COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

February 11, 2022

Ms. Melissa Harmon
Cripple Creek & Victor Gold Mining Company
P.O. Box 191
Victor, CO 80860

Re: Project, Permit No. M-1980-244;
Technical Revision (TR130) Preliminary Adequacy Review

Dear Ms. Harmon:

The Division of Reclamation, Mining and Safety (DRMS) received a request for a Technical Revision (TR130) addressing the following:

Stormwater control improvements in the vicinity of the High Grade Mill

The submittal was called complete for the purpose of filing on January 20, 2022. The **decision date for TR130 is February 21, 2022**. Please be advised that if you are unable to satisfactorily address any concerns identified in this review before the decision date, **it will be your responsibility to request an extension of the review period**. If there are outstanding issues that have not been adequately addressed prior to the end of the review period, and no extension has been requested, the Division may deny this Technical Revision.

The following comments are based on the DRMS review of the request for TR130:

1) Purpose: The compliance problem #2 cited in the August 10, 2021 DRMS inspection report was directed toward stormwater controls at the High Grade Mill (HGM) and the area off of the Valley Leach Facility 1 liner. The specific requirement was "to describe or identify how the Operator intends to safely control impacted stormwater intercepted by the High Grade Mill liner." TR130 focuses the crusher area (which has no impact on stormwater at the HGM) and on the area east of the HGM. No designs or analyses are presented in TR130 demonstrating how existing or improved stormwater controls are going to effectively control stormwater intercepted by the HGM. Please provide analyses and designs demonstrating how stormwater intercepted by the HGM will be controlled, including routing of stormwater captured in the HGM area and routed to the VLF2 and/or the low area south of the HGM and north of VLF1 (hand labeled as "New Sump" on Drawing No. 30-647-501 in the TR-79 submittal). Discharge flows form the New Sump area are what caused the problem resulting in contact water being discharged off lined areas, and the erosion of DCF off the VLF2 liner. Furthermore, if stormwater routing controls are not designed and constructed to convey discharges from the "New Sump" area, then the New Sump needs to be a zero-discharge facility. No analyses are presented for the New Sump area. Please provide analyses and designs demonstrating the

remaining runoff to the New Sump area, accounting for the reduction in flow from the proposed improvements hydrologic analyses for the New Sump area should include runoff from the north slope of VLF1, as this slope has not been ripped for probably more than 20 years and would be expected to shed some runoff during a high intensity storm event (reflected in the use of CN = 91 for the crusher area watersheds).

2) Schedule: The TR states that project funding approval and construction planning will occur after the approval of TR130 with construction beginning once funding has been secured and as weather permits. Please provide a specific construction schedule to ensure timely construction activities with a project completion prior to June 15, 2022. Please also provide temporary measures that can be completed sooner to help control current discharge in the New Sump area to ensure stormwater infiltrates into VLF1 before reaching the current infiltration area that is adjacent to the edge of liner where overtopping occurred.

3) VLF2 Discharge: The last paragraph on the first page of the aforementioned January 11th TM, discusses rerouting HGM contact water "onto VLF2 for controlled discharge and infiltration". This raises concerns about potential washouts, ponded water as a wildlife attractant, and slope stability in the proposed discharge area of VLF2. The DRMS is keenly aware of the frequent maintenance required on the VLFs to facilitate the infiltration of process solution. Ponded contact water would not be allowed under the approved wildlife protection plan. If this rerouted contact water were to infiltrate quickly enough to avoid ponding (as alluded to in the first paragraph of Section 4.0 of the TR130 TM, and the current problem in the depression/New Sump) where, it would be expected to at least temporarily saturate the discharge area, causing potential stability issues and/or washouts. Please demonstrate these concerns are unwarranted.

4) Times of concentration: The three "Native Hillside" watersheds use the maximum 300 feet for sheet flow. Steep slopes accelerate sheet flow and heavily treed or rocky slopes tend to deflect sheet flow more quickly to the faster, shallow concentrated flow, thereby decreasing the time of concentration and increasing the estimated peak flow. Common practice for calculating times of concentration for steep, heavily treed or rocky slopes would limit the sheet flow to no more than 100 feet. Please make appropriate corrections.

5) SCS Curve Numbers: Please provide rationale for the selected curve numbers.

6) Rainfall depth: The analyses indicate the 100-year, 24-hour rainfall depth is 4.07 inches. A quick check of the online NOAA precipitation frequency atlas (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co) indicates the value is 4.26 inches (*reference: Latitude: 38.7321° Longitude: -105.1486° Elevation: 10277.21 ft*). The rainfall depth used for TR101 was 4.1 inches. Please use the same value used in TR101, or provide documentation for using a different value.

