

May 14, 2020

ELECTRONIC DELIVERY

Mr. Timothy Cazier, P.E.  
Environmental Protection Specialist  
Colorado Department of Natural Resources  
Division of Reclamation, Mining and Safety  
Office of Mined Land Reclamation  
1313 Sherman Street, Room 215  
Denver, Colorado 80203

**Re: Permit No. M-1980-244; Cripple Creek & Victor Gold Mining Company; Cresson Project; – Addendum to Technical Revision 103 – Valley Leach Facility 2 Ore Stacking Guidelines**

Dear Mr. Cazier:

Newmont Corporation's Cripple Creek and Victor Gold Mining Company (CC&V) hereby submits this Addendum to Technical Revision (TR) 103, outlining the procedures and placement of ore on the Squaw Gulch Valley Leach Facility (VLF 2). Enclosed as Attachment 1 is a technical memorandum from Newfields specifying updated stacking recommendations.

Should you require further information please do not hesitate to contact Katie Blake at 719.689.4048 or myself at 719.689.4042 or [Justin.Raglin@newmont.com](mailto:Justin.Raglin@newmont.com).

Sincerely,

PP

*Kathryn Blake*

Justin Raglin  
Sustainability and External Relations Manager  
Cripple Creek & Victor Gold Mining Co

JR/kb

Ec: T. Cazier – DRMS  
M. Cunningham – DRMS  
E. Russell – DRMS

P. Lennberg - DRMS  
B. Bowles – DRMS  
J. Raglin – CC&V  
J. Bills – CC&V  
K. Blake – CC&V  
W. Conley – CC&V

Enclosures (1)

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**ATTACHMENT 1:  
VLF2 ORE STACKING RECOMMENDATION**

## TECHNICAL MEMORANDUM

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Suite 300  
Lone Tree, CO 80124

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**To:** Cripple Creek and Victor Gold Mining Company  
**From:** Jay Janney-Moore, P.E.  
**Reviewed By:** Keith Williams, P.E.  
**Project:** Liner Integrity Engineering Support  
**Project No:** 475.0106.023  
**Subject:** VLF2 Ore Stacking Guidelines Rev 1  
**Date:** 16 April 2020

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NewFields has reviewed existing documents with the intent to consolidate information and provide recommendations to Cripple Creek and Victor Gold Mining Company (CC&V) regarding the ore stacking requirements for the Squaw Gulch Valley Leach Facility (VLF2).

### 1.0 BACKGROUND

The following documents were reviewed and included information related to ore placement:

- Filtered Tailings Storage in Arequa Gulch VLF letter, dated April 22, 2011
- Cripple Creek & Victor Gold Mining Company, Squaw Gulch Leach Facility Design report dated September 1, 2011
- Stability Re-evaluation: Squaw Gulch Valley Leach Facility technical memorandum dated January 28, 2014
- Non agglomerated Tailings Strength Assessment and Stability Evaluation – Rev 2 technical memorandum dated June 1, 2017

### 2.0 ORE PLACEMENT GUIDELINES

The following guidelines are applicable for ore placement within the VLF2 area.

- **The lift may consist of crushed ore, run-of-mine material (ROM), and tailings.**

Placing ROM doesn't pose any geotechnical risk to the pad and is preferred over crushed rock because of its higher shear strength and is an acceptable industry practice. Placing ROM has been in practice at CC&V since 1996 and included in Technical Revision 37. Since CC&V also



crushes ore and places it on the pad, the stability analysis completed to date has assumed the crushed ore is the only material on the pad as a conservative assumption since crushed ore has a lower strength than the ROM. Additional studies have included mixing crushed ore with materials with a higher percent of fines, like tailings, to verify the stability of the facility. Based on these analyses, the recommendations have been to place the mixed tailings in the interior of the pad where the finer grained material doesn't pose a geotechnical risk.

- **When the lift consists of blended tailings material, this material should be placed a minimum distance of 25' back from the final exposed slope (outside face) of each lift.**

As discussed in the documents listed in the background section, the placement of the tailings material should not be placed near the outside face of any slope due to the lower shear strength associated with the finer grained material. Keeping the tailings within the interior of the pad, a minimum of 25 feet from the outside face, minimizes geotechnical risks associated with loading of the pad.

- **The nominal ratio of materials placed on VLF2 is 10% tailings to 90% ore.**

The percent fines in the tailings and some crushed ore will effect of the overall shear strength and permeability of the pad. Based on the stability evaluations completed, and documented in the Non Agglomerated Tailings Strength Assessment and Stability Evaluation, keeping the overall ratio of the material placed in VLF2 to a mixture of 10% tailings to 90% ore, crushed and/or ROM material, has minimal effect on the strength and stability of the facility.

