



Tamarack Water Alliance

Talon Tamarack High Sulfide Nickel Mine Project

- **About the Proposed Tamarack High Sulfide Mine**
- **Impact of High Sulfide Mining**
- **Key Mining Concerns**

<https://tamarackwateralliance.org/>

The Proposed Tamarack Mine

- ❖ Talon proposes to build an underground high sulfide nickel-copper mine near Tamarack, MN in Aitkin County.
- ❖ 7-10 years of production with a total yield of about 10.5 M tons of ore
 - Talon has resubmitted their Environmental Assessment Worksheet (EAW) in December 2025.
 - Located in a wetland area, in the 1855 treaty territory / Anishinaabe lands, near Minnewawa and Big Sandy Lake... Mississippi and Kettle Rivers (St. Croix).
 - They claim project construction may start in 2028 (earliest), and the construction duration is anticipated to be <27 months, with production starting in 2029
 - Target mine area is 378.8 acres out of the 20,348 acre Tamarack North Project area (green on the right) (2%)
- <https://files.dnr.state.mn.us/input/environmentalreview/tamarack-nickel/2025-12-26-tal-amended-eaw-data-submittal.pdf>
- <https://files.dnr.state.mn.us/input/environmentalreview/tamarack-nickel/2025-12-26-tal-amended-eaw-data-submittal-figures.pdf>
- TALON 2021 Preliminary Economic Analysis - PEA (https://talonmetals.com/wp-content/uploads/2021/02/Talon-Tamarack-PEA3_2021.pdf)

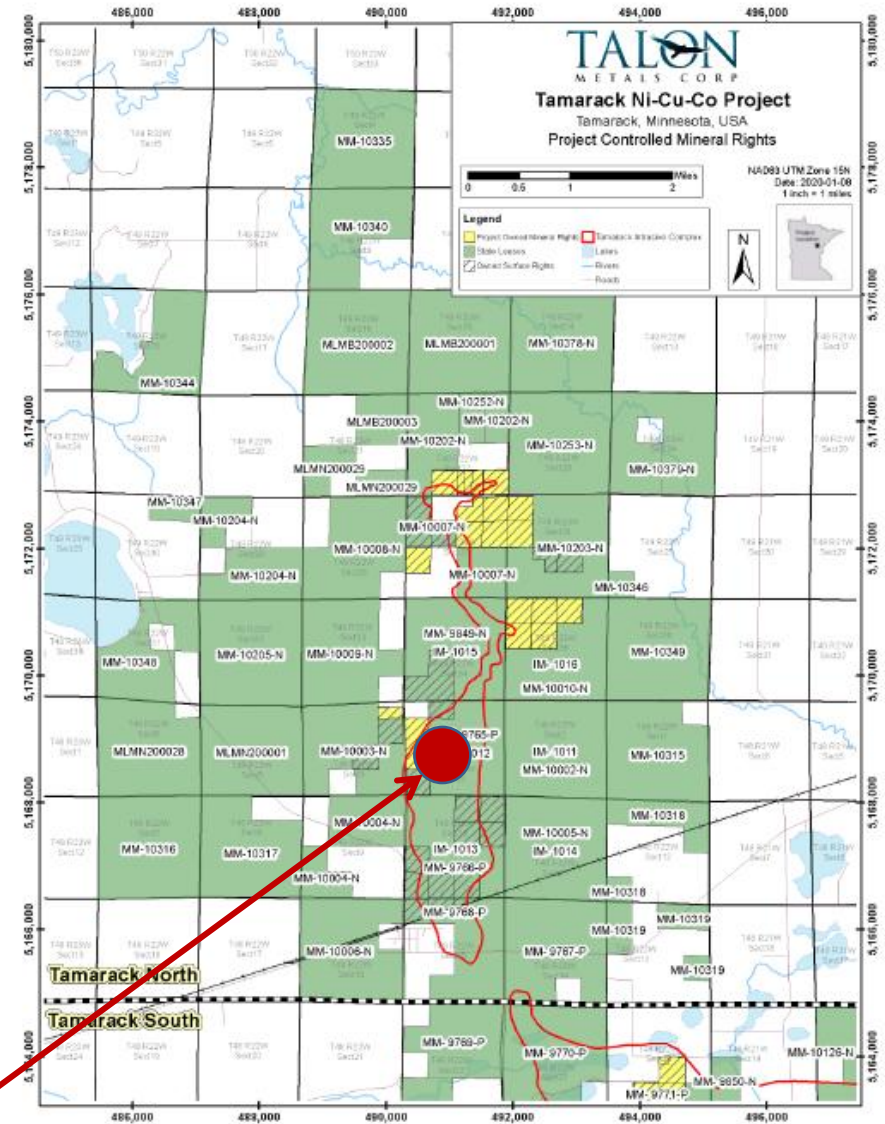


Figure 4-2: Tamarack North Project Mineral and Surface Rights

Proposed mine within project area

Taconite is **NOT** a High Sulfide Mining Operation

Taconite (Iron)

❖ Grade

- Taconite is low grade ore (20-30% iron)

❖ Found With

- Iron is bound in silica minerals (SiO_2 like quartz, ... asbestos, ...) and iron oxides

