T~~he ~~greatest~~ influx of ground water into East Boulder River likely ~~occurs~~ beginsning at the toe of the terminal moraine located near the operating permit boundary between EBR-004 and immediately upstream of EBR-004A, it is only a small gaining reach and a receives only a minor portion of the discharge mixed with groundwater. Then, after a losing reach, site ground water has been shown to discharge into the East Boulder River in the gaining stretches between EBR-BWG to EBR-005. **The majority of the ground water discharging to the East Boulder River occurs in the lower reach between EBR-BTC and EBR-005**. All ground water has reached the East Boulder River by EBR-005.
6. See above. Also see Comment #C-3.
7. The Outfall 003 standard mixing zone on page 22 should have been listed as 500 feet long, not 500 feet wide, in conformance with ARM 17.30.517(1)(d)(vii)(D).

C. Northern Plains Resource Council and Cottonwood Resource Council ("the Councils") and Zuzulock Environmental Services LLC ("ZES") on behalf of the Councils.

Comment #C-1. *Compliance Plan and Schedule for Total Nitrogen*. DEQ has established a schedule for iterative final effluent limits to ensure step-wise progress from the interim nitrogen limit of 32 lb/day down to the final limit of 2.3 lb/day.

While the information in Appendix 4 summarizes current effluent water quality conditions, it is not clear from the information presented how the Average Daily Load Limits proposed in Table 4.E relate to the referenced basis of anti-backsliding, ARM 17.30.637, and Cap at Current. DEQ should revise the Fact Sheet narrative to describe a clear basis for how these iterative effluent limits and schedule were derived. DEQ should also include consideration of current discharge water quality conditions within their description of basis for determination of a compliance schedule and iterative final TN limits in the 2023 renewal, as well as the technical and economic feasibility of achieving those final limits.

Response #C-1:

In the Fact Sheet Table 4E, the following considerations were used to develop the interim limits for TN:

- Immediate limit: 32 lb/day is anti-backsliding, comprised of 30 lb/day treated process wastewater and 2 lb/day domestic sewage. These limits were in place since the 2000-permit (see the 2000 permit Table 2 and Fact Sheet page 5, and the 2015 permit page 5 and Fact Sheet page 29).
- Two years from effective date:
  - The ARM 17.30.637 narrative and cap at current reference for Outfall 002 refers to DEQ's nutrient policy of capping facilities at current performance when the receiving waterbody (or downstream receiving waterbody as in this case) is listed as impaired but there is not a numeric water quality standard associated with the impairment. DEQ considered the fact that the period of record since the WWTP upgrade was less than two years, and that SMC has been working to optimize the WWTP when basing the limit on the maximum of the average monthly TN discharges.
  - The anti-backsliding reference is from the 2 lb/day limit for the domestic sewage discharge at Outfall 003 in the 2000- and 2015-permits.
- Four years from effective date:
  - The rationale for the 4-year interim TN limit is the same, except that DEQ considered that there would be several more years for SMC to optimize or provide further treatment, and therefore based the limit on the average of the average monthly TN discharges.

DEQ has revised the two- and four-year limits as a result of comment #B-4. Also see Responses to Comments #A-1, #B-4, and the revised Table 4.E. at the end of this Response to Comments. No changes have been made in response to this comment.

Comment #C-2. *Cumulative Effects from Nonpoint Sources*. The 2023 draft Fact Sheet (page 5) includes a description of nonpoint discharges from the waste rock storage area and Tailings Storage Facility (regulated under the Operating Permit) that describes mitigations in place to capture nitrogen seepage from waste rock, and estimates the remaining seepage load to groundwater from these facilities at approximately 9.5-12 lb/day of total nitrogen. DEQ should further describe the basis and cumulative effect of the 9.5-12 lb/day nonpoint source loading estimate in this Fact Sheet.

The two sources of nitrogen to groundwater (percolation and nonpoint tailings and waste rock) at the mine facility cannot be separated or distinguished in the aquifer and both report to the East Boulder River.

Response #C-2:

DEQ's Hard Rock section requires the facility-wide groundwater (mixed with pollutant contributions from both point and non-point sources) to meet N+N levels in the groundwater at the end of the Operating Permit boundary.

The Water Protection Bureau does not regulate the nonpoint TN contribution but recognizes it as a contribution of nitrogen to the East Boulder River. DEQ obtained the 9.5 – 12 lb/day nitrogen from embankment and TSF leakage information in the "Application for a Source Specific Groundwater Mixing Zone, Stillwater East Boulder Mine," July 2017:

- Section 2.1 Embankment Seepage: SMC discussed the recent construction of an HDPE embankment cover but stated that conservatively there could be 20% seepage loss, or 2 gallons per minute. "Assuming a 2 gpm seepage loss at an average concentration of 367 mg/L, this would yield a nitrogen load of approximately 9 pounds (lbs) per day." (Section 2.1.2)
- Section 2.2 Tailings Storage Facility TSF: SMC stated that there is always some diffuse seepage through a liner due to pin holes and minor defects in the liner. A maximum seepage rate of 4 gpm was calculated in the TSF design report (KP, 2005) and this value is estimated to decline over time. SMC stated that leakage from the TSF is therefore likely to be diffuse and limited to the incidental design rates associated with minor liner imperfections (0.5 to 4 gpm). Assuming a maximum seepage rate of 4 gpm from the TSF, potential nitrogen loading from this source could range from approximately 0.5 to 3 lbs per day.

No changes have been made in response to this comment.

Comment #C-3. *Groundwater and Surface Water Mixing Zones*. The mixing zone calculation applied does not reflect hydrologic conditions. A mixing zone is a water volume through which contaminant concentrations could exceed standards. SMC requests a mixing zone in the East Boulder River for groundwater discharge because some concentrations in groundwater at the end of the groundwater mixing zone exceed the standards in the river.

1. This mixing zone [is] assumed to be instantaneous where the groundwater discharges into the river, and to be uniformly surfacing along the perimeter of the river. Both of these assumptions do not incorporate site-specific conditions.
2. Sampling location EBR-004 is the upper end of the mixing zone and presumably the point of flow estimate. However, the synoptic analysis referenced in the Fact Sheet shows that the East Boulder River loses flow for a reach below EBR-004 (between sites EBR-004A and EBR-AWG as shown in Figure 6 of the Fact Sheet); during March 2015, almost 50% of flow was lost in that area.
3. The analysis also assumes a uniform inflow of groundwater to the East Boulder River along a reach that is about two miles long, or approximately 0.3 gpm/foot. However, because the reach includes the portion that lost flow as observed during the 2015/16 synoptic study, the actual inflow rate is higher over a shorter distance. Because of the loss in the river, more groundwater requires mixing in less river flow.

   The assumption of uniform inflow also ignores preferential flow. It is possible that most groundwater enters the stream from much smaller areas and therefore possible that mixing is not instantaneous nor uniform as assumed. The evidence for this is the significant increase in nitrogen load between EBR-BTC and EBR-AFG as seen during both low and high flow sampling periods during the 2015/16 synoptic survey.
4. The mixing analysis is estimated for low flow conditions, a time where groundwater gradient may be less steep into surface water. Therefore, the groundwater levels in the alluvium are probably lower than assumed during the groundwater inflow analysis. It is possible that the transport of discharge from the percolation pond is slower due to a lower gradient in the groundwater system caused by lowered groundwater levels. It is therefore probable that effluent discharge to the East Boulder River is much lower than analyzed, a fact that may obviate the concerns addressed above.

   The analysis also considers only the ambient groundwater developed above and within the mixing zone. There is almost two miles of floodplain adjacent to the river along the supposed mixing reach shown to be gaining groundwater. Several streams discharge from the surrounding mountains which could increase the amount of water transported through the alluvium. Flow data collected during the 2015/16 synoptic survey show that up to 3 cubic feet per second (cfs) of additional groundwater or small tributary flow occurs within this reach. This dilution could lower the concentrations below critical values in the river.
5. In April 2020 SMC submitted a request to modify the mixing zone in their application for renewal which does not appear to be addressed in the 2023 renewal. DEQ should address this prior to issuance of the final permit and account for appropriate mixing zones and dilution rates. DEQ has sufficient data, including the 2015/16 synoptic survey and 2017 fate and transport model referenced and described in the Fact Sheet, to apply a more accurate source-specific groundwater and surface water mixing zone in this 2023 renewal. DEQ should utilize the data described in the Fact Sheet, and the reasonable potential presented in the previous paragraphs regarding more accurate descriptions of the hydrology of the reach

between EBR-004 and EBR-005 to recalculate Reasonable Potential and required effluent permit limits with the demonstrated groundwater and surface water mixing zones.

