

Gold mines harm public health and the environment.



Aston Bay Holdings Ltd., a Canadian mineral exploration company, started drilling for gold in Buckingham County, Virginia in 2019 and has expanded its search for metals into additional localities of the Commonwealth. Industrial-scale gold mining has never taken place in Virginia. However, the environmental and public health impacts from gold mines in the U.S. are well-known and widely reported. Damage typically occurs through hazardous leaks, spills, and accidents; acid mine drainage; and airborne pollutants.

LEAKS, SPILLS, AND ACCIDENTS

Mining waste products—typically containing sodium cyanide, calcium oxide, and potassium amyl xanthate—regularly escape into the environment.² A recent study of gold mines in the U.S. found that 100% of the mines studied—representing 93% of gold produced in the United States in 2013—experienced an accidental release of hazardous materials.³

Recent examples of hazardous releases and accidents include the following:

- The Haile Gold Mine in South Carolina has multiple water quality violations including releasing excessive amounts of thallium, a toxic metal, into a nearby creek in 2020.⁴ The mine did not self-report the pollution until years after its operations began.⁵
- In 2015, an accident at a wastewater pond in Colorado released more than 3 million gallons of gold mining waste into the Animas River watershed, a primary source of drinking water for Colorado, New Mexico, Utah, and the Navajo Nation.⁶
- Accidents also threaten the health and safety of mine employees. In the U.S. in 2020, there were at least 797 injuries from accidents at metal mines.⁷

Cyanide, used to extract over 90% of gold mined in the U.S., is extremely toxic.⁸ It is lethal to humans (even in small amounts) and has been used as a chemical warfare agent for millennia. Sub-lethal exposures may cause Parkinson's disease and other neurological disorders.⁹

ACID MINE DRAINAGE

Open-pit waste dumps can contain pyrite and other sulfides that are unearthed during the mining process.¹⁰ Rainwater oxidizes these compounds, which acidifies the waste.¹¹ Acid mine drainage occurs when

acidic waste escapes into the surrounding environment through runoff or infrastructure failures.¹² As it travels downstream, acid mine drainage leaches toxic metals from rocks into surface and groundwater resources, thereby posing a serious threat to human health and the environment.¹³

In Prince William County, Virginia, acidic drainage from an abandoned pyrite mine was found to have leached dangerously high levels of cadmium, copper, lead and zinc.¹⁴ Each of these toxic metals accumulate in fish¹⁵ and, if ingested in excess quantities, are hazardous to human health:

- Cadmium and copper can damage the lungs and kidneys and irritate the digestive tract.
- Lead damages the brain and kidneys and can cause reproductive harm.
- Zinc damages the pancreas and may cause anemia.¹⁶

AIRBORNE POLLUTANTS

Gold mining generates dust and airborne pollutants that are carried by wind into surrounding communities.¹⁷ Soil contaminated with toxic metals poses a substantial risk to small children, who are more likely to accidentally ingest soil through crawling and playing, and who are physiologically more vulnerable to metal poisoning.¹⁸ In addition, toxic metals present in soil may bioaccumulate in crops.

Exposure to small-particle pollutants, which travel much greater distances and are more harmful to human health than large-particle pollutants,¹⁹ has been linked to:

- Heart attacks;
- Asthma;
- Decreased lung function;
- Respiratory symptoms, such as coughing or difficulty breathing; and
- Premature death in individuals with heart and lung disease.²⁰