7) Existing Depression Retention Pond: Figure 2 indicates the depression just south of the LOB will be used as a retention pond, yet there is 2,331 feet of HDPE pipe proposed to convey flows to EMP-11. Additionally, the HEC-HMS schematic on the "Watershed Flow Calculations" sheet suggests gravity flow. Is water to be pumped into the HDPE pipe, or is it gravity flow? If its gravity flow, this would be a detention pond and means to limit sediment into the HDPH pipe need to be implemented to reduce the potential for lower flows to deposit sediment into the pipes flat sections, leading to a plugged pipe. If this is truly a retention pond, it will retain a mixture of non-contact water from the native hillside and contact water from the LOB and

VLF1 over a shallow liner, thereby limiting the infiltration rate and may take quite some time to pump out (no demonstration is made of the depression's storage capacity). As this depression is proposed to receive more runoff than it currently does, and will receive some contact water, it is a potential wildlife attractant. Please address the following:

a. Is the discharge pumped or gravity flow?

b. If gravity flow, how will sediment be restricted from entering the 2,331 feet of pipe?

c. How long is the depression expected to retain stormwater following the design event?

8) HDPE pipe flow and design: Attachment A, Pipeline Flow Calculations, indicates 1,336 feet of HDPE pipe are proposed between the depression near the LOB and EMP-11. Figure 2 shows 2,331 feet of HDPE pipe in the same reach. Hydraulic analyses for the pipeline uses Manning's equation, which assumes uniform steady state flow. The pipeline plan view in Figure 2 shows multiple horizontal bends, primarily in the flatter lower portion; and there will no doubt be multiple vertical bends given the terrain where the pipeline is proposed (no profile was provided). Flow in these transition zones is non-uniform. The aforementioned pipeline calculations also demonstrate the 18-inch pipe at a 2.1 percent grade between STA 4+86 and 6+17 will be 79 percent full with an 18-inch energy head. DRMS calculations indicate the Froude number is well over 1.1 in both analyzed segments of the 18-inch pipe, suggesting a hydraulic jump could easily form in the pipe in transition zones. The calculations for the 24-inch pipe indicates the pipe will be 76 percent full. DRMS calculations indicate the Froude number is between 0.9 and 1.1 in the 24-inch pipe, suggesting the flow could easily be either subcritical or super critical, thereby indicating uniform flow calculations may not be appropriate. This is an indication that pressure flow may likely occur, at which normal depth assumptions are no longer valid. Given the length of the proposed pipe and potential long term sediment deposition in the pipe (resulting from multiple consecutive low flow events), pipe flow should be re-evaluated using non-uniform flow methodology or the pipe size should be increased such that best practice of limiting uniform flow depths to less than 60 percent full is followed. Finally, there is no mention of cleanouts in the design. Given the length and variable flow conditions, sediment is very likely to be deposited in the pipe and become cemented in over longer periods of low flow events. {*Note: The DRMS expects the proposed ~460-foot, 24-inch diameter pipe between the low area near the crusher and EMP-11 to become blocked with sediment over time, but does not believe this pipe to be critical in stormwater management.*} Please respond to the following:

a. Provide consistent documentation on the length of pipe proposed.

b. Provide a profile of the proposed pipe between the LOB depression and EMP-11.

c. Perform either non-uniform flow analyses or increase the pipe size to limit uniform flow to less than 60 percent full.

d. Describe how maintenance/sediment removal will be performed on the long pipe.

e. Will the transition between the two pipe sizes be done with eccentric or concentric reducers?

9) Water balance: It is difficult to interpret the graphs in Attachment B, but it appears the 95 percent confidence is exceeded in late 2024 and most of 2027. Please provide additional

narrative and/or labels on the two graphs to explain how the proposed discharge to VLF2 will not exceed the 80 percent full requirements for VLF2.

10) Channel/scour velocity: The design report does not appear to be concerned with channel scour resulting from flow velocities in excess of 10 fps in an unarmored channel adjacent to what appears to be a major haul road that could be undermined by such high velocity flow, but does appear to be concerned with scour in the flatter section of the proposed HDPE pipe. The latter seems unlikely and not particularly problematic, whereas the former would appear to be more problematic. Please provide rationale as to why scour protection along the haul road is not a concern, or commit to armoring the "V" portion of the proposed channel.

11) VLF2 discharge protection: The design report states "Riprap with a D_{50} of 6 inches will be installed at the pipe outlet as needed to disperse energy and prevent eroding the VLF2 surface." No design analyses or even expected discharge velocity from the proposed pipe was provided. Assuming the concerns in Comment #3 above can be adequately addressed, please provide analyses and designs for the proposed outlet on VLF2.

12) Bond impact: The TR states there is no impact to the bond. However, the TR proposes installing about 1,830 feet of 18-inch HDPE pipe and 960 feet of 24-inch HDPE pipe. Removal of this pipe at final reclamation will impact the reclamation bond. The designs submitted to address Comment #1, will also specify the length and size of the additional pipe to be installed to convey stormwater intercepted by the HGM liner to VLF2.

If you have any questions or need further information, please contact me at (303)328-5229.

Sincerely,

Timothy A. Cazier, P.E.
Environmental Protection Specialist

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