Response #C-3:

1. Within the April 2019 Updated Mixing Zone Evaluation, SMC requested a source-specific surface water mixing zone for Outfall 002 as allowed under ARM 17.30.518(5). The applicant provided information supporting that the source-specific mixing was nearly instantaneous. The definition of nearly instantaneous in ARM 17.30.502 is:

   > (7) "Nearly instantaneous mixing zone" means an area where dilution of a discharge to water by the receiving water occurs at a nearly instantaneous rate, with the result that its boundaries are either at the point of discharge or are within two stream widths downstream of the point of discharge.

   Due to the manner of the WQBEL calculations (based on nonsignificance levels at low ambient flow), the groundwater mixing zone boundaries within the East Boulder River are designed to be within two stream widths downstream of each point of discharge. In other words, for discharge at or below the effluent limits, the assumptions are built to ensure that at any gaining reach within the Outfall 002 groundwater mixing zone, the discharge will not cause any significant changes in water quality outside of twenty feet downstream.

2. The low flow used in the RP and WQBEL assumptions [7Q10 of 5.0 cfs (2,244 gpm) and 14Q5 of 10.5 cfs (4,713 gpm)] was modeled in a regression analysis over 30 years ago. DEQ assumes that these low flow statistics were based on East Boulder River's flow upgradient from where the mine is constructed. For purposes of this renewal, it should remain adequately conservative since the highest rate of groundwater influx is in lower parts of this reach that have higher flows.

3. DEQ's methodology to back-calculate an allowable concentration of pollutants assuming low ambient flow for groundwater and surface water, high ambient concentrations, and high effluent flow rate is designed to mitigate concern at any specific location by protecting all locations. Furthermore, the "limiting standard" for the parameters are all chronic or human health based on nonsignificance – the acute standard is not the driving force behind the limit. Therefore, the beneficial uses of the East Boulder River are maintained at any given location.

4. DEQ acknowledges your statement. The permit was developed based on the best available information at the time.

5. DEQ did consider the mixing zone request presented in the April 2019 "Proposed Permit Modification and Updated Mixing Zone Evaluation for Metals in Outfall 002, Stillwater East Boulder Mine MPDES Permit #MT0026808" (Updated Mixing Zone Evaluation). This document was included as Appendix A of the April 2020 "Stillwater Mining Company Application for Permit Renewal for the East Boulder Mine MPDES Permit No. MT0026808."

The methodology used by DEQ is designed to be protective of the entire mixing zone section as well as downstream. Without additional monitoring and data evaluation, including a method to identify point source versus non-point source contributions, DEQ cannot identify a way to refine the mixing zone evaluation.

No changes will be made to the permit based on this comment.

Comment #C-4. *Removal of Nitrate Nitrogen Concentration Based Effluent Limits*. The Draft Permit establishes final effluent limits for nitrogen in Table 1 and Table 3, and does not retain the final nitrate-nitrogen effluent limits established for Outfall 002 and 003 in the current permit (see 2015 final permit (effective date November 1, 2015) on page 7.)

DEQ should provide the basis for removal of the concentration-based limits in the 2023 permit renewal. The concentrations are still used in the spreadsheet to determine load-based limits. DEQ makes this change to the permit without providing justification in the Fact Sheet.

Response #C-4:

In response to this comment, DEQ reviewed the assumptions made for the Nitrate-Nitrite (N+N) RP analysis and found:

- *Current Scenario*: Outfall 002 does not have RP (see revised Table 5.C). One factor contributing to the change in RP from the 2015 permit is the reduction in the critical effluent N+N concentration from 32 mg/L down to 5.3 mg/L due to improved treatment.
- *Future Scenario*: Outfall 001 does not have RP (see revised Table 5.B). However, DEQ found that Outfall 002 does have RP after correcting the future scenario discharge flow rate to 1.11 cfs (see revised Table 5.D).

Based on the updated RP evaluation, DEQ has developed new N+N effluent limits of 2.2 mg/L average monthly and maximum daily for the Future Scenario for Outfall 002.

As part of responding to this comment, DEQ realized that two other corrections were needed under the Outfall 002 future scenario (Tables 5.D. and 6.F.), as follows:

- Nickel has RP to exceed the nonsignificance standard and new limits of 3.7 µg/L average monthly and 6.4 µg/L maximum daily have been added.
- Lead had an error in the chronic WLA calculation; using the correct WLA resulted in lower limits of 0.11 µg/L average monthly and maximum daily. This has been corrected in the permit.

No other changes are needed.

Comment #C-5. *Process Water as a New Source.* DEQ made an interpretation (Fact Sheet, page 10) of CFR language in this 2023 renewal that process water is a new source now authorized for discharge under the permit. DEQ determined that "…in addition to 40 CFR 440.113(a), the treated wastewater is also categorized under 40 CFR 440.113(b), effluent limits from mills that use the froth flotation process alone, or in conjunction with other processes, for the beneficiation of platinum ores."

This interpretation was not included in the 2015 Permit, and SMC did not request a change in source water in this renewal. The Councils would like to see this interpretation removed from the 2023 Draft Permit and Fact Sheet. In the event that East Boulder Mine plans to change water management, treatment and discharge of process water(s), then SMC should apply for this as a new source water authorized for discharge in the MPDES permit.

Response #C-5:

See Response to Comment #B-5. DEQ has revised this determination and agrees to revert to 40 CFR 440.113(a). No changes to the permit will be made.

Comment #C-6. *Beneficial Use Determination for the East Boulder River*. The draft Fact Sheet (Table 6, page 14) summarizes the beneficial use determinations for the East Boulder River, and Appendix 2 (page 66 of the Fact Sheet) describes that "There are no impairments listed for the East Boulder River segment where the East Boulder Mine is located (MT43B004_143) and this segment is found to be high quality for all parameters."

The Councils would like to see DEQ update the beneficial use assessment determinations for sections of the East Boulder River potentially impacted by East Boulder Mine discharge waters with more recent water quality and aquatic ecology assessments completed in this watershed. DEQ's 2020 Water Quality Standards Attainment Record assessment for East Boulder River section MT43B004_143 is based on data and reports from the mid-1990s to 2006. Stillwater Mining Company has collected water chemistry and physical conditions data (at least quarterly), and completed biological monitoring assessments (at least annually) since 1998.

Response #C-6:

This comment is outside the scope of the permit; however, DEQ notes your comment and has forwarded this request to the Water Quality Planning Bureau. No changes to the permit will be made.

Comment #C-7. *Total Phosphorus Breakthrough Analysis*. The Draft Permit has a calculation showing that phosphorus will not breakthrough and flow into the river for 61 years (page 30 of the Fact Sheet). The phosphorus breakthrough calculation is based on a variety of assumptions, and the Councils would like to see DEQ revisit this analysis and apply a more realistic basis.

The analysis assumes that phosphorus will adsorb to soils particles until adsorption capacity (200 ppm) is reached. Assuming a volume of soil based on the size of the drain field will be available to adsorb phosphorus, Table 4.G suggests that about 201,000 lbs of phosphorus will adsorb over 61 years. This is sufficient to assume that no phosphorus will transport through groundwater to the river. This calculation ignores the probability that preferential flow will manifest and allow large amounts of groundwater to reach the river after contacting only a small amount of aquifer soil. In other words, the uniform mixing of phosphorus-laden groundwater into the aquifer is unlikely to occur.

While phosphorus adsorption will occur, the time estimated for breakthrough is much too long. The East Boulder water quality database shows intermittent phosphorus values at all surface water stations, so there is some phosphorus reaching the river from some source (does not have

to be the mine). This might suggest that some portion of phosphorus is not currently adsorbed in soils and the site-specific adsorption capacity of the aquifer soils should be included in the analysis.

Response #C-7:

The MPDES section requested review this comment from Montana Ground Water Pollution Control System staff. The hydrogeologist explored the derivation of the assumptions in the TP breakthrough analysis and concluded that the TP breakthrough analysis is appropriate.

Phosphorus is readily sorbed in soils during subsurface transport. Elevated phosphorus levels in baseflow conditions of streams are typically reflective of short pathways (e.g. overland runoff and tile drains) but can also occur with poor adsorption of phosphorus in the subsurface (Tesoriero et al., 2009).

Phosphorus adsorption occurs readily in soils rich iron and aluminum oxide, clay minerals, and calcium carbonate but is limited in soils rich in sulfate and silica, which compete for sorption sites (Domagalski and Johnson, 2012; Tesoriero et al., 2009). Phosphorus is generally adsorbed more in fine grained soils than coarse grained ones (DEQ, 2015).

The facility is located within the East Boulder River valley, where the soil and shallow aquifer is composed of glacial till, which is a poorly sorted mix of silt, sand, gravel, and boulders that have a low to moderate permeability. Limestone, sandstone, shale, gneiss, and granite are the most common rock types in the glacial till. Soils are geologically recent, and often display little alteration from their original condition (DEQ draft EIS, 2023).