- **The lift height shall be a minimum of 20' and a maximum height of 100' for crushed ore and ROM with less than 3 inch maximum size rocks.**

The 100' maximum height was developed during the initial loading of the VLF1 pad to prevent the operators developing an excessive slope at angle of repose on the pad. The combination of the 100' lift heights and benches allows the operators to develop the overall slopes that are outlined below without additional reshaping. Additionally, keeping the maximum slope height limited to 100' with material less than 3 inches minimizes the initial loading stresses on the Drain Cover Fill (DCF).

The 20' minimum lift height recommendation was developed to minimize the force transferred to the DCF and geomembrane from a loaded haul trucks.



- **The initial lift height shall be a minimum of 20' and a maximum height of 50' for ROM with greater than 3 inch maximum size rocks when placing ore against DCF.**

To minimize the potential energy falling onto the DCF from the larger particle sizes, material with a diameter greater than 3 inches, it is recommended the maximum lift height be reduced to 50' *when placing on top of DCF. This is a common lift height observed in the industry when ROM material is placed on heap leach pads. When advancing new ore on top of existing ore, the subsequence lift height maybe increased to a 100'.*

The 20' minimum lift height recommendation was developed to minimize the force transferred to the DCF and geomembrane from a loaded haul trucks.

- **When ore is being placed directly over the DCF, the material should always be placed in an uphill direction.**

When ore is being placed directly over the DCF, the advancement of material should always be in an uphill direction. This is an industry standard practice. Most damage observed to the geomembrane liner during stacking operations happens when ore is placed on a pad in a downhill direction.

- **The overall slopes, which includes the bench width and the slope of the ore, shall have the following operational slopes based on a 100 foot lift thickness:**
  - On ore slope against up-sloping ground is 1.6(H):1(V), a bench with a minimum width of 20' is required between the crest of the lower lift and the toe of the new lift.
  - Ore Slopes against down-sloping ground is 2.5(H):1(V), a bench with a minimum width of 110' is required between the crest of the lower lift and the toe of the new lift.
  - Ore Slopes above the Pregnant Solution Storage Area (PSSA) is 2.5(H):1(V), a bench with a minimum width of 110' is required between the crest of the lower lift and the toe of the new lift.
  - Ore slopes above the Mill Platform were designed to be 2.0(H):1(V), a bench with a minimum width of 60' is required between the crest of the lower lift and the toe of the new lift.



Table 1 below summarizes the above guidelines information.

**TABLE 1**

Parameter	Value
Maximum Ore depth Over Geomembrane Liner	800 feet
Nominal Ore Angle of Repose Slope	1.4H:1V
Overall Operational Ore Slope against Up-sloping Ground	1.6H:1V
Overall Operational Ore Slope against Down-sloping Ground	2.5H:1V
Overall Operational Ore Slope above PSSA Embankment	2.5H:1V
Overall Operational Ore Slope above Mill	2.0H:1V
Maximum Ore Lift Height with Rocks with a Diameters Less Than 3 inches	100 feet (Note 1)
Maximum Ore Lift Height with Rocks with a Diameter Greater Than 3 inches	50 feet
Minimum Ore Lift Height	20 feet
Minimum Distance between the Crest of a Lift and Placement of Tailings	25 feet
Nominal Ratio of Ore to Tailings Mixture	10%

Note 1: This assumes that an engineered platform or base is available for initial loading (such as the PSSA)

Our most important guideline regarding ore placement is that ore should always be placed in an uphill direction over the drain cover fill (DCF). Due to the relatively steep slopes at CC&V, any placement in downhill direction (directly over the DCF) increases the risk of a slide that may cause damage to the DCF, piping and or geomembrane.



STATE OF  
COLORADO

Cazier - DNR, Tim <tim.cazier@state.co.us>

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## M-1980-244 - TR 103 Addendum

1 message

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**Katie Blake** <Katie.Blake@newmont.com>

Thu, May 14, 2020 at 1:50 PM

To: "Cazier - DNR, Tim" <tim.cazier@state.co.us>

Cc: "michaela.cunningham@state.co.us" <michaela.cunningham@state.co.us>, "Elliott Russell - DNR (elliott.russell@state.co.us)" <elliott.russell@state.co.us>, Patrick Lennberg - DNR <patrick.lennberg@state.co.us>, "Bowles - DNR, Brock" <brock.bowles@state.co.us>, Justin Raglin <Justin.Raglin@newmont.com>, Justin Bills <Justin.Bills@newmont.com>, Wendy Conley <Wendy.Conley@newmont.com>

Hi Tim,

Please see the attached addendum to TR 103 and let us know if you have questions.

Thanks, Katie



**Katie Blake**

SENIOR ENVIRONMENTAL COORDINATOR

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