❖ Price -> **\$120 per tonne (metric)**

❖ Ownership -> **Often US owned** (US Steel now owned by Nippon Steel)

Unlike iron mining, copper and nickel mining in Minnesota is characterized by:

- Very high sulfur content (toxic impacts)
- Very low grades but high value
- Very large amounts of waste due to the low grade (sulfide contaminated)
- Foreign Owned

High Sulfide Mining (Copper and Nickel)

❖ Grade

- Nickel from underground mines is generally in the range of 1.5-3% nickel (to be feasible) ... some underground mines report much lower (0.19% numbers)
- Nickel from open pit mines can be very low from 0.08% upward toward 0.5%
- Copper from open pit mines can be 0.3% - 0.79% (Polymet)

❖ Found With (in the Midwest)

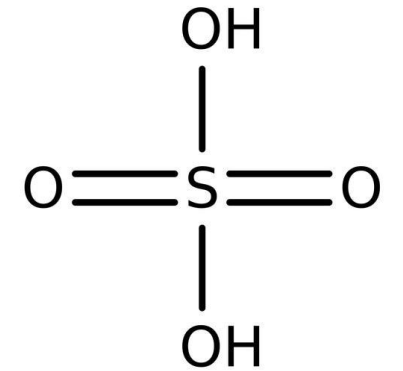
- **Sulfides** -> Highly variable, e.g. the Arkansas Geological Survey, indicated ore with sulfur ranging from 6.5 to 32.4%
- Deposits of up to 70% sulfur have been reported in MN
- A high sulfide mine might have 10 times as much sulfur than the mineral being mined

❖ Price -> **Nickel \$19,000, Copper \$14,000 per tonne (sulfur is about \$100-\$300 per tonne)**

❖ Ownership -> **Foreign companies (Rio Tinto, Glencore, Talon from Canada, ...)**

Sulfur Related Dangers of High Sulfide Mining

- ❖ Acid Mine Drainage - Nickel-Copper-Cobalt minerals are bonded to sulfur mined as sulfide ores
 - When these ores are exposed to air and moisture, a chemical reaction occurs that generates **sulfuric acid** that migrates into the surrounding environment and, through leaching, releases toxic heavy metals present in the drill cuttings, waste rock, pit walls, and tailings basins of mining operations – highly toxic to fish and aquatic life
- ❖ Sulfur reducing bacteria convert free mercury in the environment to methyl-mercury which is highly toxic and accumulates in fish creating fish consumption limits
 - Free elemental mercury can be toxic but is not the concern – mercury must be methylated to accumulate in the environment
 - Sulfur is the primary methylator for mercury
 - Methylmercury is very toxic
- ❖ 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 can decimate wild rice crops



Sulfuric Acid
A very strong acid

Extracted Sulfur is Toxic in the Environment



Minntac taconite tailings leaking north towards Sand River, possible causes of the damaged vegetation include acid mine drainage and/or chemicals used in mine operations.

– “The Mining Guys”

Acid Mine Drainage (AMD)

- ❖ For the 20 years that Wisconsin had a “Prove It First” law in place, the mining industry **could not find a non-polluting sulfide mine**. The law was repealed in 2017.
 - <https://www.sierraclub.org/wisconsin/prove-it-first-law>
- ❖ Kuipers et al studied 25 operating hard rock 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
 - 89% had inaccurately predicted that they would not create AMD.

According to the EPA, sulfide ore mining is the most toxic industry in the US - metal mining industry releases the most toxic chemicals by weight compared to any other industry



Photo courtesy of the U.S. Geological Survey, 1998. Status and trends of the nation's biological resources. Vol. 1. Reston, VA: U.S. Department of the Interior. Available at: <http://www.nwrc.usgs.gov/sandt/>.

https://earthworks.org/releases/epa_metal_mining_most_toxic_industry_in_america/

Acid Mine Drainage (AMD)

- ❖ AMD is primarily the result of sulfur from mine waste interacting with air/water to create sulfuric acid
- ❖ A literature review on acid mine drainage concluded that “no hard rock surface mines exist today that can demonstrate that acid mine drainage can be stopped once it occurs on a large scale.”
- ❖ Acid runoff from the Summitville Mine in Colorado killed all biological life in a 17-mile stretch of the Alamosa River. The site was designated a federal Superfund site, and the EPA has spent over \$210 million on clean-up.
- ❖ Zortman Landusky mine in north central Montana filed for bankruptcy in 1998 leaving the state of Montana with the liability for \$33 million in long-term water treatment and reclamation costs

- ❖ Torch Lake in Houghton County, MI is a superfund site
 - Copper mining activities in the area from the 1890s until 1969 produced mill tailings that contaminated lake sediments and the shoreline
 - Years later, fish were found with cancerous tumors and high levels of copper, arsenic, mercury and PCBs
 - Remediation efforts started in 1998 and continued through 2006 – EPA updated cleanup plan Nov 2024

Environmental Damage Not Recognized until nearly 20-30 years after mine closed!