In phosphorus breakthrough calculations, a soil adsorption capacity of 200 ppm is used (DEQ, 2015). This is a conservative estimate for most soils. Soil adsorption can range from 6.2 to 1300 ppm depending on soil grain size (EPA, 1975). Unless a study about phosphorus adsorption in soil has been done, DEQ has consistently used 200 ppm (DEQ, 2015).

Given the variability in grain size and clast material at the facility, it is unlikely that the soils have a limited adsorption capacity. Furthermore, the phosphorus breakthrough calculation is independent of soil permeability and hydraulic conductivity, so preferential flowpaths are not likely to be impactful. DEQ stands by that the phosphorus breakthrough analysis is conservative.

No changes will be made in response to this comment.

References for Response #C-7:

Department of Environmental Quality. 2023. Draft Environmental Impact Statement East Boulder Mine Amendment 004.

Department of Environmental Quality. 2015. How To Perform A Nondegradation Analysis For Subsurface Wastewater Treatment Systems Under The Subdivision Review Process.

Domagalski, Joseph and Johnson, Henry. 2012. Phosphorus and Groundwater: Establishing Links Between Agricultural Use and Transport to Streams. U.S. Geological Survey Fact Sheet 2012-3004.

Enfield, Carl G. and Bledsoe, Bert E. 1975. Kinetic Model for Orthophosphate Reactions in Mineral Soils. National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, EPA-660/2-75-022.

Tesoriero, Anthony; Duff, John; Wolock, David; Spahr, Norma. Identifying Pathways and Processes Affecting Nitrate and Orthophosphate Inputs to Streams in Agricultural Watersheds. J. Environ. Qual. 38:1892–1900. doi:10.2134/jeq2008.0484

Comment #C-8. *Total Phosphorus Additions to the Wastewater Treatment Facility (WWTP).* Appendix 4 of the Fact Sheet, page 75, describes the 2023 proposed nutrient permit limits for Total Nitrogen concluding that East Boulder Mine cannot meet the calculated final limits. The Fact Sheet States, "Furthermore, the Facility has worked to optimize their WWTP to remove nitrogen; however, **this is at the expense of increasing phosphorus**. It is premature to limit the facility to a cap at current performance limit immediately because this could restrict future optimization efforts."

This statement is not factually accurate and should be removed from the Fact Sheet as part of the basis for determination of nitrogen limits. The Good Neighbor Agreement Technical Advisors and Councils have been focused on work with the East Boulder Mine to optimize their biological treatment systems over the past two-years, which includes refining and reducing the levels of phosphorus currently added to the treatment system to balance the need for phosphorus to support nitrification and denitrification and minimize overdosing the system resulting in unnecessary levels of phosphorus in treated mine water discharged to percolation. A WWTP can optimize phosphorus dosing such that the microbial community is not phosphorus-limited and the DEQ-12A limit can be attained in the effluent water chemistry.

Response #C-8:

This Response to Comments supplements the administrative record and supersedes the Fact Sheet to the extent specific permit changes or clarifications are discussed herein. In this case, DEQ has not made a finding that any revisions of the Fact Sheet are necessary. However, DEQ realizes that the wording used in the cited statement was conclusionary, and the sentence should have read as follows:

> "Furthermore, the Facility has worked to optimize their WWTP to remove nitrogen; however, ~~this is at the expense of increasing phosphorus. It~~ it is premature to limit the facility to a cap at current performance limit immediately because this could restrict future optimization efforts."

However, there is anecdotal evidence that the optimization efforts have allowed an increase in TP discharge concentrations. The maximum TP concentration for the 2015 POR was 0.22 mg/L and the average was 0.01 mg/L, while the maximum TP concentration for the 2023 POR was 3.4 mg/L and the average was 1.5 mg/L.

****

The below tables show the relevant updates to the 2023 Fact Sheet.

Also see specific responses to relevant comments in #A.1, #A.4, #B-2, #B-3, #B-4, and #C-1.

Table 17. SUM – Facility-Wide Interim Effluent Limits - REVISED

Parameter	Units	Effluent Limits Average Monthly	Interim Limit Date Range	Basis
Copper, TR	lbs/day	0.061	Immediate for Duration of Permit	2009 TMDL Boulder River
Iron, TR	lbs/day	28.5		2009 TMDL Boulder River
Lead, TR	lbs/day	0.005		2009 TMDL Boulder River
Total Nitrogen (1)	lbs/day	32	Immediate through August 31, 2025	Anti-backsliding (Outfalls 002 and 003)
		15.1	September 1, 2025 through August 31, 2027	Narrative (ARM 17.30.637) Cap at Current (Max Outfall 002) plus Anti-backsliding (Outfall 003)
Footnotes: (1) The East Boulder Mine will be provided Compliance Schedules to meet the Final Effluent limits for TN by August 31, 2033.				

Table 18. SUM – Facility-Wide Final Effluent Limits - REVISED

Parameter	Units	Effluent Limits Avg Monthly	Final Limits Date Range	Basis
Copper, TR	lbs/day	0.061	Immediate for Duration of Permit	2009 TMDL Boulder River WLA
Iron, TR	lbs/day	28.5		2009 TMDL Boulder River WLA
Lead, TR	lbs/day	0.005		2009 TMDL Boulder River WLA
Total Nitrogen – Final limit for 2023 Permit	lbs/day	10.8	September 1, 2027 through August 31, 2033	Narrative (ARM 17.30.637) Cap at Current (Avg Outfall 002) plus Anti-backsliding (Outfall 003)
Total Nitrogen – Final limit for Outfall 002/003		0.27	September 1, 2033 unless approved operation of Outfall 001	17.30.715(1)(f) and Circular DEQ-12A = 0.1 mg/L x 0.5 cfs (see Table 6.D)
Total Nitrogen – Final limit for Outfalls 001/002/003		2.3	Upon approved operation of Outfall 001	17.30.715(1)(f) and Circular DEQ-12A 001 = 0.29 mg/L x 1.11 cfs = 1.7 lb/day 002 = 0.1 mg/L x 1.11 cfs = 0.6 lb/day (see Tables 6.B + 6.F)

Fact Sheet Appendix 4:

Table 4.E: Facility-wide Total Nitrogen Interim Limits - REVISED

Compliance Deadlines	Average Daily Load Limit (lb/day)	Basis
Effective Immediately	32	Anti-backsliding, historic nonsignificance Outfall 002 (30 lb/day) plus Outfall 003 (2 lb/day)
September 1, 2025	15.1	ARM 17.30.637 Cap at Current – Outfall 002 Maximum Observed (12.0 lb/day) plus Outfall 003 (2.0 lb/day) anti-backsliding
September 1, 2027	10.8	ARM 17.30.637 Cap at Current – Outfall 002 Long-term Average Observed (8.3 lb/day) plus Outfall 003 (2.0 lb/day) anti-backsliding

Also see attached the following revised Excel documents used to evaluate and respond to these comments:

Table 5.B. RP for Outfall 001

Table 5.C. RP for Outfall 002 (current)

Table 5.D. RP for Outfall 002 in future scenario with Outfall 001

Table 6.B. WQBEL for Outfall 001

Table 6.D. WQBEL for Outfall 002 (current)

