



2/27/2023

To: Colorado Department of Reclamation, Mining, and Safety,

We are pleased to submit The Watershed Center comments on Colorado Milling Company's recently completed conversion application for permit #M1994117 at the Gold Hill Mill. The Watershed Center (originally named the Lefthand Watershed Oversight Group) is a local stakeholder-driven watershed group that has been directly involved with water quality concerns in Left Hand Creek. Our Board of Directors include representatives from Boulder County, City of Boulder, City of Longmont, Colorado Division of Reclamation, Mining, and Safety, Left Hand Ditch Company, Left Hand Water District, St. Vrain and Left Hand Water Conservancy District, Town of Jamestown, Town of Ward, Trout Unlimited, and residents of the St. Vrain Basin. As a long-time watershed stakeholder, please consider our comments and list of technical questions and comments (Attachment A) as they relate to the Gold Hill Mill application.

Background Information

The Watershed Center has been monitoring the Captain Jack Mill Superfund site clean-up project since 2005 and subsequently monitoring water quality and aquatic life and habitat in the upper reaches of Left Hand Creek and the surrounding watershed. Water quality and aquatic life in upper Left Hand Creek are directly impacted by abandoned mines, with the most notable source being the Captain Jack site. In the Watershed Center's time working on Captain Jack Mill for over 15 years, we have had emergency events such as a fish kill in 2018 and lessons learned about the type of treatment, monitoring, and response time that's necessary to evaluate and alleviate water quality concerns.

Comments

Below we present a list of comments that address various components of the application with requests for revisions. In addition, Attachment A includes several technical questions and comments we would like to see addressed in your review.

Site Conditions

1. We are not confident that there is or will be no acid mine generation in the Times-Wynona mine shaft during milling operations. First, we do not see existing water quality data from the mine pool (location WS) presented in the application to demonstrate no existing acid mine generation. Second, the Section C Mining Plan states that, "Mineralization characteristic of the Boulder Country deposits is not generally acid producing"—this does not align with our experience involving the Big Five Tunnel at the nearby Captain Jack Mill site. In the Big Five Tunnel, acid generation in the mine pool is the crux of the Subsurface Remedy (*in situ* treatment). Moreover, during Captain Jack Mill's ongoing *in situ* treatment pilot study, monitoring showed that increasing the mine pool elevation exacerbated acid mine generation by exposing historically dry sections of the mine shaft to water. **We request that the applicant demonstrate their confidence that the Times-Wynona mine workings are not composed of acid-generating material, that the current mine pool water is not contaminated by reporting on current water quality, and that future increased mine pool elevation will not produce acid mine water.**

2. We are not confident that the tailings slurry will be chemically inert. On p. C-8 of the application, the proposal states, “What remains behind is non-mineralized ground up rock, known as tailings. The tailings slurry is chemically inert, as shown on the SPLP found in Appendix E-2.” First, Appendix E-2 can’t be found in the report (additionally, none of the maps listed in Exhibit E (Map E-2: Mill Extents, Map E-3: Reclamation Plan, Map E-4: Times-Wynona Mine, Map E-5: Tailings Storage Facility) are in the application). A search for “SPLP” in the document reveals Table U-3, which contains data for the release of a limited set of elements from the ore (*not tailings*) by the synthetic precipitation leaching procedure (SPLP; U.S. EPA Method 1312). These results are compared to “CDPHE Ag. Water Standards,” the relevance of which to evaluating water quality at this site are never stated. In most cases, the concentrations of elements released from the ore exceed these standards; therefore, it is incorrect to refer to the ore, or the resulting tailings, as “chemically inert.” **We request the applicant to clarify this claim or present a plan to remediate the contamination.**

Mining Plan

3. We are concerned about mine pool stratification in the Times-Wynona mine shaft without circulation in the Mining Plan. From our experience at Captain Jack, we have learned that mine pool water quality stratifies without circulation. Highly acidified water could be generated at depth and pose threats to groundwater without appropriate circulation. **We request the applicant consider revising their Mining Plan to include a circulation system in the Times-Wynona mine pool in order to homogenize water quality.**

