



Tamarack Water Alliance Community Zoom Meeting Wednesday, July 8, 2026 10am CT

TOPIC: Dangers of Sulfide Mining
PRESENTED BY: Tom Anderson, MSEE

Many metals of economic interest (such as nickel, copper, gold and cobalt) are found in high sulfide ores. The metals in these ores are bonded to sulfur, forming sulfide minerals. The amount of sulfur in these ores can be 5-10 times higher than any specific metal of interest. In the case of the proposed Tamarack/Talon/Rio Tinto underground mine in Minnesota, nickel comprises only 1.73% of the ore on average based on the latest Talon publications. Other high sulfide nickel and copper mine proposals in Minnesota claim mineral content even lower, often less than 1%. As such, high sulfide mining creates a very large amount of waste sulfur which is often discarded into the environment with many toxic effects.

Tom Anderson has Master of Science in Electrical Engineering from the University of Minnesota, is a resident of Tamarack, Minnesota as well as a founding member of the Tamarack Water Alliance. He is recently retired as principal technologist for the Alliance for Telecommunications Industry Solutions, or ATIS (atis.org), a Washington, D.C., nonprofit that assists telecommunications service providers and vendors with information and communications technology and standards. He also teaches a variety of courses in the UMD Seniors program.

Support Water Over Nickel Campaign - Protect or Pollute?

The Minnesota DNR is expected to open a 60-day public comment period on the Tamarack Mine from July 14 through September 12, 2026. This will be the first formal opportunity for Minnesotans to provide feedback on the project proposal during the environmental review process.

Public comments can help influence environmental standards, permitting requirements, and how state agencies evaluate the project's potential impacts on water, communities, and natural resources. To voice your concerns when the comment period opens go to: <https://waterovernickel.com/>.

Additional details regarding times, format, and participation requirements are still being finalized by the DNR. We will share updates as soon as they become available.

Upcoming 'Water Over Nickel' Events

- **Tuesday, July 28, 2026 - 12pm Webinar**
Beyond the BWCA: Sulfide Mining Looming Threat to Minnesota
with Water Over Nickel, Friends of the Mississippi River, and Minnesota Center for Environmental Advocacy (MCEA)
https://us02web.zoom.us/webinar/register/6617815478911/WN_yx5UzFMdQ2GMyY0nRIx0uw#/registration
- **Sunday, August 2, 2026 - RIPPLE 2-4pm**
Cultural Arts Exhibit at Grand Casino Hinkley, MN
<https://waterovernickel.com/ripple-cultural-arts-show>
- **August 5- DNR Public Meeting McGregor High School**
- **August 12- DNR Public Meeting Blaine Sports Arena**

Get Involved

You can donate on our website anytime at <https://tamarackwateralliance.org/donate.html> or through the Grand Rapids Area Community Foundation, (gracf.fcsuite.com/erp/donate/create/fund?funit_id=4849) for tax deductible contributions to a 501c3.

We invite your donations now and throughout the year. Tamarack Water Alliance is all volunteer Minnesota non-profit with no paid staff. Every penny you donate goes to support our hard work educating the public about the risks of sulfide mining to our water, environment, fish, wild rice, and ecosystems.

Your donation goes to support our community educational activities which include tabling at community festivals and parades, participation in other community events, targeted speaking engagements with interested local organizations, monthly informational public zoom calls and an associated email newsletter, website and social media, letter writing campaigns and articles in local news outlets, interviews with media, and other community outreach and canvassing.

Our current focus is on providing education about the risks of sulfide mining, narratives to counter the greenwashing and divisiveness that some mining companies promote, as well as forging connections to other communities concerned about sulfide mines in Minnesota, across the Midwest, and around the world. Thank you for your contributions to our work.

REQUEST Presentation On Risks of Sulfide Mining for your group, Rotary Club, church or community club. Send us an email at waters@tamarackwateralliance.org.