There are NO examples of high sulfide mines in water rich areas that do not pollute

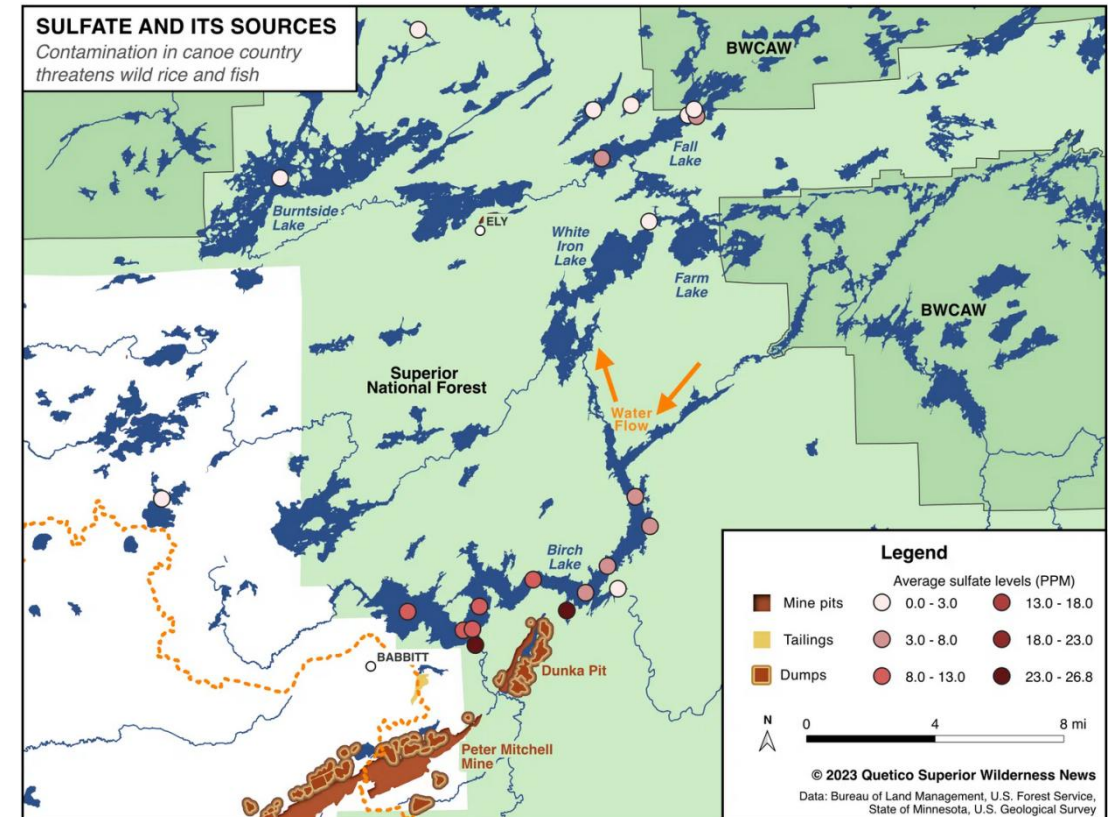
SOURCES:

- https://earthworks.org/issues/acid_mine_drainage/
- <https://www.usgs.gov/mission-areas/water-resources/science/mine-drainage>
- <https://www.epa.gov/nps/abandoned-mine-drainage>

Acid Mine Drainage (AMD)

- ❖ MPCA recently announced that Birch Lake has excessive sulfate in its water (impaired)
- ❖ The Dunka taconite mine (closed in 1991) waste rock piles, which are 80–100 feet high and extend for almost a mile, have been leaching metals into the streams and wetlands that flow into Birch Lake.
- ❖ Several lakes and rivers upstream of the Boundary Waters Canoe Area Wilderness are contaminated with sulfate, which causes more mercury in fish and kills manoomin (wild rice), according to the MPCA and several citizen-led sampling efforts.
- ❖ Waters downstream of past and present iron mines exceed standards for sulfate levels designed to protect the environment.

