Great Basin Resource Watch

Working with Communities to Protect Their Land, Air, and Water

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State Mining and Geology Board
801 K Street, MS 20-15
Sacramento, CA 95814

To whom it may concern,

Great Basin Resource Watch (GBRW) is a Nevada based non-profit organization founded in 1994 by a coalition of environmental, Native American, and scientific community representatives. We review mine and other facility proposals, permits, and expansions in the Great Basin and adjacent regions as need arises, and we recommend policy solutions. GBRW works with communities of the Great Basin to protect their land, air, and water from the adverse effects of resource extraction and use, and other industrial development.

These comments pertains to question 10 on the "Open-Pit Metallic Mine Backfill Regulations Pre-Rulemaking Workshop Questionnaire."

In Nevada there is no mining backfill requirement. Mining companies can request an exemption from full reclamation of open pits. In all cases the Nevada Division of Environmental Protection allows this exemption, thus open pits are not backfilled. Many of these open pits reach below the regional water table requiring dewatering during mining operations. At the close of mining these open pits begin to fill with water. According to the Bureau of Mining Regulation and Reclamation there existed 40 mining pit lakes in Nevada as of 2013.[1] There will be additional pit lakes, and most of the largest mining pits are still being worked, so the total volume of water that will be contained in all of the pit lakes is not close to being realized.

GBRW contracted hydrologist Dr. Tom Myers, who is very familiar with the Great Basin and mining to analyze the formation of pit lakes in the Humboldt River basin, which is where most of the largest pit lakes are expected. According to his analysis, 1,052,000[2] acre-feet of water will be locked up in the pit lakes of the Humboldt River Basin alone. The groundwater entering these pit lakes is typically of good quality often drinking quality; however, the water in the pit lakes is of much lower quality as a result of chemical reactions of the water with the walls of the pit and evaporation that will concentrate salts. As a result these not reclaimed open pits will eventually convert a very large amount of usable water into unusable water. The time required for the poor quality of the pit lakes water to become useable will vary considerably from decades to hundreds of years.

California should consider that just as in Nevada there will be many pit lakes that form from non-backfilled open pits. The amount of water lost to pit lakes in California is likely to be at least as great as in Nevada, since the water table is generally higher than in Nevada. Also, just as in Nevada water is precious and wasting water in pit lakes is not responsible water policy.

California should not count on assurances from mining companies that pit lakes will be of good water quality. One of the pit lakes near the Humboldt River that has been forming since 2006 is at the Lone Tree Mine. This pit lake was predicted to have good water quality. According to the Final EIS on the Lone Tree Mine:[3]

> "Water in the pit lake would be subject to natural buffering by groundwater and adsorptive removal of metals by precipitating AFH (PTI 1995). Pit lake water is predicted to be alkaline (pH =8.7-9.1) at all times during pit lake development."

This conclusion was wildly incorrect. The Lone Tree Mine, only a mile from the Humboldt River, ceased pumping groundwater (dewatering) in 2006, and the pit lake has been developing rapidly. Late in 2007 the lake acidity began to increase (pH dropping) to a point so severe that corrective action was required since it was a risk to wildlife (In 2008 Newmont Mining Corp received approval from the state of Nevada to add ~1,900 tons of caustic soda (sodium hydroxide – lye). Currently, the acidity of the lake has been kept in check with continual additions of lime (~65,000 tons[4] as of the end of 2013), a commonly used acid neutralizing agent. At this time is in unclear how long treatment will be needed with the possibility of treatment in perpetuity.

Pit lakes become contaminated and acidic as a result of reactive minerals, typically sulfides, that are exposed to air and water as the pit fills, and the process is catalyzed by bacteria that are always present. There are a number of methods that attempt to predict water quality at mines and in pit lakes. These acid/base accounting methods and longer-term kinetic testing can give an indication, but seldom are they very predictive when the geochemistrty of the rock and ore is neither very reactive or unreactive. In a 2006 study of water quality predictions in mines of western U.S. it is stated, "Of the 25 case study mines, nine (36%) have developed acid drainage on site to date. Nearly all the mines (8 of 9) that developed acid drainage either underestimated or ignored the potential for acid drainage in their EISs."[5] Because of the complexity of wall rock and the lack of understanding of what reactions occur when groundwater is removed, it is practically impossible to account for all of the factors in calculating future water quality in pit lakes.

GBRW recommends that California retain its backfilling requirement for open pit mines. Our experience with pit lakes, the water wasted, and potential need to aggressive indefinite water treatment underscores a very negative consequence of leaving open pits unreclaimed.

Sincerely,

John Hadder
Director, Great Basin Resource Watch

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[1] Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, "Draft Mining Pit Lake Water Quality Reference Values (Profile III)," November 5, 2013.
[2] Myers, T, "Hydrogeology of the Humboldt River Basin, Impacts of Open-Pit Mine Dewatering and Pit Lake, Formation (Preliminary Draft)," Prepared for Great Basin Resource Watch, Reno, NV, June 2010.
[3] United States Department of the Interior Bureau of Land Management, *FINAL Environmental Impact Statement Lone Tree Mine Expansion Project*, September 1996. Pg. 3-31.
[4] NDEP, "Water Pollution control Permit NEV90058,Fourth Quarter and Annual 2013 Monitoring Report – Pit lake, Newmont – Lone tree Mine, January 27, 2014.
[5] Kuipers, J.R., Maest, A.S., MacHardy, K.A., and Lawson, G. 2006. Comparison of Predicted and Actual Water Quality at Hardrock Mines: The reliability of predictions in Environmental Impact Statements.