ACID MINE DRAINAGE *and* MINING POLLUTION

Acid mine drainage (AMD) is a major environmental threat that results from hardrock mining (mining copper and other metals encased in sulfide-bearing ores, such as those in the Duluth Complex southeast of Ely). ***In excess of 95% of any rock disturbed for copper mining and other hardrock mining in Minnesota would be waste.*** When sulfide-bearing ore and the vast quantities of waste rock from mining are exposed to air and water, a chemical reaction among sulfides, air, and water creates sulfuric acid. Of course, preventing exposure to air and water is impossible as a practical matter. The sulfuric acid seeps into groundwater, streams, and lakes as AMD.

AMD is a worldwide problem, leading to ecological destruction in watersheds and the contamination of human water sources by sulfuric acid and toxic heavy metals, such as copper, nickel, manganese, arsenic, and lead. The sulfuric acid in AMD is a highly corrosive chemical. Sulfuric acid is used in many industrial processes, as well as in car batteries. It is also one of the primary constituents in acid rain, and is toxic to most living organisms. AMD can be many times more acidic than acid rain. Some is more acidic than battery acid. For instance, the Iron Mountain Mine in California contains water with a pH as low as -3.6, which is about 1000 times more acidic than battery acid.

Once sulfide-bearing rock is crushed and exposed to oxygen, acid generation is very difficult to contain or stop, and can continue for hundreds or thousands of years until the available sulfide minerals are exhausted. Some Roman-era mines in Europe more than 1500 years old are still producing acid mine drainage. The scale of modern mining, and the thoroughness with which the ore is crushed, dwarf ancient mines, raising concerns that our legacy of modern AMD will cause severe environmental and human harm for generations to come. The Draft Environmental Impact Statement for the PolyMet project south of Ely predicted heavy-metal contamination of local streams for 2000 years.

The damage caused by AMD is widely-recognized:

> Generation of contaminated drainage from abandoned, existing, and future mine sites has been identified by the US Forest Service (USFS) "as the most difficult and costly reclamation problem it faces with western metalliferous mining operations" (USFS 1993). According to the Abandoned Mine Land Task Force (1996), more than 100,000 abandoned mines in the western U.S. are located on BLM [U.S. Bureau of Land Management] and USFS lands; additionally, several thousand are reported on National Park Service (NPS) lands. Based on state 303(d) listings . . ., as many as 15,910 miles of stream length have been affected by contaminated drainage from metal-mining activities. USFS (1993) also identified more than 1500 mining sites on National Forest Lands that have been affected by contaminated drainage. Contaminated drainage adversely affects water quality, damages aquatic and riparian habitats, and consequently has the potential to impact wildlife and human health, and limit use and enjoyment of some of the more scenic portions of the Public Lands.

The Environmental Protection Agency estimates that headwater streams in 40 percent of Western watersheds are polluted by mining. A scientific review in 2006 of 25 modern Western mines by the environmental group Earthworks found that more than three-fourths resulted in water contamination. Over all, the EPA has estimated that it will cost $20 billion to $54 billion to clean up abandoned mine sites.

For more information, see Ground Truth Trekking's 2013 Acid Mine Drainage report: http://www.groundtruthtrekking.org/Issues/MetalsMining/AcidMineDrainage.html

Sulfates Discharge

In addition to AMD and metal contamination, chemical compounds called "sulfates" are often discharged from sulfide-ore mining operations when sulfides are oxidized. Sulfates are responsible for triggering the production of methylmercury, the toxic form of mercury that bio-accumulates in fish and results in fish consumption advisories. Mercury contamination causes brain and kidney damage and behavioral disorders in humans. In a study of newborn babies in the Lake Superior Basin (2007 to 2011), the Minnesota Department of Health found 10% of tested newborn babies have elevated levels of mercury in their blood and 8% of the tested newborn babies had mercury levels above the safe dose limit for methylmercury, likely from pregnant mothers eating fish. The mining industry is the major source of sulfate pollution in northern Minnesota.

U.S. hardrock mines will pollute up to 27 billion gallons of fresh water per year and cost as much as $67 billion per year to clean, in perpetuity.

The primary cause of this lasting pollution is AMD.