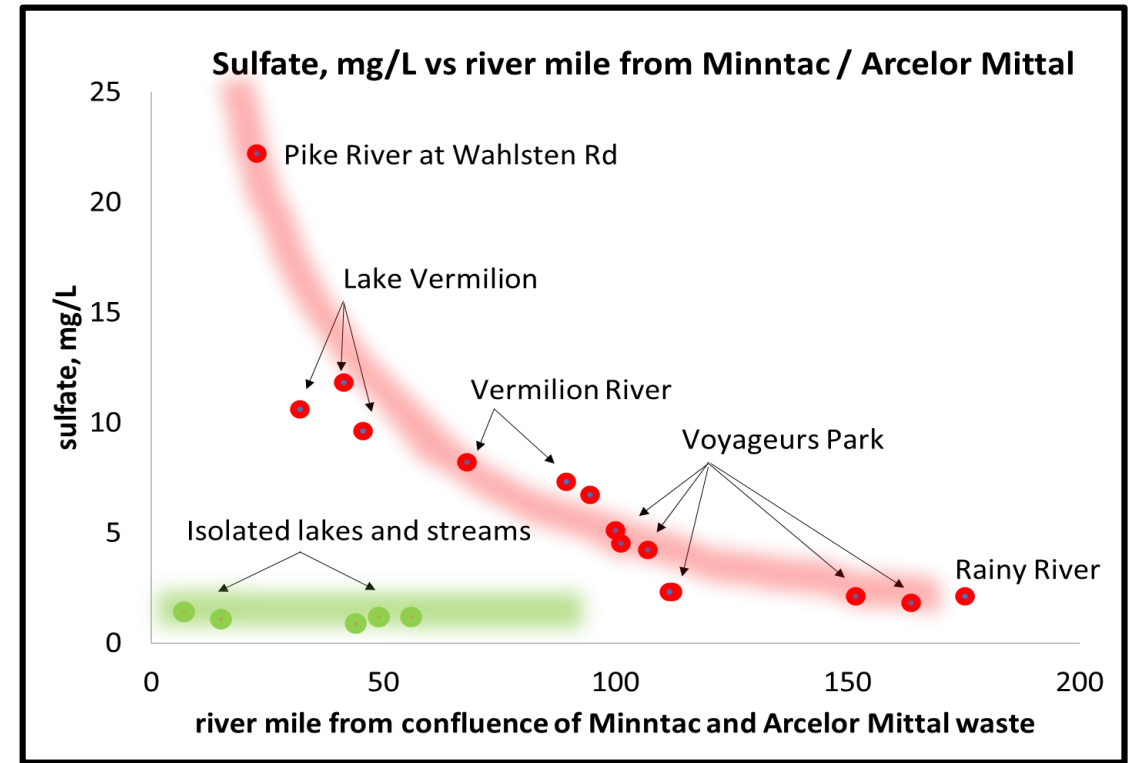
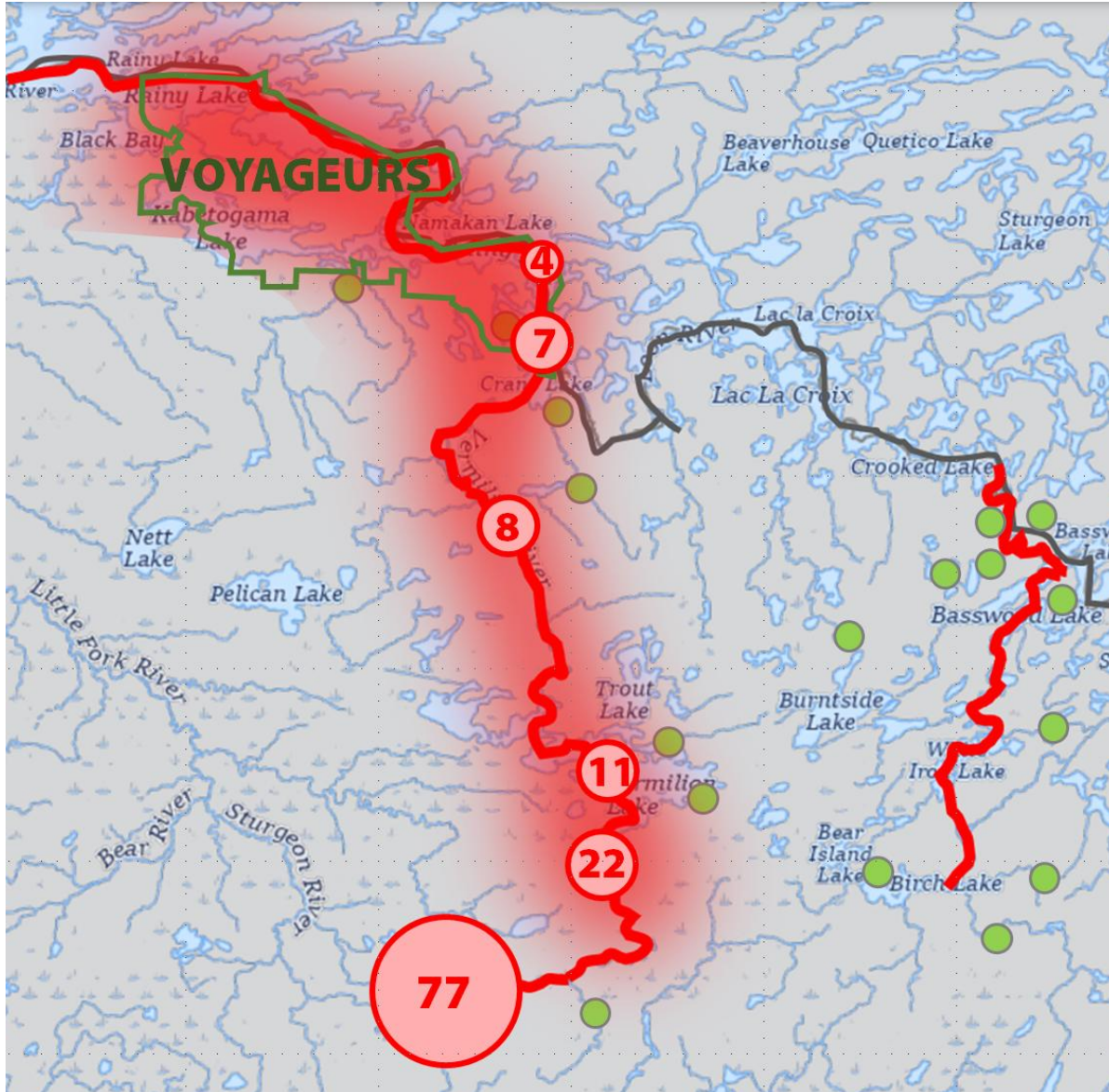
Environmental Damage Not Recognized until nearly 20-30 years after mine closed!



