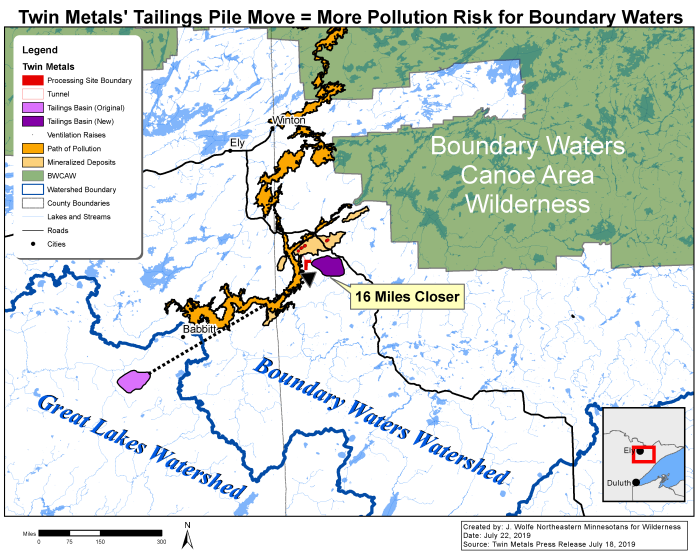
In 2019, Antofagasta's Twin Metals (TMM) announced that it would use a drystack method for permanently dumping its tailings next to lakes and streams that flow into the Boundary Waters. TMM said that four mines in North America ha□used this method of tailings pile without causing pollution. TMM wasn't being honest for at least three reasons.

□ **The Minnesota DNR has stated that dry stacking increases the likelihood of acid generation, and□ that "[d]ry stacked tailings that become wet again … are subject to oxidation and leaching.** As precipitation then intermittently washes through tailings, those heavy metals and other [pollutants] may be washed into surrounding soils and nearby water bodies." *See* Findings of Fact ##209 to 220 in Findings of Fact, Conclusions, and Order of Commissioner – November 1, 2018. Dam Safety Permits 2016-1380, 2016-1383: https://files.dnr.state.mn.us/lands_minerals/northmet/dam-safety/04-dam-safety-fof.pdf

□ 7RRKDPPRHGLWSURSRHGWDLOLQJXPS□ PLOHWRWKHQRUWKHDVWRIWKH□ /DNH The changeSODFHPLOOORRRQ□ of heavy metalDQGXOIXUODGHQPLQL wastePPHGLDWHOXSWUHDPURPDD connection to the Boundary Waters. The tailings dump would occupy most of a square mile, and be piled at least 130 feet high, or two to three times as high as the trees in the surrounding forest. Creating a permanent toxic dumping toxic tailings next to lakes and streams that flow into the Boundary Waters is highly risky.



The mines TMM points to actually have caused significant water pollution and lead□contamination. TMM asserted (see its July 18th, 2019 press release) that dry-stacking had "been successfully used in four mines in the northern United States and Canada with similar climates to Minnesota." When asked which mines the company was referring to, **a Twin Metals representativeidentified them as the Green's Creek and Pogo mines in Alaska, and the Raglan and Éleonore mines innorthern Quebec.** Here's what can be determined from available materials on these four mines:

- All four mines are still in operation. It sometimes takes a decade or two after mine closure for the full scale of water pollution to become evident. Even so, all four mines have polluted and may continue to pollute surrounding surface water and/or groundwater.
- **At the Green's Creek mine,** the "dry" stacked tailings pile has partially re-saturated, and the mine has polluted the waters and sediments of Hawks Inlet (on Admiralty Island, a National Monument) by discharging on numerous occasions total suspended solids and heavy metals, including lead and zinc, in excess of permit limits and water quality standards. [*See* 2013 Alaska Pollutant Discharge Elimination System Permit Fact Sheet for the Hecla Greens Creek Mining Company, https://bit.ly/2kwIIyI, at p. 11; *see also* pp. 7-9] The state of Alaska has so far failed to resurvey marine life in the bay for comparison with baseline studies that occurred in the 1980s, before the mine opened. Until those baseline studies are repeated the full impact from the mine, in terms of heavy metals contamination of the ocean and sea life, cannot be quantified. Alaska has confirmed elevated lead levels around, and at distances up to 1,695 feet from, the Greens