Table 6.F. WQBEL for Outfall 002 in future scenario with Outfall 001

Table 5.B. East Boulder Mine *Reasonable Potential Analysis for Outfall 001*

REVISED JULY 2023

SURFACE WATER MIXING for Outfall 001

			TOXICS [ARM 17.30.715(1)(c.)]																	
			TBELS - NEW RP EVALUATION																	
			Ammonia			**N+N**		**Cadmium (TR)**		**Copper (TR)**		**Lead (TR)**		**Mercury (TR) BCF>300**			**Zinc (TR)**	
term	description		Acute	Chronic		HH		Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	HHS	Acute	Chronic
Q_s[1]	critical stream flow (7Q10 or 14Q5)	cfs	5.0	5.0	cfs	5.0	cfs	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
% Q_s	% of Qs being provided (as decimal, e.g. - .10 for 10%)		10%	100%		100%		10%	100%	10%	100%	10%	100%	10%	100%	100%	10%	100%
$Q_{s\text{-}EBR}$	critical stream flow available for dilution (Qs^1 * %Qs)	cfs	0.5	5.0	cfs	5.0	cfs	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0	5.0	0.5	5.0
Q_d	critical effluent flow (WWTF Design Rate)	cfs	1.11	1.11	cfs	1.11	cfs	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Q_r	downstream flow ($Q_{s\text{-}EBR}$ + Q_d)	cfs	1.6	6.1	cfs	6.1	cfs	1.6	6.1	1.6	6.1	1.6	6.1	1.6	6.1	6.1	1.6	6.1
C_d	**critical discharge concentration (C_d) Red = new/revised**	**mg/L**	**3.8**	**3.8**	**mg/L**	**5.3**	**µg/L**	**100**	**100**	**300**	**300**	**600**	**600**	**2.0**	**2.0**	**2.0**	**1500**	**1500**
$C_{s\text{-}EBR}$	**critical upstream (river) concentration (75%tile)**	**mg/L**	***0.05***	***0.05***	**mg/L**	**0.09**	**µg/L**	0.03	0.03	0.8	**0.8**	***0.08***	***0.08***	**0.005**	**0.005**	**0.005**	8	**8**
$C_{r\text{-}EBR}$	**resulting or downstream pollutant concentration (surface water mixing)**	**mg/L**	**2.64**	**0.73**	**mg/L**	**1.04**	**µg/L**	**69**	**18.2**	**207**	**55**	**414**	**109**	**1.4**	**0.37**	**0.37**	**1038**	**280**
	Change in WQ	mg/L	--	0.68	mg/L	0.95	µg/L	69	18	207	55	414	109	1.4	0.36	0.36	1030	272
	water quality standard (from DEQ-7 or rule)	mg/L	**2.59**	1.29	mg/L	**10**	**µg/L**	**0.95**	0.45	**7.1**	5.1	**33**	1.3	1.7	0.91	0.05	**65**	65
	Trigger Value	mg/L	0.01	0.01		0.01	µg/L	0.1	0.1	0.5	0.5	0.1	0.1		--		5	5
	RP to exceed trigger?		yes	yes		yes		yes	yes	yes	yes	yes	yes		--		yes	yes
	Nonsignificance Value (15% std)	**mg/L**	--	**0.19**	**mg/L**	**1.5**	**µg/L**	--	**0.07**	--	**0.76**	--	**0.19**	**0.005**	**0.005**	**0.005**	--	**9.8**
	RP to Exceed Nonsignificance?		yes	yes		no		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

**underline and italics means all samples were ND at or below RRV*

Acute flow based on max daily discharge during POR. Chronic/HH flow based on maximum monthly avg.

Table 5.B. East Boulder Mine *Reasonable Potential Analysis fo*

REVISED JULY 2023

SURFACE WATER MIXING for Outfall 001

Harmful [ARM 17.30.715(1)(e.)]

term	description		Nickel (TR) Acute	Nickel (TR) Chronic	Nickel (TR) HH
Q_s[1]	critical stream flow (7Q10 or 14Q5)	cfs	5.0	5.0	5.0
% Q_s	% of Qs being provided (as decimal, e.g. - .10 for 10%)		10%	100%	100%
$Q_{s\text{-}EBR}$	critical stream flow available for dilution (Qs^1 * %Qs)	cfs	0.5	5.0	5.0
Q_d	critical effluent flow (WWTF Design Rate)	cfs	1.11	1.11	1.11
Q_r	downstream flow ($Q_{s\text{-}EBR}$ + Q_d)	cfs	1.6	6.1	6.1
C_d	**critical discharge concentration (C_d) Red = new/revised**	**µg/L**	**15.0**	**15.0**	**15.0**
$C_{s\text{-}EBR}$	**critical upstream (river) concentration (75%tile)**	**µg/L**	***2.0***	***2.0***	***2.0***
$C_{r\text{-}EBR}$	**resulting or downstream pollutant concentration (surface water mixing)**	**µg/L**	**11.0**	**4.4**	**4.4**
	Change in WQ	µg/L	9.0	2.4	2.4
	water quality standard (from DEQ-7 or rule)	**µg/L**	**257**	29	100
	Trigger Value		0.5	0.5	0.5
	RP to exceed trigger?		yes	yes	yes
	Nonsignificance Value (15% std)	**µg/L**	--	**4.3**	**38**
	RP to Exceed Nonsignificance?		**no**	**yes**	**no**

		Iron (TR) Chronic		TN Harmful		TP Harmful
	cfs	5.0	cfs	10.5	14Q5	10.5
		100%		100%		100%
	cfs	5.0	cfs	10.5		10.5
	cfs	1.11	cfs	1.11		1.11
	cfs	6.1	cfs	11.6		11.6
Critical Discharge Conc	**µg/L**	**242**	**mg/L**	**6.0**		**3.7**
75th % Ambient	**µg/L**	**20**	**mg/L**	**0.08**		**0.005**
downstream mixed conc	**µg/L**	**60**	**mg/L**	**0.65**		**0.36**
	µg/L	40		0.57		0.35
Standard	µg/L	1000	mg/L	0.30		0.03
		--		--		--
		--		--		--
Existing 75th % WQ < 40% Std?		yes		yes		yes
25th % Ambient	**µg/L**	20	mg/L	0.07	mg/L	*0.005*
Nonsignif = 25th% + (10% of std)	**µg/L**	**120**	mg/L	**0.10**	mg/L	**0.008**
Is $C_{r\text{-}sw}$ > nonsignif level RP?		**no**		yes		yes

**underline and italics means all samples were ND at or below RRV*

Acute flow based on max daily discharge during POR. Chronic/HH flow based on r

Table 6.B. East Boulder Mine WQBELs for Outfall 001

(No changes)

		Ammonia			Cadmium, TR (TBEL)			Copper, TR (TBEL)			Lead, TR (TBEL)			Mercury, TR (TBEL)		
		acute	chronic		acute	chronic	HHS	acute	chronic	HHS	acute	chronic	HHS	acute	chronic	HHS
Low Flow (7Q10 or 14Q5)	cfs	5.0			5.0			5.0			5.0			5.0		
% of 7Q10 to use for dilution	%	10	100		10	100	100	10	100	100	10	100	100	10	100	100
instream flow available for dilution (Qs)	cfs	0.5	5.0		0.5	5.0	5.0	0.5	5.0	5.0	0.5	5.0	5.0	0.5	5.0	5.0
Critical discharge flow (Qd)	cfs	1.11	1.11		1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
downstream flow (Qs + Qd)	cfs	1.6	6.1		1.6	6.1	6.1	1.6	6.1	6.1	1.6	6.1	6.1	1.6	6.1	6.1
Water quality standard	mg/L	**2.59**	1.29		µg/L **0.95**	0.45	5.0	µg/L **7.1**	5.1	1300	µg/L **33**	1.3	15	µg/L **1.7**	0.9	0.05
Nondeg (Toxics =15% of applicable std)		--	**0.19**		--	**0.07**	**0.75**		**0.76**	**195**		**0.19**	**2.3**			
Nondeg (BCF>300 = 25th background)														25th percentile	**0.0050**	**0.0050**
instream concentration (75th percentile)	mg/L	***0.05***			µg/L 0.03			µg/L 0.80			µg/L *0.08*			µg/L 0.0050		
waste load allocation ((Qr*Cr) - (Qs*Cs))/Qd)	mg/L	**3.7**	**0.8**		**µg/L** **1.4**	**0.2**	**4.0**	**µg/L** **10**	**0.58**	**1067**	**µg/L** **48**	**0.7**	**12**	**µg/L** **2**	**0.0050**	**0.0050**
number of samples per month ***(if = 1, enter 4)***	N	4	ammonia? yes		4			4			4			4		
CV ***(if sample set >= 10, then SD/mean, else 0.6)***	CV	7			0			0.54			0			0		
acute and chronic long term average (99 %tile)		0.3	0.1		1.4	0.2		3.5	0.3		47.7	0.7		2.5	0.0050	
most conservative LTA		0.1			0.2			0.3			0.7			0.0050		
maximum daily limit (99 %tile)	mg/L	**1.94**			µg/L **0.23**		4.0	µg/L **0.93**		1067	µg/L **0.70**		12	µg/L **0.0050**		0.0050
average monthly limit (95 %tile)	mg/L		**0.53**		µg/L	**0.23**	4.0	µg/L	**0.49**	1067	µg/L	**0.70**	12	µg/L	**0.0050**	0.0050
critical effluent flow (design flow)	cfs	1.114			1.114			1.114			1.114			1.11		
CONVERSION TO AML LOAD-BASED		**3.2 lb/day**			**0.0014 lb/day**			**0.0029 lb/day**			**0.0042 lb/day**			**0.000030 lb/day**		

Table 6.B. East Boulder Mine WQBELs for
(No changes)