<https://www.youtube.com/watch?v=ZW8p640wNno>
The Northern Lakes Scientific Advisory Panel, or NLSAP, monitors (sulfate based) water pollution in Voyageurs Park and the BWCA in cooperation with the Minnesota Pollution Control Agency and have measured high levels of sulfate
<https://youtu.be/GPaAw6mu4us>

<https://queticosuperior.org/birch-lake-near-bwcaw-polluted-by-sulfate-advocates-blame-taconite-mines/>

BWCA/Voyageurs Pollution



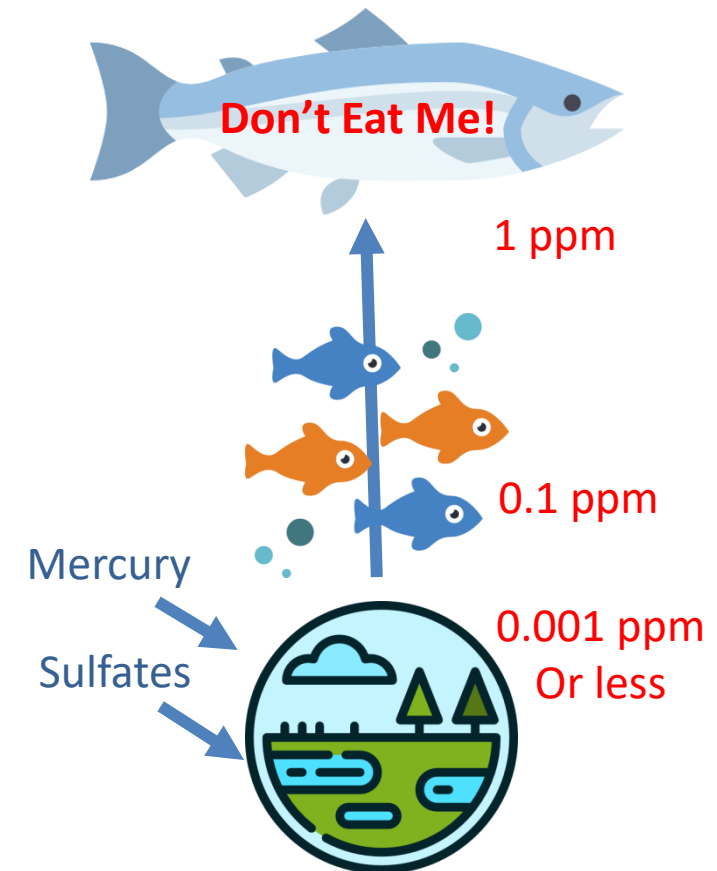
- ❖ **LEFT:** Sulfate pollution from Minntac and Arcelor Mittal mines in Virginia, through Voyageurs Park
- ❖ **RIGHT:** Sulfates from Northshore Mine in Babbit through BWCA
- ❖ Red bubbles show the sulfate concentrations dropping steadily from 77 parts per million (PPM) in Virginia to 2.5 PPM in International Falls
- ❖ Background sulfate concentrations in unpolluted lakes and streams is less than 2 ppm as indicated by small green bubbles.
- ❖ Six PPM is enough to quadruple concentration of mercury in fish.
- ❖ Voyageurs Park walleyes are severely contaminated with mercury because of sulfates - WORSE than 64 of 65 commercial seafood species monitored by the US FDA

Courtesy of Northern Lakes Scientific Advisory Panel (NLSAP)

Sulfate Reducing Bacteria Produces Methylmercury

- ❖ 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.startribune.com/epa-rule-targets-taconite-industry-mercury-polluter-minnesota-coal-regulation-earthjustice-tribe/600274349>
 - Coal-fired power plants are another significant source of mercury
- ❖ Atmospherically derived Hg must be methylated prior to accumulating in fish
- ❖ Sulfate-reducing bacteria are the primary methylators of Hg in the environment
 - Sulfur + Mercury creates methylmercury
 - Sulfur historically comes from coal plants (e.g. Acid Rain), and to a lesser extent fertilizers and some soaps
- ❖ Methylmercury is a highly toxic substance that is fat soluble and thus can “bio-magnify” in the food chain (in fatty tissues), primarily in fish and shellfish.

