From: Herrera, Andrew
To: Angland, Kevin M.
Cc: bflesher@mt.gov; Hector, Steve; Poisson, Kyle
Subject: RE: [EXTERNAL] Sludge Disposal trench
Date: Friday, May 5, 2023 2:37:25 PM

Greetings Kevin,

Below is a brief explanation of the sludge disposal trenches. Please let us know if you have any questions or comments. I tried keeping it brief but am happy to explain further.

Belt Water Treatment Plant Sludge Disposal

The Belt Water Treatment Plant (WTP) is designed to remove metals, primarily iron and aluminum, from mine-impacted water (MIW) through chemical precipitation processes, commonly known as the high-density sludge (HDS) process. Currently, these metals are being discharged into Belt Creek. Immediately after discharging into Belt Creek, the dissolved metals in the MIW oxidize and begin precipitating causing the orange, red, and white staining downstream of the Anaconda Adit MIW discharge location.

In the first step of the HDS process, hydrated lime ($Ca(OH)_2$) is added to water to create a lime slurry. The slurry is then combined with recycled sludge from the treatment process. This combination is then added to MIW to remove suspended solids, biochemical oxygen demand (BOD), and dissolved metals by precipitating HDS. HDS consists of metal hydroxides, gypsum, carbonate, unused lime, and water, all of which are non-toxic and insoluble under aerobic, neutral-to-alkali pH conditions.

HDS generated at the WTP will be disposed of on-site in unlined trenches adjacent to the WTP as shown on Figure C-P2-307. The risk of metal leaching from HDS is nonexistent, as the excess alkalinity available in the sludge is enough to sustain neutral pH. More specifically, the high residual lime ($Ca(OH)_2$) and precipitated carbonate ($CaCO_3$) content of the HDS will ensure a long-term buffering capacity and mineral stability. Over time, the HDS will harden with comparable properties found in weak cement as chemical dewatering occurs. This process reduces the permeability and subsequent potential for the infiltration of water through HDS.

The trenches will be located on-site on a topographic high away from surface drainage features, where surface water run-on and runoff can be managed to reduce the potential for contact with infiltrating precipitation. However, even if stormwater does contact the HDS, the metal hydroxides are insoluble and will not leach. The site receives on average 15-inches of

precipitation annually. The soil cover will be designed to direct precipitation off the disposal trenches and topographically downgradient to reduce residence time and decrease the potential for infiltration.

HDS disposal will be maintained on-site to reduce greenhouse gas emissions by lowering transportation requirements and will improve quality control by allowing direct supervision of HDS management. Allowing HDS to decant through infiltration and evapotranspiration will decrease HDS volume and increase HDS storage capacity. Water decanted from the HDS will be clean and have the same quality as water discharged from the plant.

Drew Herrera, P.E.
Senior Civil Engineer, VP
Office: 406-259-2412
Mobile: 307-680-0026
aherrera@hgl.com

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HydroGeoLogic, Inc.
315 N. 24th Street
Billings, Montana 59101
www.hgl.com

From: Angland, Kevin M. <kangland@cascadecountymt.gov>
Sent: Wednesday, May 3, 2023 9:41 AM
To: Herrera, Andrew <aherrera@hgl.com>
Subject: [EXTERNAL] Sludge Disposal trench

Good morning Andrew,

I am writing my findings of fact and I am on question #4 Protection of public community, or private water supplies, including possible adverse effects on surface waters or groundwater. I want to put in a little information about the sludge disposal trench, because I am anticipating that that could come up by the board so I want to try and address it beforehand.

Could you email me like a brief synopsis about the trench? Something along the lines of where the sludge is disposed, will the trench be lined, etc.

Thanks!
Kevin Angland
Planner, CFM
Cascade County Planning & GIS Department
Phone: (406) 454-6905| Fax:406-454-6919

Web: www.cascadecountymt.gov |Email: kangland@cascadecountymt.gov
121 4th Street North, Suite 2H/I, Great Falls, MT 59401

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