		Nickel, TR			Zinc, TR (TBEL)		
		acute	chronic	HHS	acute	chronic	HHS
Low Flow (7Q10 or 14Q5)	cfs	5.0			5.0		
% of 7Q10 to use for dilution		10	100	100	10	100	100
instream flow available for dilution (Qs)	cfs	0.5	5.0	5.0	0.5	5.0	5.0
Critical discharge flow (Qd)	cfs	1.11	1.11	1.11	1.11	1.11	1.11
downstream flow (Qs + Qd)	cfs	1.6	6.1	6.1	1.6	6.1	6.1
Water quality standard	µg/L	**257**	29	100	**65**	65	7400
Nondeg (Toxics =15% of applicable std)			**4**	**15**		**10**	**1110**
Nondeg (BCF>300 = 25th background)							
instream concentration (75th percentile)	µg/L	*2.0*			8.0		
waste load allocation ((Qr*Cr) - (Qs*Cs))/Qd)	**µg/L**	**371**	**14.5**	**73**	**91**	**18.0**	**6056**
number of samples per month ***(if = 1, enter 4)***		4			4		
CV ***(if sample set >= 10, then SD/mean, else 0.6)***		0.43			0.58		
acute and chronic long term average (99 %tile)		155	9.1		30.1	9.7	
most conservative LTA		9.1			9.7		
maximum daily limit (99 %tile)	µg/L	**22**		73	**29**		6056
average monthly limit (95 %tile)	µg/L		**13**	73		**15**	6056
critical effluent flow (design flow)		1.114			1.114		
CONVERSION TO AML LOAD-BASED		**0.075 lb/day**			**0.089 lb/day**		

		TN		TP
		harmful		harmful
	cfs	10.5	14Q5	10.5
		100		100
Instream flow available for dilution	cfs	10.5		10.5
Critical discharge flow (Qd)	cfs	1.11		1.11
Downstream flow (Qs + Qd)	cfs	11.6		11.6
Circular DEQ-12A Std	mg/L	0.30		0.03
instream 25th %	mg/L	0.07		0.005
instream 75th %	mg/L	0.08		0.005
Nonsignif Limit (25th% bkgd + 10% std)		**0.10**		**0.008**
WLA	mg/L	**0.29**		**0.036**
		4		4
CV		0.66		0.40
TSD Multiplier		0.621		0.736
chronic LTA (95 %tile)		0.18		0.027
LTA		**0.18**		**0.027**
	mg/L	**0.29**		**0.036**
	cfs	1.114		1.114
		1.7 lb/day		**0.22 lb/day**

Table 5.D.: East Boulder Mine - RP Analysis for Outfall 002 (Future Scenario with Outfall 001 operational)

REVISED JULY 2023

(1) GROUNDWATER - Outfall 002

				TBELS - NEW EVALUATION					
				TOXICS [ARM 17.30.715(1)(c.)] except mercury					
								BCF>300	
				N+N	Cadmium (TR)	Copper (TR)	Lead (TR)	Mercury (TR)	Zinc (TR)
$Q_{s\text{-}gw}$[1]	critical groundwater flow (average flux)	cfs	cfs	0.89	0.89	0.89	0.89	0.89	0.89
% Q_s	% of Qs being provided			100%	100%	100%	100%	100%	100%
$Q_{s\text{-}002}$	**critical ambient groundwater flow available for dilution (Qs^1 * %Qs)**	**cfs**	**cfs**	**0.89**	**0.89**	**0.89**	**0.89**	**0.89**	**0.89**
$C_{s\text{-}002}$	**critical ambient GW concentration (flow-rated Outfall 003 + ambient)**	**mg/L**	**mg/L**	**0.68**	**µg/L 0.03**	**2.0**	**0.30**	**0.0051**	**9.08**
Q_d	**critical effluent flow (maximum monthly average) Corrected from 0.5 cfs**	**cfs**	**cfs**	**1.11**	**1.11**	**1.11**	**1.11**	**1.11**	**1.11**
C_{max}	maximum effluent concentration	mg/L	mg/L	4.5	µg/L 100	300	600	2.0	1500
n	number of samples in effluent data set			39	--	--	--	--	--
CV	coefficient of variation for effluent data (if n<10, use 0.6)			0.92	--	--	--	--	--
TSD	calculated TSD multiplier (should be close to Table 3-2 value)			1.17	--	--	--	--	--
C_d	**critical effluent concentration = 95%tile (max. effl conc for POR * TSD multiplier)**	mg/L	mg/L	**5.3**	**µg/L 100**	**300**	**600**	**2**	**1500**
$Q_{r\text{-}002}$	downstream groundwater flow ($Q_{s\text{-}002}$ + Q_d)	cfs	cfs	2.0	2.0	2.0	2.0	2.0	2.0
$C_{r\text{-}002}$	**resulting or downstream pollutant concentration (end of GW Mixing)**	mg/L	mg/L	**3.2**	**µg/L 56**	**167**	**333**	**1.11**	**837**
	Groundwater Standard		**ARM 17.30.715(1)(d)**		**5.0**	**1300**	**15**	**2**	**2000**
	Groundwater Nondegradation Criteria		mg/L	**7.5**	**0.8**	**195**	**2.3**	**0.0051** ≤ 25th bkgrd	**300**
	GW RP? (Cr-002 > GW nondeg criteria?)			**no**	**yes**	**no**	**yes**	**yes**	**yes**

(2) SURFACE WATER MIXING for Outfall 002

					EBR has no Assimilative Capacity (001 consumes)											
				N+N	Cadmium (TR)		Copper (TR)		Lead (TR)		Mercury (TR) BCF>300			Zinc (TR)		
term	description			HH	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	HHS	Acute	Chronic	
Q_s[1]	critical stream flow (7Q10 or 14Q5) plus discharge from 001	cfs	cfs	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
% Q_s	% of Qs being provided - red is revised from draft			100%	10%	100%	10%	100%	10%	100%	10%	100%	100%	10%	100%	
$Q_{s\text{-}EBR}$	resulting critical stream flow available for dilution (Qs^1 * %Qs)	cfs	cfs	5.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0	5.0	0.5	5.0	
$C_{s\text{-}EBR}$	**critical ambient (river upstream) concentration (75%tile) considering 001**	**mg/L**	**mg/L**	**1.04**	**µg/L 69**	**18.2**	**207**	**55**	**414**	**109**	**1.4**	**0.37**	**0.37**	**1038**	**280**	
Q_d	critical ground water flow (= $Q_{r\text{-}002}$) at end of GW mix zone	cfs	cfs	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
C_d	critical ground water concentration (= $C_{r\text{-}002}$) at end of GW mix zone	**mg/L**	**mg/L**	**3.2**	µg/L **56**	**56**	**167**	**167**	**333**	**333**	**1.1**	**1.1**	**1.1**	**1500**	**750**	
Q_r	downstream flow ($Q_{s\text{-}EBR}$ + $Q_{r\text{-}002}$)	cfs	cfs	7.0	2.5	7.0	2.5	7.0	2.5	7.0	2.5	7.0	7.0	2.5	7.0	
$C_{r\text{-}EBR}$	**resulting or downstream pollutant concentration (surface water mixing)**	**mg/L**	**mg/L**	**1.7**	**µg/L 58**	**29**	**175**	**87**	**349**	**173**	**1.2**	**0.58**	**0.58**	**1408**	**414**	
	Change in WQ	**mg/L**	**mg/L**	**0.62**	**µg/L**	10.6		32		64	-0.22	0.21	0.21		134	
	water quality standard (from DEQ-7 or rule)	mg/L	mg/L	**10**	**0.95**	0.45	**7.1**	5.1	**33**	1.3	1.70	0.91	0.05	**65**	65	
	Trigger Value	mg/L		0.01	0.1	0.1	0.5	0.5	0.1	0.1	--			5	5	
	RP to exceed trigger?			yes	**no**	**yes**	**no**	**yes**	**no**	**yes**	--			**no**	**yes**	
	Nonsignificance Value	**mg/L**	**mg/L**	**1.5**	**µg/L --**	**0.07**	**--**	**0.77**	**--**	**0.20**	**0.0050**	**0.0050**	**0.0050**	**--**	**9.8**	
	RP? (Cr-EBR > Nonsignif Value?)			**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	

Table 5.D.: East Boulder Mine - RP Analysis for Outfall 002 (Future Scenario with
REVISED JULY 2023