DOWNLOAD Tamarack Water Alliance fact sheets/flyers [here](https://tamarackwateralliance.org/resources.html#flyers)
(<https://tamarackwateralliance.org/resources.html#flyers>).

SIGN-UP To Receive Updates from the DNR on Talon Metals Environmental Impact Statement [here](https://www.dnr.state.mn.us/input/environmentalreview/tamarack-nickel-project.html)
(<https://www.dnr.state.mn.us/input/environmentalreview/tamarack-nickel-project.html>).

VOLUNTEER with the Tamarack Water Alliance. Send us an email at waters@tamarackwateralliance.org.

SIGN-UP FOR THIS NEWSLETTER: Encourage your friends, family and neighbors to sign up for the monthly Tamarack Water Alliance email newsletter at tamarackwateralliance.org/php/articlereg.php.

Sulfide Mining is Destructive and Dangerous
Tom Anderson, MSEE



Elizabeth Copper Mine, Superfund Site Vermont-Edward E. Meyer, May 8, 2014, CC BY-SA 3.0 , via Wikimedia Commons

Many metals of economic interest (such as nickel, copper, gold and cobalt) are found in high sulfide ores. The metals in these ores are bonded to sulfur, forming sulfide minerals. The amount of sulfide minerals in these ores can range as high as 70% (see talonmetals.com/talon-metals-feasibility-study-drilling-shows-potential-lateral-extension-of-high-grade-nickel-copper-mineralization-beyond-the-southernmost-tip-of-the-tamarack-resource-area/.) The sulfur content of high sulfide mine ore may be 5-10 times higher than the specific metal of interest. As such, high sulfide mining creates a very large amount of waste sulfur which is often discarded into the environment with many toxic effects.

Toxic Consequences of High Sulfide Mining

Sulfur waste from high sulfide mining operations as well as exploratory bore hole cuttings have at least 3 toxic consequences for the environment and the general population.

- **Acid Mine Drainage (AMD):** When sulfide mining waste is exposed to air and moisture, a chemical reaction occurs over time that generates sulfuric acid which migrates into the surrounding environment and, through leaching, releases heavy metals present in the waste rock, pit walls, and tailings basins of mining operations. The sulfuric acid along with dissolved heavy metals released onto the land will seep into the aquifers below and then into streams and lakes at levels that are toxic to fish and other aquatic life. This process can often take 20 years or more to unfold and as such, becomes a ticking time bomb in high sulfide mining areas. The close proximity of sulfide mines to valued water bodies such as lakes and rivers of the Mississippi watershed intensifies the magnitude of this issue. All of the water bodies in the Tamarack Minnesota area are linked by multiple aquifers.
- **Methylmercury in fish:** Sulfur reducing bacteria convert free mercury in the environment to methyl-mercury, a potent neurotoxin which can accumulate in fish creating fish consumption limits. Consumption of methyl-mercury contaminated fish can cause serious health problems.
- **Die-off of Wild Rice Waters:** Wild rice is very sensitive to sulfate levels and require an environment where sulfate levels are less than 10ppm, thus even relatively low levels of sulfates in wild rice areas can decimate wild rice crops. Wild rice is very difficult to reintroduce once it is gone.

Acid Mine Drainage - High Sulfide Mining Leads To Contaminated Water

Many organizations have noted that anytime a sulfide mine has been built in a water rich area, the water has been contaminated. Of course, new mines open over time so no single reference can ever be "up to date" in support of this statement. Nevertheless, we can show that no high sulfide mine has been found to not contaminate the local water based environment, particularly in wetland areas.

For example, research (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) (tamarackwateralliance.org/docs/KuipersMaest2006_EISComparisonsReport.pdf) shows that mines with high acid generating potential and in close proximity to surface and groundwater are at highest risk for water quality impacts. This report studied 25 operating hard rock mines (not just high sulfide mines) and their EISs. All predicted compliance with water quality standard within their EISs however pollution from 85% of mines near surface water and 93% of mines near ground water exceeded water quality standards. In addition, 89% had inaccurately predicted that they would not create AMD.