Monitoring Plan

4. We are not confident the proposed Monitoring Plan has adequate sampling locations to detect stratified acid mine generation in the Times-Wynona mine pool and ground water contamination. Without proper circulation and monitoring at multiple elevations in the mine pool, highly acidified water could go undetected. Additionally, the current Monitoring Plan only includes ground water sampling locations on the south/southeastern slopes of Fourmile Watershed. Based on the location of the Times-Wynona mine shaft, we see ground water contamination risk to wells in the town of Gold Hill and waterways in the Left Hand Creek watershed. **We request the applicant consider revising the Monitoring Plan to 1. add sampling locations at WS, the Times-Wynona shaft to sample from multiple elevations in the mine pool to detect stratification, and 2. add ground water monitoring locations to the west and north to capture any contamination headed towards Gold Hill (to the west) or Left Hand Creek (to the north).**
5. We are concerned that the Monitoring Plan goals are inappropriate for the values at risk. From the existing monitoring data, we see that water quality parameters are in dissolved concentrations and are compared to agricultural standards. Based on the location of the mine, receptors potentially at risk include Gold Hill residents using groundwater for domestic water supply and aquatic life in surrounding surface waters; therefore, the standards for water quality comparison should be drinking water standards and aquatic life standards, not agricultural water standards. **We request the applicant clarify their monitoring goals and have the appropriate methods and standards to evaluate.**



Exceedance Plan and Emergency Response Plan

6. We are not confident in the timeliness and preparedness of the Exceedance Plan or Emergency Response Plan actions to detect and respond to exceedances, specifically in the case of an emergency (e.g., mine water release) that could impact water quality of Fourmile or Left Hand Creek. The Appendix C Water Monitoring Plan explains that in the event of a detected exceedance, follow-up monitoring will occur to investigate specific parameters of concern. The timeliness and preparedness of this Plan does not align with our experience at Captain Jack Mill site. From our experience at Captain Jack Mill, the fish kill in 2018 was a result of highly acidic water containing high concentrations of copper, zinc, and other metals (stratified in the mine pool) entering the creek during a managed mine pool release. In this situation, monitoring did not detect the issue until it was too late. The follow-up actions included immediately shutting down the release followed by construction of an *ex situ* water treatment facility that took months to be operational. The treatment facility is still on site today to mitigate future exceedances in case of emergency. **We request the applicant consider revising their Exceedance Plan to include 1. shorter analysis and reporting turnaround time when monitoring exceedances and 2. add a list of potential actions that may be implemented in the case of an exceedance and/or emergency situation (e.g. cease operations, external treatment facility).**

Thank you for considering our comments and requests in your application process. We look forward to your responses.

Sincerely,

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Attachment A. List of Technical Questions and Comments prepared by the Watershed Center.