Methylmercury

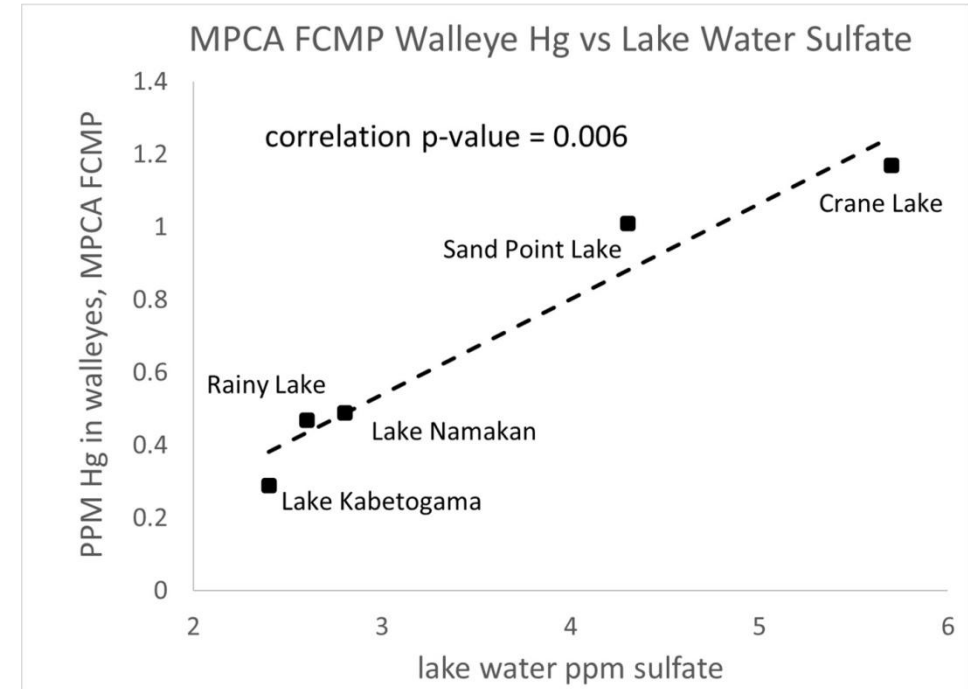


Methylmercury Presents a Serious Health Threat
And is Created by Sulfate Reducing Bacteria

https://www.fs.usda.gov/nrs/pubs/jrnl/2006/nc_2006_jeremiason_001.pdf
<https://www.pca.state.mn.us/pollutants-and-contaminants/mercury>
<https://pmc.ncbi.nlm.nih.gov/articles/PMC3514465/>
<https://www.ucsfhealth.org/medical-tests/methylmercury-poisoning>
Fish icons created by Freepik, Smashicon and monkik - Flaticon

Methylmercury is VERY Toxic

- ❖ 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)
- ❖ “Mercury in Newborns in the Lake Superior Basin” study showed that 10% of tested newborns in MN had concentrations of mercury above EPA reference dose
 - 3% of the WI and 0% of MI samples were above EPA dose limit.
 - Babies born during the summer months were more likely to have an elevated mercury level.
- ❖ Karen Wetterhahn, a chemistry professor at Dartmouth College, died from mercury poisoning in 1997 due to accidental exposure to dimethylmercury
 - A few drops of the highly toxic compound seeped through her gloves
 - This led to her death about a year later
 - https://en.wikipedia.org/wiki/Karen_Wetterhahn

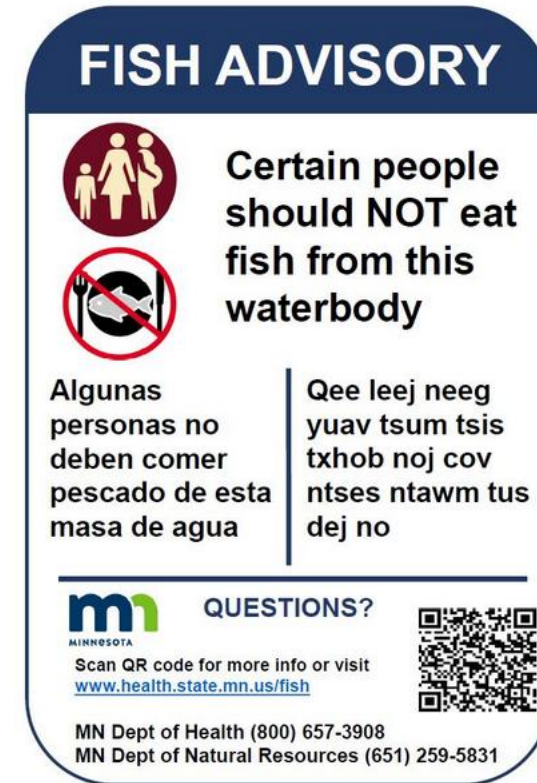


NLSAP (Northern Lakes Scientific Advisory Panel)

www.health.state.mn.us/communities/environment/fish/techinfo/newbornhgls.html

Local Lakes Are Already Impaired (mercury levels in fish)

- ❖ Impaired Lakes as listed in EAW (line 2150):
 - Round Lake (mercury)
 - Tamarack Lake (mercury)
 - Big Sandy Lake (nutrients and mercury)
- ❖ However – there are many more lakes in the area that are impaired including
 - Minnewawa (mercury)
 - Horseshoe (nutrients)
 - Savanna (mercury)
 - Glacier (mercury)
- ❖ Most of these lakes have generic fish consumption advisories due to mercury levels
- ❖ BUT only Round Lake which shares the same watershed as Talon has elevated mercury levels with specific limits