(1) GROUNDWATER - Outfall 002

			Nickel (TR)		Harmful [ARM 17.30.715(1)(f)] Iron (TR)		TN	
$Q_{s\text{-}gw}$[1]	critical groundwater flow (average flux)	cfs	0.89		cfs	0.89	cfs	0.89
% Q_s	% of Qs being provided		100%			100%		100%
$Q_{s\text{-}002}$	**critical ambient groundwater flow available for dilution (Qs^1 * %Qs)**	**cfs**	**0.89**		**cfs**	**0.89**	**cfs**	**0.89**
$C_{s\text{-}002}$	**critical ambient GW concentration (flow-rated Outfall 003 + ambient)**	**µg/L**	**2.1**		**µg/L**	**23**	**mg/L**	**0.7**
Q_d	**critical effluent flow (maximum monthly average)** Corrected from 0.5 cfs	**cfs**	1.11	<-corrected	**cfs**	**1.11**	**cfs**	**1.11**
C_{max}	maximum effluent concentration	µg/L	14.0		µg/L	200	mg/L	5.3
n	number of samples in effluent data set		35			35		39
CV	coefficient of variation for effluent data (if n<10, use 0.6)		0.19			0.88		0.66
TSD	calculated TSD multiplier (should be close to Table 3-2 value)		1.05			1.2		1.1
C_d	**critical effluent concentration = 95%tile (max. effl conc for POR * TSD multiplier)**	**µg/L**	**14.7**		**µg/L**	**242**	mg/L	**6.0**
$Q_{r\text{-}002}$	downstream groundwater flow ($Q_{s\text{-}002}$ + Q_d)	cfs	2.0		cfs	2.0	cfs	2.0
$C_{r\text{-}002}$	**resulting or downstream pollutant concentration (end of GW Mixing)**	**µg/L**	**9.1**		**µg/L**	**145**	mg/L	**3.6**
	Groundwater Standard							
	Groundwater Nondegradation Criteria		**15**					
	GW RP? (Cr-002 > GW nondeg criteria?)		**no**					

(2) SURFACE WATER MIXING for Outfall 002

No Assimilative Capacity

term	description		Nickel (TR) Acute	Chronic	HH		Iron (TR) Chronic	TN Harmful
Q_s[1]	critical stream flow (7Q10 or 14Q5) plus discharge from 001	cfs	5.0	5.0	5.0	low flow plus discharge from 001 cfs	5.0	10.5
% Q_s	% of Qs being provided - red is revised from draft		0%	0%	0%		100%	100%
$Q_{s\text{-}EBR}$	resulting critical stream flow available for dilution (Qs^1 * %Qs)	cfs	0.0	0.0	0.0	cfs	5.0	10.5
$C_{s\text{-}EBR}$	**critical ambient (river upstream) concentration (75%tile) considering 001**	**µg/L**	**11.0**	**11.0**	**11.0**	<-corrected :h percentile ambient considering 001 **µg/L**	**60**	**0.65**
Q_d	critical ground water flow (= $Q_{r\text{-}002}$) at end of GW mix zone	cfs	2.0	2.0	2.0	cfs	2.0	2.0
C_d	critical ground water concentration (= $C_{r\text{-}002}$) at end of GW mix zone	µg/L	9.1	9.1	9.1	µg/L	145	**3.6**
Q_r	downstream flow ($Q_{s\text{-}EBR}$ + $Q_{r\text{-}002}$)	cfs	2.0	2.0	2.0	cfs	7.0	12.5
$C_{r\text{-}EBR}$	**resulting or downstream pollutant concentration (surface water mixing)**	**µg/L**	**9.1**	**9.1**	**9.1**	**µg/L**	**85**	**1.1**
	Change in WQ	**µg/L**	**-1.9**	**-1.9**	**-1.9**	**Standard µg/L**	1000	mg/L 0.3
	water quality standard (from DEQ-7 or rule)	**µg/L**	**257**	29	100	Existing WQ < 40% Std?	**yes**	** no
	Trigger Value		0.5	0.5	0.5	**25th % Ambient µg/L**	*20*	mg/L 0.07
	RP to exceed trigger?		**no**	**no**	**no**	Nonsignif = 25th% + (10% of std) **µg/L**	**120**	mg/L **0.10**
	Nonsignificance Value	**µg/L**	--	**4.3**	**38**	**RP?**	**no**	**yes**
	RP? (Cr-EBR > Nonsignif Value?)		**no**	**yes**	**no**			

Table 6.F. East Boulder Mine Future WQBELs for Outfall 002 (for Future Scenario with Outfall 001 Operational)

REVISED JULY 2023 red = new/change

				Toxics [ARM 17.30.715(1)(c.)] TBELS													
			N+N *NEW	Cadmium, TR			Copper, TR			Lead, TR			Mercury, TR			Zinc, TR	
E. Boulder River			human health	acute	chronic	human health	acute	chronic	human health	acute	chronic	human health	acute	chronic	human health	acute	chronic	human health
Low Flow (7Q10)		cfs	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
% of 7Q10 to use- None since Outfall 001 operational		%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Boulder River dilution flow	$Q_{s\text{-}EBR}$	cfs	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0
GW flux		cfs	0.89	0.89			0.89			0.89			0.89			0.89		
% to use		%	100	100	100	100	100	100	100	100	100	100	100	0	0	100	100	100
GW dilution flow	$Q_{s\text{-}002}$	cfs	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0	0	0.89	0.89	0.89
Max. 30-day ave. discharge (500 gpm)	Q_d	cfs	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114	1.114
Ambient E. Boulder River concentration	$C_{s\text{-}EBR}$	mg/L	0.09	µg/L *0.03*	*0.03*	*0.03*	0.8	0.8	0.8	*0.08*	*0.08*	*0.08*	0.005	0.005	0.005	*8.0*	*8.0*	*8.0*
Ambient GW concentration (WW-1 75th percentile + 003)	$C_{s\text{-}002}$	mg/L	0.68	µg/L *0.03*	*0.03*	*0.03*	*2.0*	*2.0*	*2.0*	*0.3*	*0.3*	*0.3*	*0.0051*	*0.0051*	*0.0051*	*9.1*	*9.1*	*9.1*
water quality standard	WQS	mg/L	10	µg/L **0.95**	0.45	5.0	**7.15**	5.07	1,300	**32.9**	1.3	15	**1.7**	0.91	0.05	**65**	65	7,400
Nondeg (=15% std, except Hg = 25th percentile background)	S_N	mg/L	**1.5**	µg/L	**0.07**	**0.75**		**0.76**	**195**		**0.19**	**2.3**		**0.005**	**0.005**		**9.8**	**1,110**
C_d = Waste load allocation =	**WLA**	mg/L	2.2	µg/L **1.7**	**0.097**	**1.3**	**11.3**	**0.76**	**349**	**59**	**0.11**	**3.8**	**3.1**	**0.005**	**0.005**	**111**	**10**	**1,990**
$C_d = [(S_{N\text{-}sw} \times (Q_{s\text{-}sw} + Q_{s\text{-}gw} + Q_d)) - [(Q_{s\text{-}gw} \times C_{s\text{-}gw}) + (Q_{s\text{-}sw} \times C_{s\text{-}sw})]] / Q_d$							*WLA = S_N											
number of samples per month ***(if = 1, enter 4)***	N			4			4			4			4			4		
coefficient of variation ***(if sample set >= 10, then SD/mean, else 0.6)***	CV			0			0.54			0			0			0.58		
acute and chronic long term average (99 %tile)	LTA_a LTA_c			1.68	0.10		3.9	0.43		59	0.11		3.1	0.005		37	6	
most conservative LTA	MIN (LTA_a, LTA_c)			0.10			0.43			0.11			0.005			6		
maximum daily limit (99 %tile)	**MDL**	mg/L	2.2	µg/L **0.10**		1.3	**1.2**		667	**0.11**		4	**0.0050**		0.005	**17**		3,929
average monthly limit (95 %tile)	**AML**	mg/L	2.2	µg/L **0.10**		1.3	**0.63**		349	**0.11**		4	**0.0050**		0.005	**8.6**		1,990
critical effluent flow		cfs	1.114	1.114			1.114			1.114			1.114			1.114		
CONVERSION TO AML LOAD-BASED			0.013	lb/day **0.00058 lb/day**			**0.0038 lb/day**			**0.0006 lb/day**			**0.00003 lb/day**			**0.052 lb/day**		

Table 6.F. East Boulder Mine Future WQBELs for Outfall 002 (for

REVISED JULY 2023 red = new/change

Harmful [ARM 17.30.715(f)]