1. p. B-5: The applicant noted that “There is a difference in altitude of over 700 feet between the Times-Wynona Mine portal and Left Hand Creek. Any intermittent surface water flowing from the Times-Wynona Mine area must progress of over 4500 feet to reach Left Hand Creek.” This seems to suggest that the 4,500 feet of separation between the mine area and Left Hand Creek is adequate protection against surface runoff that could result from over-filling the mine with water or from a pipe failure. But the gradient is almost 16% (700 ft / 4,500 ft), so surface flow will be fast over that 4,500 feet of separation and there will be little opportunity for any contaminants to be removed. Can the applicant clarify this claim?
2. p. B-6: “Typical wells in the area show static water levels in the granite well below the surface (80’+) and low yields (<10 gpm) from pumping. This is to be expected with wells in the granite system. Nearby wells are shown on Map E-1.” First, we cannot locate Map E-1 in the document, so we are not sure where the water wells near the mill are – Map E-1 is listed in the contents of Exhibit E (the 229th page of the document), but the map does not appear following this list of contents. Neither do any of the other maps listed in Exhibit E (Map E-2: Mill Extents, Map E-3: Reclamation Plan, Map E-4: Times-Wynona Mine, Map E-5: Tailings Storage Facility). We can’t fully review this application without seeing these maps.
3. p. B-6: “Groundwater monitoring has taken place downhill from the mill area to the south. The results of this monitoring can be found in Appendix B-2.” The groundwater monitor results are presented for a limited set of properties and elements. For the elements, results are provided only for the dissolved (filter-passing) phase, not the total concentrations of the elements, which would be higher. The concentrations are compared to “Agricultural Standards” for some unexplained reason – they should be compared to drinking water standards because groundwater used for domestic use is at risk.
4. p. C-5: “Water has been stored behind the Times-Wynona Mine bulkhead for over 30 years. The historic use of these underground mine workings for water storage has not disturbed the prevailing hydrologic balance of the surrounding area over those 31 years.” As noted in the previous Watershed Center comments, the main concern would be changes in the water level in the mine as the mine is filled with creek water or as the water in the mine fluctuates during milling. Will these changes in water levels affect water levels or water quality in nearby domestic water wells? Is there adequate monitoring to answer this question?
5. p. C-8: “Ore will be stored in stockpiles within the Stockpile Yard prior to processing.” How are releases of metal contaminants from the ore stockpiles (which are separate from the tailings storage facility) going to be prevented?
6. p. C-10: “Based upon milling operations at 50 tons per day, the mill can operate at full capacity for one-hundred (100) days before available capacity is filled. No processing will take place within the mill without either adequate capacity in the tailings storage facility or an approved offsite disposal/storage location.” The applicants previously stated that they want to operate the mill for seven years to process the 92,000 tons of ore, but here they state that they have capacity for only 5,000 tons of tailings storage (and later, they state that the storage is 15,000 tons). Does this mean that they will be applying for much more tailings storage in the future?



7. p. C2-1: In this section, the applicants list eight sampling locations in Table 1 and state that these locations are shown in Figure 1 (of this section). However, only six sampling locations are shown on Figure 1 – the locations of the WS (Wynona shaft) and MW1 (a groundwater sample) are not shown. Figure U-2 (p. U-2, 252nd page of pdf) does show the sampling locations on an aerial photograph of the site. These sample locations appear to be inadequate to monitor groundwater that may be pulled toward the residential water wells in the town of Gold Hill, which appears to be the most likely risk to public health for this facility.
8. p. C2-2: “Analytes for groundwater monitoring and the tailings storage facility (TSF) will continue to be those currently approved in the existing permit. These analytes have been the basis for monitoring at these locations for many years. Left Hand Creek (LHC) monitoring will be a larger suite as it is a baseline and background monitoring point.” The Watershed Center presents two issues with the list of analyses to be conducted on the groundwater and Left Hand Creek water samples:
(1) groundwater analyses are limited to dissolved constituents and (2) far fewer constituents will be measured in groundwater than in the Left Hand Creek water.
 - Because it appears that the major public health risk of this facility is to the groundwater used by residents of Gold Hill, the *groundwater samples should be measured for total concentrations* of the groundwater constituents, not just the dissolved (filter-passing) concentrations. Drinking water standards are based on total concentrations, not dissolved concentrations.
 - The list of constituents measured in groundwater should be increased to include those measured in the Left Hand Creek water samples to properly assess the quality of water potentially pulled in by residential water wells in Gold Hill. Notably, aluminum, chromium, selenium, thallium, and uranium should be included in the groundwater analysis list and compared with drinking water standards.
9. p. C2-4: “No well purging will take place prior to sampling of groundwater wells due to the low flow nature of granite fracture based groundwater systems.” Sampling without purging goes against all established groundwater sampling procedures. Water standing in a well between quarterly samples will be exposed to the atmosphere and subject to reactions that affect metal concentrations (e.g., oxidation and precipitation of reduced metals) which will be measured as concentrations of metals lower than what is actually moving in the groundwater. *The wells must be purged to pull in groundwater from the formation before sampling.* If the flow of groundwater into the well is considered insufficient for sampling, purge the well and sample a day later, a week later (but not three months later) when water has re-filled the well.
10. Appendix C-5 (96th page of pdf): The applicants have appended a “Construction Completion Report” for the tailings pond at the Gold Hill Mill. The report is dated December 22, 1998. Have requirements and regulations for tailings ponds changes in the past 25 years? Is this tailings pond still in proper condition? How has it been inspected over the years? How do we know that the tailings pond will operate as designed 25 years later?
11. p. U-2: “Appendix B-2 contains a summary of all monitoring results to date....The results are summarized in Appendix B-2 and compared to the Table Value Standards for Agricultural Water².” Footnote 2 refers to the CDPHE Regulation 41. The choice to use standards for agricultural water for assessing water quality at and around this mill is not clear. Receptors potentially at risk