Sulfate Reducing Bacteria Produces Methyl-Mercury in Fish

Atmospheric mercury (Hg) is the dominant source of Hg in northern Minnesota. Taconite plants, are the largest industrial source of mercury pollution in Minnesota, have vented the toxic metal for years into the air without enforced limits. (<https://www.pca.state.mn.us/air-water-land-climate/reducing-mercury-releases>). Coal-fired power plants are another significant source of mercury. Atmospherically derived Hg must be methylated prior to accumulating in fish and sulfate-reducing bacteria are the primary methylators of Hg in the environment. Thus sulfur plus mercury creates methylmercury which is a potent neurotoxin. Methylmercury is fat soluble and thus can "bio-magnify" in the food chain (in fatty tissues), primarily in fish and shellfish.

Methylmercury can cause a wide range of health effects, including:

- Neurological damage (e.g., tremors, seizures, memory loss)
- Kidney damage
- Cardiovascular problems
- Developmental problems in children (e.g., brain damage, motor coordination difficulties)

The "Mercury in Newborns in the Lake Superior Basin" study showed that ten percent of tested newborns in the Minnesota arrowhead had concentrations of Mercury above the reference dose. This is in contrast to a 3% rate in Wisconsin and 0% of Michigan samples were above the U.S. EPA dose limit. It is likely that taconite mine operations and associated release of sulfur on the iron range has created increased methyl-mercury load in local fish. Indeed, babies born during the summer months were more likely to have an elevated mercury level suggesting that increased consumption of locally caught fish during the warm months is an important source of pregnant women's mercury exposure in this region (<https://www.lrl.mn.gov/docs/2025/other/251327.pdf>).

High Sulfide Mines Can Generate High levels of Toxic Dust and Gases Vented into the Atmosphere

Mining activities such as shoveling, bulldozing, and blasting, crushing, grinding, and screening rock, soil, and other materials can result in dust (PM10) air pollution. Vented dust from high sulfide mine operations (PM2.5 and PM10) will have high sulfate concentrations and can travel 30 miles. (www.clarity.io/blog/pm10-air-pollution-from-mining-activities-monitoring-dust-for-mining-operations). Sulfate particulate matter settles on the land, washed into rivers and wetlands over many years resulting in sulfate based environmental damage.

Sulfide Mining Threatens Tribal Wild Rice Resources

Minnesota ranks #1 in the United States for wild rice production, both naturally grown and cultivated wild rice is very sensitive to sulfide contamination. Anishinaabe seasonally harvest tens of thousands of acres of wild rice in Northeastern Minnesota's undisturbed watersheds Manoomin is sacred to their way of life. Pristine water quality must be maintained for wild rice to germinate, grow, and survive. Sulfates bound in glacial/bedrock geology are released when the water is disturbed due to mining, endangering wild rice fields. Many lakes and streams around the Great Lakes have already lost their wild rice. Wild rice is hard to restore once it is gone. Minnesota's wild rice sulfate standard limits sulfates to 10 parts per million (ppm or mg/L) in wild rice waters.

High sulfide mining (e.g. for copper and nickel) is destructive and dangerous to both the environment and human health. Mining is not a sustainable activity as these ore bodies are soon depleted. The long term health of the economy requires more focus on recycling to reuse minerals previously mined rather than further depleting our resources.

REFERENCES

1. <https://talonmetals.com/talon-metals-feasibility-study-drilling-shows-potential-lateral-extension-of-high-grade-nickel-copper-mineralization-beyond-the-southernmost-tip-of-the-tamarack-resource-area//li>>
 2. https://tamarackwateralliance.org/docs/KuipersMaest2006_EISComparisonsReport.pdf
 3. <https://www.pca.state.mn.us/air-water-land-climate/reducing-mercury-releases>
 4. <https://www.lrl.mn.gov/docs/2025/other/251327.pdf>
 5. <https://www.clarity.io/blog/pm10-air-pollution-from-mining-activities-monitoring-dust-for-mining-operations>
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Sulfide Mining Pollution: What Actually Happens

From author David Willms in Meateater: "...Over the past sixty years, major sulfide copper mines in the United States and Canada have a consistent record: nearly 100% of them contaminated surface or groundwater. This happens even using the most advanced technology and prudent regulations of today."