Creek mine tailings dump. Alaska Department of Environmental Conservation attributes the lead loading to fugitive dust blown from the dump during dry, cold, windy conditions. [*See* Final EIS for the Greens Creek Mine Tailings Disposal Facility Expansion, https://bit.ly/2lBn8ti, at p. "3-7"] As stated in Southeast Alaska Conservation Council's report, "Performance of Hecla Mining Company at the Greens Creek Mine in Admiralty Island National Monument":

> Hecla's claim that mining operations at Greens Creek have maintained or protected the surrounding marine environment is unsupported by credible scientific evidence. Neither the company, nor state and federal agencies, can show that mining operations at the Greens Creek Mine within the Admiralty Island National Monument meets the "no irreparable harm" standard for mining operations under the Alaska National Interest Lands Conservation Act. The record does show a 3-6 times increase in lead concentrations in various receptors within the adjacent marine environment.

- **At the Pogo mine,** water discharged by the mine contains excess nitrates, likely because the dry-stack tailings pile was built without a liner. It was said by the mining company and its contractors that a bottom liner would not add to water protection, but would increase the risk of re-saturation of the tailings and a future failure of the tailings facility:

> Permeabilities of the fine-grained dry-stack tailings themselves were not considered to be greatly different than permeabilities of an installed liner system. … Placement of an impermeable liner beneath the general placement zone likely would cause saturation of the tailings pile and result in occurrence of the worst case scenario, which was not the design intent. Thus, saturation caused by the impervious liner likely would increase stability risk. [*See* Pogo FEIS, https://bit.ly/2kL9K5x, at p. 4-182]

Groundwater monitoring wells installed downstream of the recycled tailings pond (RTP) dam, around the RTP, down-gradient from the ore body, and within the footprint of the mine's surface processing facility show violations of groundwater water quality standards (WQS) for nitrates, iron, arsenic, manganese, and other pollutants. For example:

> Two wells are located below the Drystack Tailings Facility: MW11-001A and MW11-001B. The wells monitor groundwater downstream of the DSTF and upstream of the Recycled Tailings Pond (RTP). Nitrates and TDS [total dissolved solids] remain above ADEQ [Alaska Department of Environmental Conservation] WQS in this area and Copper in MW11-001A.

Results in some groundwater wells also show chloride, nitrate, and sodium levels above "trigger limits," and Pogo reports that "mercury remains elevated" in the mine process water separated from the tailings. [*See* Northern Star's 2018 "Annual Activity and Monitoring Report" for the Pogo mine (https://bit.ly/2lGDgte), at pp 7-9, 14-17; 21-22]

- **"At the Raglan mine site,"** which began production in mid-1998, "site runoff and tailings water discharge that is collected in a holding pond, treated and then released to the environment continues to exceed toxicity limits. The closing of the zero process water discharge recycling loop has reduced the frequency of toxicity events." [*See* a May 10, 2004 "Annual Information Form," (https://bit.ly/2lxmFrX) filed with the Securities Exchange Commission (SEC) by Falconbridge Limited, then the Raglan mine's owner]

- **At the Éleonore mine,** which began operations in 2014, "elevated concentrations of ammonia and residual cyanide by-products were detected in mill effluent," a pollution problem that continued until October, 2017:

> "Following Éleonore's mill start-up in 2014, the new process water bleed (discharge) to water treatment plant (WTP) and paste backfill process resulted in increased

> concentrations of contaminants in water effluent, according to Goldcorp. Even though the cause of the ammonia and residual cyanide toxicity couldn't readily be identified, the Éleonore team immediately notified all major stakeholders … informing them on the extent of the problem and plans to rectify the situation."
>
> After years of discharging toxic effluent, Goldcorp, the parent and owner of the Éleonore mine, later gave the mine an environmental responsibility award for finally reducing – not eliminating – toxicity in its wastewater. [*See* International Mining (https://bit.ly/2TNXi5i)]

A review of available environmental performance data for the four mines shows that Twin Metals, when it said those mines had used dry-stacking successfully, was not correct. Twin Metals either failed to review the actual track record at those mines, intended to mislead Minnesotans, or has difficulty distinguishing between success and failure.