February 14, 2023

Manh Choh Project

Major Environmental Issues of Concern

In my opinion, the biggest environmental issues with hardrock mines are the long-term acid producing and metal leaching properties of the waste products, which are major problems with most hardrock mining ventures in Alaska including Red Dog, Donlin, the Pebble prospect, Pogo, Greens Creek, and now Manh Choh. A notable exception is the Fort Knox mine near Fairbanks. Most solutions to the problem after a mine has exhausted the mineral deposit has been to minimize oxygen exposure for reactive material and capture resulting mine effluent and provide some sort of treatment that will neutralize the acidity and precipitate the leached metals before releasing the water to the environment downstream. A long-term monitoring program is generally required to confirm that the mitigation efforts are effective. However, the toxic effluent can persist for hundreds or thousands of years following the closure of an acid producing mine. It used to be that mining ventures would simply abandon the mines when the ore was depleted and leave the mitigation to the State of Federal Government to deal with. Many of those abandoned mines in the lower 48 states are now superfund sites that will continue to be mitigated long into the future. The Alaska mining laws require that acid producing mines establish an assurance bond prior to the start of mining to cover the cost of eventual reclamation and closure of a mine, as well as perpetual mitigation of toxic effluent. The following section highlights some critical issues related to the handling, transportation, processing, and eventual disposal of these toxic waste products.

1. According to the geochemical characterization report (SRK 2022), the ore and much of the waste rock is acid producing and metal leaching, which means it must be handled carefully at every step of the process and contained after the gold is removed or organized in such a way that the contaminated effluent can be captured and mitigated before it causes harm in downstream aquatic habitats.
2. There are five primary regions in which the material must be contained: A) the mine site where waste rock and pit walls will remain; B) the road from the mine to the Alaska Highway staging area where the ore will be transported with large dump trucks that are not suitable for highway transportation; C) the ore will then be dumped at the staging area and reloaded on large double trailer haul trucks; D) the 250 mile route along a series of public highways and roads where the ore will be hauled, ultimately to the processing facility at Fort Knox; and E) the ore will be processed at the Fort Knox milling facility to extract the gold, leaving all of the acid producing and metal leaching tailings at the Fort Knox mine, which does not produce acid or large quantities of dissolved metals.
3. The reclamation and closure plan for the mine site, once the ore has been removed, is to move the waste rock back into the two pits, the primarily metal leaching rock in the north pit and the primarily acid producing rock in the south pit. The north pit will then be filled with non-reactive waste rock until it is slightly domed over the pit. An impermeable cap layer will be just below the top layer where plants will be sown. As such, snow and rain are expected to mostly run off and not fill the north pit, which will have groundwater saturating the lower reaches of the pit. Minimizing the rain and snowmelt is expected to reduce the metal leaching of the buried rock. The most reactive acid producing waste rock in the south pit will be below the level where the top of the groundwater is expected to reach. Submerging the reactive rock in water will minimize oxygen exposure and subsequent sulfuric acid production. A thick layer of nonreactive waste rock will cap the reactive material and elevate the surface above the expected water level but not as high as the rim of the pit. There will then be a depression in the south pit, rather than a dome, but the proponents are not expecting a lake to form. Based on the groundwater flow experiments that were conducted, they believe there will be a slow exchange of water from the pit to the larger groundwater reservoir and then into perennial streams that flow to the Tetlin Lake and Tetlin River on the south and east side of the Tetlin Hills, and the Tok River on the north and west side of the Tetlin Hills. They believe the acid and dissolved metals will be sufficiently diluted once they reach surface waters that they will achieve State of Alaska water quality standards. They intend to monitor water quality for at least 10 years following mining, and 7 years following closure from a series of groundwater and surface water test points on both sides of the Tetlin Hills. The implication being that if water quality did not achieve their expectations, they would be required to create a more robust mitigation plan.
4. Transporting the ore from the mine site to the transfer station is poorly described in the mine plan. It’s not clear if the large dump trucks used for this segment of the ore transportation operation will be covered or not. If there are no covers on the large dump trucks, high metal content fugitive dust will contaminate the landscape and associated wetlands as it has done along the Red Dog haul road in NW Alaska.
5. It isn’t clear whether there will be any indoor facility or other type of wind shelter at the transfer site where ore can be dumped from the mine trucks and then reloaded onto the highway haul trucks without having fine material blow away across the landscape and wetland habitats that prevail in that area.
6. The highway haul trucks are designed to have covers over their load beds to minimize fugitive dust. However, as demonstrated along the Red Dog haul road, despite covers, fugitive dust is still dispersed in smaller measure from the truck beds and from wheel wells, tires, underbeds, and other external features of the trucks. While the Red Dog haul road runs through a remote region of the State with no other traffic or communities, the route between the Tetlin transfer area and Fort Knox will be on public roads winding through several rural communities, agricultural areas, and urban cities on its way to and from the Fort Knox mine. The contamination risk from fugitive dust to people living beside this haul route could be substantial during the several year life of the Manh Choh mine.
7. Ore from the Fort Knox mine does not generate acid mine drainage or substantial amounts of metal leaching. As a result, the reclamation and closure plan suggests that when they exhaust the local mineral deposits they will be able to attain complete closure and stabilization of the mine site and associated effluent within 100 years and then walk away without consigning many generations of people to perpetually mitigate toxic effluent. Many mines, such as Red Dog and Donlin, will require generations of people far into the future to be mitigating the toxic effluents produced by those mines. But what happens to the Fort Knox reclamation and closure plans after four to five years of continuous deliveries of acid producing and metal leaching ore from the Manh Choh mine? In the Manh Choh geochemical characterization report, the proponents described blending Manh Choh ore with Fort Knox ore at 20:80 and 30:70, Manh Choh:Fort Knox, presumably to see whether tailings with a mix of ore types would neutralize acid production and metal leaching. They conclude that all ore samples produce acid and elevated levels of dissolved metals. Given these results, will Fort Knox then require perpetual mitigation of effluent? The Manh Choh documents suggest that Fort Knox will not require any additional permits or oversight to accept these very different type of ore deliveries. The Army Corps of Engineers wetland permit for the Manh Choh mine declined to consider wetland impacts beyond the actual mine site and associated road to the Alaska Highway transfer site.

