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Local View: Acid rock drainage a nonissue with Twin Metals mine

From the column: "Furthermore, Twin Metals has a host of innovations that set the project apart as a model operation, such as the environmentally friendly dry stack tailings method, carbon sequestration, an electric fleet, and a goal to become net zero."

Twin Metals' headquarters in Ely. Even with federal approval, Twin Metals' proposed underground copper-nickel mine would face years of environmental and permitting review. Clint Austin / 2017 file / Duluth News Tribune

By Rens Verburg

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If you read media coverage about copper-nickel mining, it’s likely you’ve seen references to one of its concerns: the potential for acid rock drainage. This is something the mining industry takes very seriously.

Yet, understanding it requires a deeper dive than the oversimplified assumptions we too often read about.

If acid rock drainage concerns you, I urge you to read on. As an expert on this topic, I believe it's critical to better understand this issue and how it may or may not apply to local mining projects.

So, how is acid rock drainage created? Some rock naturally contains sulfide minerals. Sulfides are made up of sulfur bound to another metal, such as iron, copper, or nickel. When oxidation of sulfide minerals occurs naturally or from mining, water that comes in contact with the rock may then contain higher levels of acidity. If not managed properly, this water can affect natural waters, resulting in potentially negative impacts.

Mining-related acid rock drainage may occur when improper or insufficient mitigation measures are in place for two materials: waste rock and tailings. Waste rock is any low-grade or undesirable rock removed during operations. Tailings are the leftover ground materials after the minerals of economic interest have been physically separated and removed from the ore.

In open-pit mining, several tons of waste rock are typically removed for every ton of ore. This waste rock is placed in piles, often around the open pit, and may contain elevated sulfide minerals, which could cause acid rock drainage if not managed properly. However, modern open-pit mines employ environmentally protective management plans for waste rock and are strictly regulated by U.S. government agencies.

With underground mining, such as the proposed Twin Metals Minnesota copper-nickel-cobalt project, tunnels are created to strategically target the ore deep underground. The underground mining method does not require excavation and movement of equally large amounts of waste rock, and no surface waste rock piles are needed. Therefore, the risk of acid rock drainage from surface facilities is zero.

As mentioned, tailings are a second potential source of acid rock drainage. It's important to understand that every mineral deposit's geology varies greatly, and a mine must tailor its mineral-processing methods based on these variations and the target minerals it's after. The processing step at a mine involves separating target minerals from the ore, resulting in a concentrate product that is sold. The leftover materials are the tailings, and, if they have a sufficient sulfide content, they can present acid-rock-drainage issues if unmanaged. Therefore, such tailings must be managed safely to ensure acid rock drainage does not occur.

The geology of the Twin Metals deposit is such that the target metals, copper and nickel, occur in the predominant sulfide minerals in the deposit. This is an important qualifier, because it means that during processing, these minerals are recovered and report to the concentrates. The financial success of the mining operation depends on the recovery of the sulfides. As a consequence, the leftover tailings do not contain enough sulfide minerals to create acid, so the risk of acid rock drainage from this potential source is zero.

So, acid rock drainage simply has little or no relevance to the Twin Metals project. Furthermore, Twin Metals has a host of innovations that set the project apart as a model operation, such as the environmentally friendly dry stack tailings method, carbon sequestration, an electric fleet, and a goal to become net zero.

Each of us consumes metals every day. As such, I encourage us all to dig deeper into the science behind our modern mining industry that produces the materials on which we are dependent.

Rens Verburg of Redmond, Washington, is a principal geochemist at Golder Associates USA (golder.com), with more than 30 years experience in the geochemical evaluation of mining issues. He was project director for the development of the Global Acid Rock Drainage (GARD) Guide for the International Network for Acid Prevention. The GARD Guide (gardguide.com) is a worldwide reference for best practices in preventing acid rock drainage.

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