		Nickel, TR *NEW				TN
E. Boulder River		acute	chronic	HHS		human health
Low Flow (7Q10)	cfs	5.0	5.0	5.0	14Q5 plus 001 discharge	cfs 10.5
% of 7Q10 to use- None since Outfall 001 operational		0	0	0		**% 100**
East Boulder River dilution flow	cfs	0	0.0	0.0	East Boulder River dilution flow	cfs 10.5
GW flux		0.89				cfs 0.89
% to use		100	100	100		% 100
GW dilution flow		0.89	0.89	0.89	GW dilution flow	cfs 0.89
Max. 30-day ave. discharge (500 gpm)		1.114	1.114	1.114	Max. 30-day ave. discharge	cfs 1.114
Ambient E. Boulder River concentration	µg/L		0	0	75th percentile EBR ambient	mg/L 0.08
Ambient GW concentration (WW-1 75th percentile + 003)	µg/L	2.1	2.1	2.1	critical ambient GW conc (Outfall 003 + WW-1)	mg/L 0.68
					Circular DEQ-12A	mg/L 0.30
water quality standard		**257**	29	100	25th percentile EBR ambient	0.07
Nondeg (=15% std, except Hg = 25th percentile background)	µg/L		**4.3**	**15**	Nonsignif harmful (25th% bkgd + 10% std)	mg/L **0.10**
C_d = Waste load allocation =	**µg/L**	**460**	**4.3**	**25**	*WLA = Nonsignif Std	mg/L **0.10** *
$C_d = [(S_{N\text{-}sw} \times (Q_{s\text{-}sw} + Q_{s\text{-}gw} + Q_d)) - [(Q_{s\text{-}gw} \times C_{s\text{-}gw}) + (Q_{s\text{-}sw} \times C_{s\text{-}sw})]] / Q_d$		*WLA = S_N				*WLA = S_N
number of samples per month ***(if = 1, enter 4)***		4				4
coefficient of variation ***(if sample set >= 10, then SD/mean, else 0.6)***		0.43			CV	0.66
acute and chronic long term average (99 %tile)		192	2.7		TSD Multiplier	0.621
most conservative LTA		2.7			chronic LTA 95th percentile	0.062
					LTA	0.062
maximum daily limit (99 %tile)	µg/L	**6.4**		25		
average monthly limit (95 %tile)	µg/L	**3.7**		25	AML	mg/L **0.10**
critical effluent flow		1.114				cfs 1.114
CONVERSION TO AML LOAD-BASED		**0.022 lb/day**				**lb/day 0.60**

Table 5.C.: East Boulder Mine - RP to exceed Nonsignificance for Outfall 002

REVISED JULY 2023

(1) GROUNDWATER - Outfall 002

				Toxics (except Mercury is BCF > 300)				
					TBELS - NEW EVALUATION			
			N+N	Nickel (TR)	Cadmium (TR)	Copper (TR)	Lead (TR)	Mercury (TR)
Q_s[1]	critical groundwater flow (average flux)	cfs	0.89	cfs	0.89	0.89	0.89	0.89
% Q_s	% of Qs being provided		100%	100%	100%	100%	100%	100%
$Q_{s\text{-}002}$	**critical ambient groundwater flow available for dilution (Qs^1 * %Qs)**	**cfs**	**0.89**	**cfs 0.89**	**0.89**	**0.89**	**0.89**	**0.89**
$C_{s\text{-}002}$	**critical ambient GW concentration (flow-rated Outfall 003 + ambient)**	**mg/L**	**0.7**	**µg/L 2.1**	**0.03**	**2.0**	**0.30**	**0.0051**
Q_d	**critical effluent flow (maximum monthly average)**	**cfs**	**0.5**	**cfs 0.5**	**0.5**	**0.5**	**0.5**	**0.5**
C_{max}	maximum effluent concentration	mg/L	4.5	µg/L 14.0	100	300.0	600	2
n	number of samples in effluent data set		39	35	--	--	--	--
CV	coefficient of variation for effluent data (if n<10, use 0.6)		0.92	0.19	--	--	--	--
TSD	calculated TSD multiplier (should be close to Table 3-2 value)		1.17	1.05	--	--	--	--
C_d	**critical effluent concentration = 95%tile (max. effl conc for POR * TSD multiplier)**	mg/L	**5.3**	**µg/L 14.7**	**100**	**300**	**600**	**2**
$Q_{r\text{-}002}$	downstream groundwater flow ($Q_{s\text{-}gw}$ + Q_d)	cfs	1.4	cfs 1.4	1.4	1.4	1.4	1.4
$C_{r\text{-}002}$	**resulting or downstream pollutant concentration (end of GW Mixing)**	mg/L	**2.3**	**µg/L 6.6**	**36**	**109**	**216**	**1**
	Groundwater Standard	mg/L		100	5	1300	15	2
	Groundwater Nondegradation Criteria	mg/L	**7.5**	**15**	**1**	**195**	**2**	**0.0051** ≤ 25th bkgrd
	GW RP?		**no**	**no**	**yes**	**no**	**yes**	**yes**

(2) SURFACE WATER MIXING for Outfall 002

				Nickel (TR)			Cadmium (TR)		Copper (TR)		Lead (TR)		Mercury (TR) BCF>300		
			N+N												
term	description		HH	Acute	Chronic	HH	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	HHS
Q_s[1]	critical stream flow (7Q10)	cfs	5.0	cfs 5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
% Q_s	% of Qs being provided (as decimal, e.g. - .10 for 10%)		100%	10%	100%	100%	10%	100%	10%	100%	10%	100%	10%	100%	100%
$Q_{s\text{-}EBR}$	resulting critical stream flow available for dilution (Qs^1 * %Qs)	cfs	5.0	cfs 0.5	5.0	5.0	0.5	5.0	0.5	5.0	0.5	5.0	0.5	5.0	5.0
$C_{s\text{-}EBR}$	**critical ambient (river upstream) concentration (75%tile)**	**mg/L**	**0.09**	**µg/L *2.0***	***2.0***	***2.0***	***0.03***	***0.03***	***0.8***	***0.8***	***0.08***	***0.08***	***0.0050***	***0.0050***	***0.0050***
Q_d	critical effluent flow (= $Q_{r\text{-}002}$)	cfs	1.4	cfs 1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
C_d	critical discharge (groundwater) concentration (= $C_{r\text{-}002}$)	mg/L	2.3	µg/L 6.6	6.6	6.6	36	36	109	109	216	216	0.7	0.7	0.7
Q_r	downstream flow ($Q_{s\text{-}EBR}$ + $Q_{r\text{-}002}$)	cfs	6.4	cfs 1.9	6.4	6.4	1.9	6.4	1.9	6.4	1.9	6.4	1.9	6.4	6.4
$C_{r\text{-}EBR}$	**resulting or downstream pollutant concentration (surface water mixing)**	**mg/L**	**0.58**	**µg/L 5.4**	**3.0**	**3.0**	**26**	**7.9**	**81**	**24**	**159**	**47**	**0.5**	**0.2**	**0.2**
	Change in WQ	**mg/L**	**0.49**	**µg/L 3.4**	**1.0**	**1.0**		**7.8**		**24**		**47**	**0.5**	**0.2**	**0.2**
	water quality standard (from DEQ-7 or rule)	mg/L	**10**	**µg/L 257**	29	100	**0.95**	0.45	**7.1**	5.1	**33**	1	**1.70**	0.91	0.05
	Trigger Value		0.01	0.5	0.5	0.5	0.10	0.10	0.5	0.5	0.1	0.1	--		
	RP to exceed trigger?		yes	yes	yes	yes		yes		yes		yes	--		
	Nonsignificance Value	**mg/L**	**1.5**	**µg/L --**	**4.3**	**38**	--	**0.07**	--	**0.8**	--	**0.20**	0.005	**0.005**	**0.005**
	RP?		**no**	**no**	**no**	**no**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**

Table 5.C.: East Boulder Mine - RP to exceed Nonsignificance for Outfall 002

REVISED JULY 2023

(1) GROUNDWATER - Outfall 002

		Zinc (TR)		Iron (TR)		TN	
				Harmful [ARM 17.30.715(1)(f)]			
Q_s[1]	critical groundwater flow (average flux)	0.89	cfs	0.89	cfs	0.89	
% Q_s	% of Qs being provided	100%		100%		100%	
$Q_{s\text{-}002}$	**critical ambient groundwater flow available for dilution (Qs^1 * %Qs)**	**0.89**	**cfs**	0.89	**cfs**	0.89	
$C_{s\text{-}002}$	**critical ambient GW concentration (flow-rated Outfall 003 + ambient)**	**9.1**	**µg/L**	**22.8**	**mg/L**	**0.68**	
Q_d	**critical effluent flow (maximum monthly average)**	**0.5**	**cfs**	**0.5**	**cfs**	**0.5**	
C_{max}	maximum effluent concentration	1500	µg/L	200	mg/L	5.3	
n	number of samples in effluent data set	--		35		39	
CV	coefficient of variation for effluent data (if n<10, use 0.6)	--		0.88		0.66	
TSD	calculated TSD multiplier (should be close to Table 3-2 value)	--		1.2		1.1	
C_d	**critical effluent concentration = 95%tile (max. effl conc for POR * TSD multiplier)**	**1500**	**µg/L**	**242**	mg/L	**6.0**	
$Q_{r\text{-}002}$	downstream groundwater flow ($Q_{s\text{-}gw}$ + Q_d)	1.4	cfs	1.4	cfs	1.4	
$C_{r\text{-}002}$	**resulting or downstream pollutant concentration (end of GW Mixing)**	**545**	**µg/L**	**102**	mg/L	**2.6**	
	Groundwater Standard	2000					
	Groundwater Nondegradation Criteria	**300**					
	GW RP?	**yes**					