Bibliography

Brumbaugh, W. G., and T. W. May. 2008. Elements in mud and snow in the vicinity of the DeLong Mountain regional transportation system road, Red Dog Mine, and Cape Krusenstern National Monument, Alaska, 2005–06. U.S. Geological Survey, Scientific Investigations Report 2008–5040.

EPA. 1994. Acid mine drainage prediction. U.S. Environmental Protection Agency, Office of Solid Waste, Technical Document EPA530-R-94-036, NTIS PB94-201829, Washington, D.C., 52 pp. <https://www.epa.gov/sites/default/files/2015-09/documents/amd.pdf>

Fort Knox Mine. 1993. Environmental Assessment. Prepared by CH2M Hill for Fairbanks Gold Mining, Inc, Anchorage, Alaska. Available in hard copy in Rasmuson Library in Fairbanks (TN423.A6 F347 1993 ALASKA), and from ARLIS (TN423.A7F35 1993). Digital copy also available from ARLIS upon request.

Hasselbach, L., J. M. Ver Hoef, J. Ford, P. Neitlich, E. Crecelius, S. Berryman, B. Wolk, and T. Bohle. 2005. Spatial patterns of cadmium and lead deposition on and adjacent to National Park Service lands in the vicinity of Red Dog Mine, Alaska. Science of the Total Environment 348:211–230.

Kempton, H., T. A. Bloomfield, J. L. Hanson, and P. Limerick. 2010. Policy guidance for identifying and effectively managing perpetual environmental impacts from new hardrock mines. Environmental Science & Policy 13:558–566.

Kerin, E. J., and H. K. Lin. 2010. Fugitive dust and human exposure to heavy metals around the Red Dog Mine. Reviews of Environmental Contamination and Toxicology 206:49–63.

Neitlich, P. N., S. Berryman, L. H. Geiser, A. Mines, and A. E. Shiel. 2022. Impacts on tundra vegetation from heavy metal-enriched fugitive dust on National Park Service lands along the Red Dog Mine haul road, Alasks. PLoS One 17(6):e0269801.

Pogo Mine Document: <https://dnr.alaska.gov/mlw/mining/large-mines/pogo/>

Red Dog Mine Documents: <https://dnr.alaska.gov/mlw/mining/large-mines/red-dog/>

Shock, S. S., B. A. Bessinger, Y. W. Lowney, and J. L. Clark. 2007. Assessment of the solubility and bioaccessibility of barium and aluminum in soils affected by mine dust deposition. Environmental Science and Technology 41:4813–4820.

U.S. Environmental Protection Agency. 1984. Final Environmental Impact Statement Red Dog Mine. Vol I: https://nepis.epa.gov/Exe/ZyPDF.cgi/20008ZOO.PDF?Dockey=20008ZOO.PDF

Vol. II: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000901U.PDF?Dockey=2000901U.PDF

SEIS. 2009: https://www.pewtrusts.org/-/media/assets/2019/09/hia-reports/red-dog-mine-extension-final-hia.pdf

U.S. Army Corps of Engineers. 2020. Pebble Project Final Environmental Impact Statement documents. https://www.arlis.org/docs/vol1/Pebble/Final-EIS/index.html

U.S. Environmental Protection Agency. 2003. Final Environmental Impact Statement Pogo Gold Mine Project. Available on the Alaska Department of Natural Resources Large Mines website,

Vol 1: https://dnr.alaska.gov/mlw/mining/large-mines/pogo/pdf/pogp\_feis\_vol\_%20I.pdf

Vol 2: https://dnr.alaska.gov/mlw/mining/large-mines/pogo/pdf/pogo\_feis\_vol\_II.pdf

Wilkin, R. T. 2008. Contaminant attenuation processes at mine sites. Mine Water and the Environment 27:251–258.

Yeoman, B. 2010. The mines that built empires. https://barryyeoman.com/2010/09/the-mines-that-built-empires/

SRK Consulting. (2022). Manh Choh Project: geochemical characterization report, revision 1.