REFERENCES

- ¹ U.S. ARMY CORPS OF ENGINEERS, FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE HAILE GOLD MINE PROJECT 3.19-3 (2014).
- ² EARTHWORKS, CYANIDE LEACHING PACKET 2 (2000); Ronald Eisler & Stanley N. Wiemeyer, *Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues*, 183 REVS. ENV'T CONTAMINATION & TOXICOLOGY 21, 23–24, 36 (2004).
- ³ BONNIE GESTRING & JOHN HADDER, U.S. GOLD MINES: SPILLS AND FAILURES REPORT 6–7 (2017).
- ⁴ Greg Summers, *State Fines Gold Mine After Water Violation*, LANCASTER NEWS (Sept. 23, 2020), <https://perma.cc/H4VE-JM36>; Letter from Scott McDaniel, Env't Manager, OceanaGold to Byron Amick, S.C. Dep't Health & Env't Control (Sept. 10, 2021), <https://perma.cc/D5G9-3X7C> (requesting modification to National Pollutant Discharge Elimination System (NPDES) permit for discharges into Haile Gold Mine Creek, includes report for reducing thallium).
- ⁵ Greg Summers, *State Fines Gold Mine After Water Violation*, LANCASTER NEWS (Sept. 23, 2020), <https://perma.cc/H4VE-JM36>.
- ⁶ Lucia Rodriguez-Freire, *Post Gold King Mine Spill Investigation of Metal Stability in Water and Sediments of the Animas River Watershed*, 50 ENV'T SCI. & TECH. 11,539, 11,539–40 (2016).
- ⁷ U.S. DEP'T OF LABOR, MINE INJURY AND WORKTIME 5, 20 (2020).
- ⁸ EARTHWORKS, CYANIDE LEACHING PACKET 2 (2000).
- ⁹ JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH, CYANIDE FACT SHEET 1 (2011).
- ¹⁰ Zenah W. Orndorff & W. Lee Daniels, *Evaluation of Acid-Producing Sulfidic Materials in Virginia Highway Corridors*, 46 ENV'T GEOLOGY 209, 209–10 (2004); K. Naicker et al., *Acid Mine Drainage Arising from Gold Mining Activity in Johannesburg, South Africa and Environs*, 122 ENV'T POLLUTION 29, 30 (2003).
- ¹¹ K. Naicker et al., *Acid Mine Drainage Arising from Gold Mining Activity in Johannesburg, South Africa and Environs*, 122 ENV'T POLLUTION 29, 30 (2003).
- ¹² *Mine Drainage*, U.S. GEOLOGICAL SURVEY, <https://perma.cc/V8UZ-KS9Y>.
- ¹³ *Abandoned Mine Drainage*, EPA, <https://perma.cc/PKX4-PYR7>.
- ¹⁴ Michael Komalowski et al., *Mitigation of Acid Mine Drainage and Other Contamination in the Prince William Forest National Park in Northern Virginia*, in CONTAMINATED SOILS, SEDIMENTS, AND WATER 175, 176–78 (Edward J. Calabrese et al. eds., 2004).
- ¹⁵ Samuel O. Asagba et al., *Bioaccumulation of Cadmium and its Biochemical Effect on Selected Tissues of the Catfish*, 34 FISH PHYSIOLOGY & BIOCHEMISTRY 61, 66 (2008) (cadmium); Feng Liu et al., *Metal Accumulation in the Tissues of Grass Carps (Ctenopharyngodon idellus) from Fresh Water Around a Copper Mine in Southeast China*, 184 ENV'T MONITORING & ASSESSMENT 4289, 4297 (2012) (copper, lead, zinc).
- ¹⁶ Michael Komalowski et al., *Mitigation of Acid Mine Drainage and Other Contamination in the Prince William Forest National Park in Northern Virginia*, in CONTAMINATED SOILS, SEDIMENTS, AND WATER 175, 176 (Edward J. Calabrese et al. eds., 2004).
- ¹⁷ Zunaira Asif et al., *Air Quality Modeling for Effective Environmental Management in the Mining Region*, 68 J. AIR & WASTE MGMT. ASS'N 1001, 1001 (2018).
- ¹⁸ Enio Barbieri et al., *Indoor Metallic Pollution and Children Exposure in a Mining City*, 487 SCI. TOTAL ENV'T 13, 13 (2014).
- ¹⁹ Janae Csavina, *A Review on the Importance of Metals and Metalloids in Atmospheric Dust and Aerosol from Mining Operations*, 433 SCI. TOTAL ENV'T 58, 60 (2012).
- ²⁰ *Health and Environmental Effects of Particulate Matter (PM)*, EPA, <https://perma.cc/DR2S-YY5T>.



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