include Gold Hill residents using groundwater for domestic water supply and aquatic life in surrounding surface waters; therefore, the *standards for water quality comparison should be drinking water standards and aquatic life standards, not agricultural water standards*. And the sampling plan should specify analyses for total and dissolved concentrations of constituents as needed for assessment relative to drinking water standards (total concentrations) and aquatic life standards (dissolved concentrations).

12. p. U-2: “As summarized, groundwater quality has been consistently good for the past seven years.” The water quality results presented in Appendix B-2 are limited to groundwater samples from locations W1, W2, W3, and W4 – no results are presented for the mine shaft (WS) or location MW1. Table B2-1 summarizes the maximum dissolved concentrations (in units of milligrams per liter, reported in a later table) recorded for a set of metals. First, there are quite a few data gaps (e.g., a maximum concentration of dissolved copper is reported for only one sampling location). Second, there are exceedances of the agricultural water standards for manganese at two locations, which does not fit the “consistently good” characterization used on p. U-2. Third, these results for groundwater samples should be compared to drinking water standards, not agricultural water samples.
13. p. U-2: “Well W1 (previously labelled MW1) will be the compliance point for groundwater around the mill.” If location W1 was previously labelled as MW1, then is the current location labelled as MW1 a new sampling location? Figure U-2 shows W1 and MW1 at different locations.
14. p. U-4: “In the flotation process, underflow from the gravity process thickener is pumped to the conditioning tank where several reagents are intensely mixed into the mineral-bearing slurry. The reagents include soda ash for pH adjustment; active reagents (promoters and collectors) that adhere to the desirable gold, telluride, and sulfide minerals; or depressants to de-activate unwanted minerals. The reagents to be utilized are itemized in Table U-1, shown elsewhere in this document.” This list of reagents is not present – Table U-1 is “Mill Layout Labels” (p. U-7). It appears that these reagents are listed in Table U-2 on p. U-8. They include four organic compounds used in froth flotation, the method used to separate gold from the ore, that are considered hazardous materials: (1) di-isobutyl dithiophosphate, (2) di-ethyl dithiophosphate, (3) isopropyl xanthate (decomposes to carbon disulfide), and (4) methyl isobutyl carbinol. These compounds should be included in the analyses for the groundwater samples.
15. p. U-5: “The tailings storage facility has been constructed to hold roughly 15,000 tons of tailings material according to the designs found in Appendix C-5.” This specification of the tailings storage facility capacity at 15,000 tons is three times higher than the capacity listed on p. C-10 (5,000 tons). What is the capacity?
16. p. U-15: “Note: No lab analyses will be conducted if there is not material to sample (i.e. dry ground water monitoring wells).” If there is not water in the monitoring wells, then the monitoring wells are not doing their job and must be replaced with monitoring wells that reach groundwater. Otherwise, the sampling plan needs to include sampling of domestic water wells to check for potential contamination.
17. p. 9 (276th page of pdf): In this Materials Containment Plan, the transport of chemicals to the site is addressed: “The chemicals used in the milling process will be delivered to the mine site by highway



trucks.” What are the risks of releases during transport on the steep, winding gravel roads that lead to the Gold Hill Mill? What are the plans for response to releases?