Mining Operations Will Only Make Lake Conditions Worse, Further Compromising Water Quality and Fish Consumptions Limits

See list of **Minnesota Impaired Waters**: <https://www.pca.state.mn.us/air-water-land-climate/minnesotas-impaired-waters-list>

Minnesota Lake Finder for more detail:

<https://www.dnr.state.mn.us/lakefind/lake.html?id=01002300>

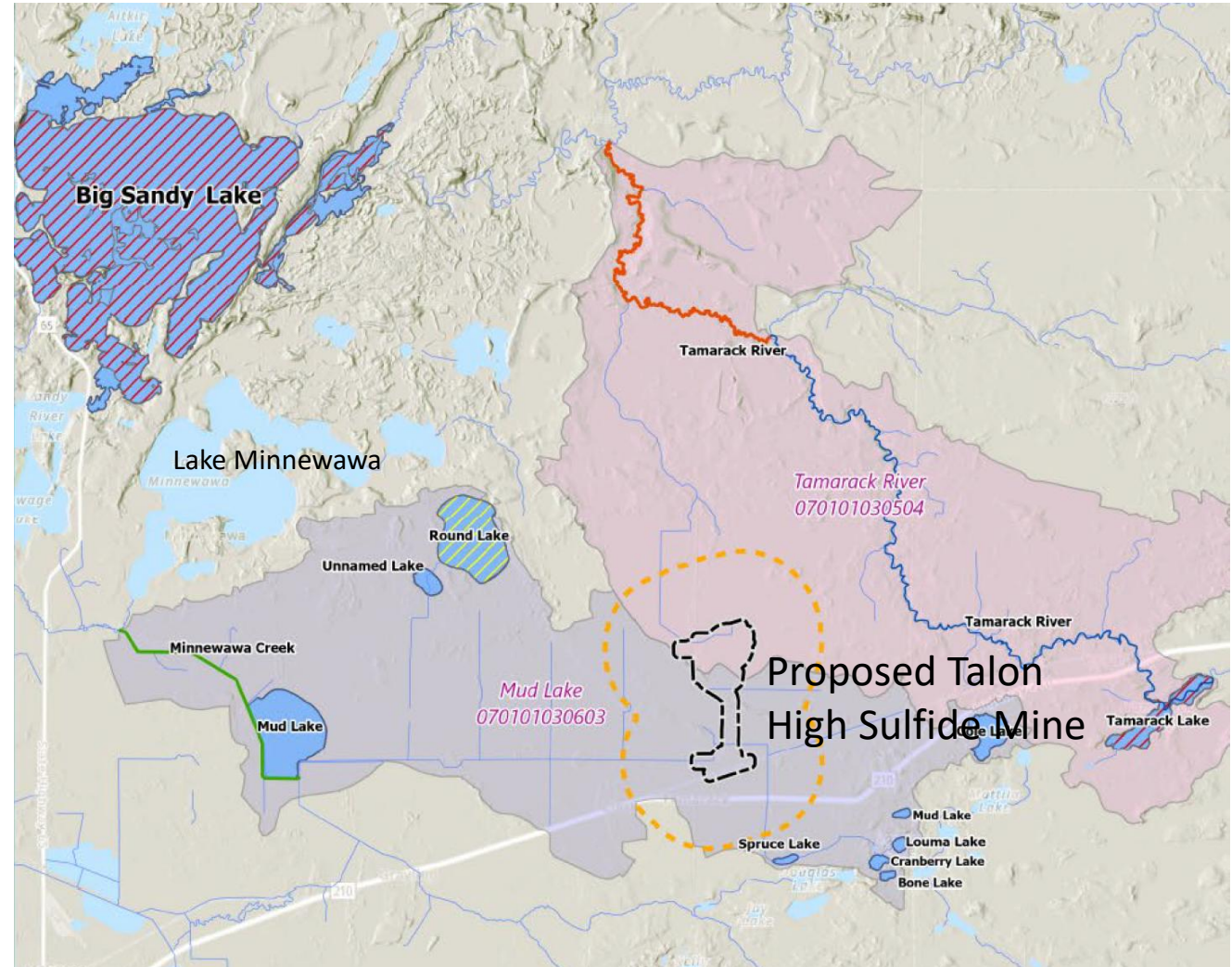
Fish consumption guidance can be found here:

<https://www.dnr.state.mn.us/lakefind/fca/report.html?downum=01002300>

An example – Round Lake Shares a Watershed with Talon

ROUND LAKE

- ❖ Round Lake is already impaired due high levels of mercury in the fish
- ❖ Round Lake shares the same watershed (Mud Lake Watershed) as the proposed mine
 - Tamarack drilling started in 2002 and sulfide drill “cuttings” have been dumped into pits without liners within a few feet of the water table
 - Sulfates interact with sulfate-reducing bacteria to produce the more bio-toxic form of mercury, methylmercury, a known neurodevelopmental toxin
 - Other area lakes are often designated as impaired but at a lower level with no specific fish consumption limits (as Round Lake has).