(2) SURFACE WATER MIXING for Outfall 002

		Zinc (TR)		Iron (TR)		TN		
term	description	Acute	Chronic		Chronic		Harmful	
Q_s[1]	critical stream flow (7Q10)	5.0	5.0	cfs	5.0	cfs	10.5	14Q5
% Q_s	% of Qs being provided (as decimal, e.g. - .10 for 10%)	10%	100%		100%		100%	
$Q_{s\text{-}EBR}$	resulting critical stream flow available for dilution (Qs^1 * %Qs)	0.5	5.0	cfs	5.0	cfs	10.5	
$C_{s\text{-}EBR}$	**critical ambient (river upstream) concentration (75%tile)**	***8.0***	***8.0***	**75th percentile ambient**	***20***	**mg/L**	**0.08**	
Q_d	critical effluent flow (= $Q_{r\text{-}002}$)	1.4	1.4	cfs	1.4	cfs	1.4	
C_d	critical discharge (groundwater) concentration (= $C_{r\text{-}002}$)	545	545	µg/L	102	**mg/L**	**2.6**	
Q_r	downstream flow ($Q_{s\text{-}EBR}$ + $Q_{r\text{-}002}$)	1.9	6.4	cfs	6.4	cfs	11.9	
$C_{r\text{-}EBR}$	**resulting or downstream pollutant concentration (surface water mixing)**	**403**	**125**		**37.8**	**mg/L**	**0.37**	
	Change in WQ		**117**	**Standard**	1000	mg/L	0.3	
	water quality standard (from DEQ-7 or rule)	**65**	65	Existing WQ < 40% Std?	**yes**		**yes**	
	Trigger Value	5.0	5.0	**25th % Ambient**	*20*	mg/L	0.07	
	RP to exceed trigger?		yes	Nonsignif = 25th% + (10% of std)	**120**	mg/L	**0.10**	
	Nonsignificance Value	--	**9.8**	**RP?**	**no**		**yes**	
	RP?	**yes**	**yes**					

Table 6.D. East Boulder Mine Current WQBELs for Outfall 002 (no Outfall 001)

REVISED JULY 2023

			Toxics [ARM 17.30.715(1)(c.)] TBELS														
			Cadmium, TR			Copper, TR			Lead, TR			Mercury, TR			Zinc, TR		
E. Boulder River			acute	chronic	human health	acute	chronic	human health	acute	chronic	human health	acute	chronic	human health	acute	chronic	human health
Low Flow (7Q10)		cfs		5.0			5.0			5.0			5.0			5.0	
% of 7Q10 to use		%	10	100	100	10	100	100	10	100	100	0	0	0	10	100	100
East Boulder River dilution flow	$Q_{s\text{-}EBR}$	cfs	0.5	5.0	5.0	0.5	5.0	5.0	0.5	5.0	5.0	0	0	0	0.5	5.0	5.0
GW flux		cfs		0.89			0.89			0.89			0.89			0.89	
% to use		%	100	100	100	100	100	100	100	100	100	0	0	0	100	100	100
GW dilution flow	$Q_{s\text{-}002}$	cfs	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0	0	0	0.89	0.89	0.89
Max. 30-day ave. discharge	Q_d	cfs	0.79	0.5	0.5	0.79	0.5	0.5	0.79	0.5	0.5	0.79	0.5	0.5	0.79	0.5	0.5
Ambient E. Boulder River concentration (75th percentile)	$C_{s\text{-}sw}$	µg/L	*0.03*	*0.03*	*0.03*	0.8	0.8	0.8	*0.08*	*0.08*	*0.08*	0.005	0.005	0.005	*8.0*	*8.0*	*8.0*
Ambient GW conc (75th percentile WW-1 w/003 dischg)	$C_{s\text{-}gw}$	µg/L	*0.03*	*0.03*	*0.03*	*2.0*	*2.0*	*2.0*	*0.3*	*0.3*	*0.3*	*0.0051*	*0.0051*	*0.0051*	*9.1*	*9.1*	*9.1*
water quality standard	$C_{r\text{-}sw}$	µg/L	**0.95**	0.45	5.0	**7.15**	5.07	1,300	**32.9**	1.3	15	**1.7**	0.91	0.05	**65**	65	7,400
Nondeg (=15% std, except Hg = 25th percentile background)	$S_{N\text{-}sw}$	µg/L		**0.07**	**0.8**		**0.76**	**195**		**0.19**	**2.3**		**0.0050**	**0.0050**		**9.8**	**1,110**
TRIGGER VALUE FOR NONSIG TOXICS (for Comparison to $S_{N\text{-}SW}$)		µg/L		**0.10**			**0.5**			**0.10**			**NA**			**5**	
Cd = Waste load allocation =	**WLA**	µg/L	**2.6**	**0.50**	**9.2**	**17**	**0.8**	**2,481**	**90**	**1.1**	**27**	**1.7**	**0.005**	**0.005**	**165**	**29**	**14,090**
$C_d = [(S_{N\text{-}sw} \times (Q_{s\text{-}sw} + Q_{s\text{-}gw} + Q_d)) - [(Q_{s\text{-}gw} \times C_{s\text{-}gw}) + (Q_{s\text{-}sw} \times C_{s\text{-}sw})]] / Q_d$							*WLA = nonsig										
number of samples per month ***(if = 1, enter 4)***	N		4			4			4			4			4		
coefficient of variation ***(if sample set >= 10, then SD/mean, else 0.6)***	CV		0			0.54			0			0			0.58		
acute and chronic long term average (99 %tile)	LTA_a LTA_c		2.56	0.50		5.9	0.4		90	1.12		1.7	0.005		55	16	
most conservative LTA	MIN (LTA_a, LTA_c)		0.50			0.4			1.12			0.005			16		
maximum daily limit (99 %tile)	**MDL**	µg/L	**0.50**	9.2		µg/L	**1.21**	4,740	µg/L	**1.1**	27	µg/L	**0.005**	0.005	µg/L	**48**	27,825
average monthly limit (95 %tile)	**AML**	µg/L	**0.50**	9.2		µg/L	**0.63**	2,481	µg/L	**1.1**	27	µg/L	**0.005**	0.005	µg/L	**24**	14,090
critical effluent flow		cfs	0.5			cfs	0.5		cfs	0.50		cfs	0.5		cfs	0.50	
CONVERSION TO AML LOAD-BASED			**0.0014 lb/day**			**0.0017 lb/day**			**0.0030 lb/day**			**0.000013 lb/day**			**0.065 lb/day**		

Table 6.D. East Boulder Mine Current WQBELs for Outfall (

REVISED JULY 2023

Harmful [ARM 17.30.715(f)]

			TN
E. Boulder River			human health
Low Flow (7Q10)	14Q5	cfs	10.5
% of 7Q10 to use		%	100
East Boulder River dilution flow	East Boulder River dilution flow	cfs	**10.5**
GW flux		cfs	0.89
% to use		%	100
GW dilution flow	GW dilution flow	cfs	**0.89**
Max. 30-day ave. discharge	Max. 30-day ave. discharge	cfs	**0.5**
Ambient E. Boulder River concentration (75th percentile)	75th percentile EBR ambient	mg/L	0.08
Ambient GW conc (75th percentile WW-1 w/003 dischg)	Ambient GW conc (75th percentile WW-1 w/003 dischg)	mg/L	0.68
	Circular DEQ-12A	mg/L	0.30
water quality standard	25th percentile EBR ambient		0.07
Nondeg (=15% std, except Hg = 25th percentile background)	Nonsignif harmful (25th% bkgd + 10% std)	mg/L	**0.10**
TRIGGER VALUE FOR NONSIG TOXICS (for Comparison to $S_{N\text{-}SW}$)			
Cd = Waste load allocation =		mg/L	**0.10**
$C_d = [(S_{N\text{-}sw} \times (Q_{S\text{-}sw} + Q_{S\text{-}gw} + Q_d)) - [(Q_{s\text{-}gw} \times C_{s\text{-}gw}) + (Q_{s\text{-}sw} \times C_{s\text{-}sw})]] / Q_d$			*WLA = Nonsi
number of samples per month ***(if = 1, enter 4)***			4
coefficient of variation ***(if sample set >= 10, then SD/mean, else 0.6)***		CV	0.66
acute and chronic long term average (99 %tile)		TSD Multiplier	0.621
most conservative LTA		chronic LTA 95th percentile	0.062
		LTA	0.062
maximum daily limit (99 %tile)			
average monthly limit (95 %tile)		AML mg/L	**0.10**
critical effluent flow		cfs	0.5
CONVERSION TO AML LOAD-BASED		**Load lb/day**	**0.27**