"...In Montana, California, Vermont, Idaho, and British Columbia, former and current mining sites have produced acidic, metal-laden water that contaminated rivers, streams, and groundwater. Some of these sites, such as the Berkeley Pit in Montana or Iron Mountain in California, require continuous water treatment and will likely do so forever. This perpetual treatment occurs at great taxpayer expense..."

Willms writes that these problems do not emerge immediately, but over a long slow period of time, often after mines have closed. "...Across different companies, different regulatory regimes, and different decades, the outcome has been as consistent as gravity. Water contamination follows sulfide mining. This is not a condemnation of individual operators. It reflects the inherent difficulty of managing sulfide waste over long periods of time in real-world conditions..."

Excerpts from Water over Nickel Campaign

"We can advance a green economy without relying on practices that threaten clean water"

"The proposed Tamarack Mine sits near homes and culturally significant places, including Rice Lake, Sandy Lake, and Round Lake. About **90% of the ore body lies beneath wetlands, peatlands, and lakes** - making this a uniquely risky place to mine." (Friends of the Mississippi River, 2025)

"In water-rich landscapes like Tamarack, mine runoff and pollution risks can persist for 500-1,000 years. Contamination can spread through major watersheds and affect communities far beyond the mine site." (Friends of the Mississippi River, 2025)

"Recycling could cut demand for new mining by 25-40% by 2050, and recycled minerals produce about 80% fewer greenhouse gas emissions than newly mined materials." (IEA, 2025)

Newer battery chemistries such as LFP (iron-phosphate) and sodium-ion are increasingly meeting booming EV demand while reducing reliance on nickel and cobalt in the clean energy. (ScienceDirect, 2024)

<https://waterovernickel.com/>

Who We Are

Tamarack Water Alliance is a group of local residents and landowners working together with others from across Minnesota to protect water and community health from the dangers of sulfide mining near our beloved lakes and wild rice beds, at the headwaters of the Kettle River and in the Mississippi River watershed. Visit our website [here](https://tamarackwateralliance.org/index.html) (<https://tamarackwateralliance.org/index.html>).

A proposal by a foreign owned mining company, Talon Metals/Rio Tinto to mine nickel and other metals near Tamarack in Aitkin County threatens the health of our communities. This kind of sulfide mining, especially in water-rich environments, has never been done without severe impacts to water and the health of those downstream. Mining here is also a threat to environmental justice and the long-term economic security of nearby native and rural communities.

Review our **community slide presentation** (tamarackwateralliance.org/docs/TamarackMineConcerns-Consolidated.pdf) and download **informative flyers** (tamarackwateralliance.org/resources.html):

- Talon Mine Risks
- Geology of Aitkin County
- Talon Dumping Toxic Drilling Waste,
- Minnesota Declares Round Lake Impaired
- High Sulfide Mines Create Acid Mine Drainage
- Nickel Not Needed for Future EV Batteries
- Minnesota's Prime Wild Rice Lakes Under Threat,
- Difference Between High Sulfide Mining and Taconite Mining
- Minnesota Regulators Poor Record In Protecting The Environment
- Eagle Mine Environmental Report & Saving Our Meager Nickel Reserves
- Is There Really A Talon Tesla Supply Agreement? (no)
- Rio Tinto: A History of Corruption
- Green Bridge Metals -Canadian proposed sulfide mine near Duluth seeks to acquire battery rich mineral assets
- Copper and The Green Economy

- Prove It First!

We will send this monthly newsletter to keep you informed about this project, to share information and opportunities to act to protect clean water and community health.

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