Talon Metals Has Been Dumping Toxic Drilling Waste On-site For Years

- ❖ DNR specifically requires that the sumps used to dispose of drilling waste NOT be in wetlands and that drilling fluids must be contained (a condition in the permit approval letter)
- ❖ Talon has violated terms of the permit and MN regulations:
 - DNR photos show sumps in wetlands
 - DNR reports at least 63 instances where bore holes have not been sealed properly
 - No provision to “contain” drilling fluids
- ❖ Materials “dumped” include high sulfide materials:
 - High sulfide cuttings from the drilling operations that react with environmental mercury to create highly toxic methyl-mercury
 - Sulfur above 10ppm will kill wild rice beds
 - Sulfuric acid created from this dumping can kill vegetation and leach heavy metals (toxic)



RIO TINTO - TALON METALS HEADQUARTERS | DRILLING FLUID SUMPS

These pits are in the same watershed as Round Lake and only a few miles away

Talon Metals Has Been Dumping Toxic Drilling Waste On-site For Years

- ❖ Multiple DNR photos show sump pits adjacent to mats covering wetland areas.
- ❖ And drilling fluids are used in cutting through rock
 - Even if these drilling fluids are food grade lubricants as Talon claims ..
 - Restaurants are not permitted to dump food grade lubricants (cooking oil) in the environment – disposal by a waste management company required
 - Talon is not properly disposing these drilling fluids
- ❖ Research shows that drill site pollution can impact wetland and nearby water bodies
 - <https://www.mdpi.com/2076-3298/6/7/84>

Over 554 Bore Holes Drilled (up to 2023)



Talon sump adjacent to mats over wetlands (Source: DNR 2024-08-07 right)

Sulfide Mining Threatens Tribal Wild Rice Resources

- ❖ 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 sulfate to 10 parts per million (ppm or mg/L) in wild rice waters.

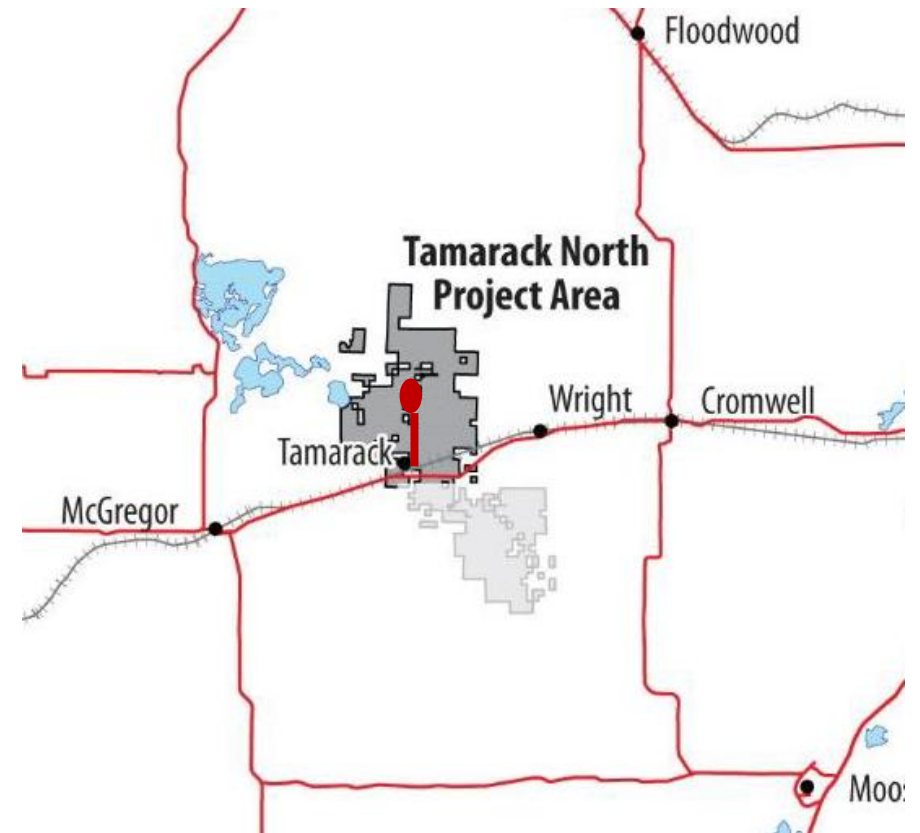
Documented Health Risks of Sulfide Mining in Minnesota

- ❖ Sulfide Mining and Human Health in Minnesota
https://pubs.royle.com/publication/?i=352462&article_id=2624726&view=articleBrowser
- ❖ Risks and costs to human health of sulfide-ore mining near the Boundary Waters Canoe Area Wilderness
<https://www.tandfonline.com/doi/abs/10.1080/10807039.2019.1576026>
- ❖ Sulfide-ore mining AND human health in Minnesota - WHERE ARE WE NOW?
<https://www.savetheboundarywaters.org/sites/default/files/resource-file/MNMedicine2022.pdf>
- ❖ Human Health and Sulfide Mining
<https://www.tamarackwateralliance.org/docs/HumanHealthAndSulfideMining.pdf>

Talon “says” there will be no problem but offers no evidence for that statement –
FACT IS ... there has never been a high sulfide mine in a water rich area that has not
polluted the environment

Proposed Tamarack High Sulfide Nickel-Copper Mine

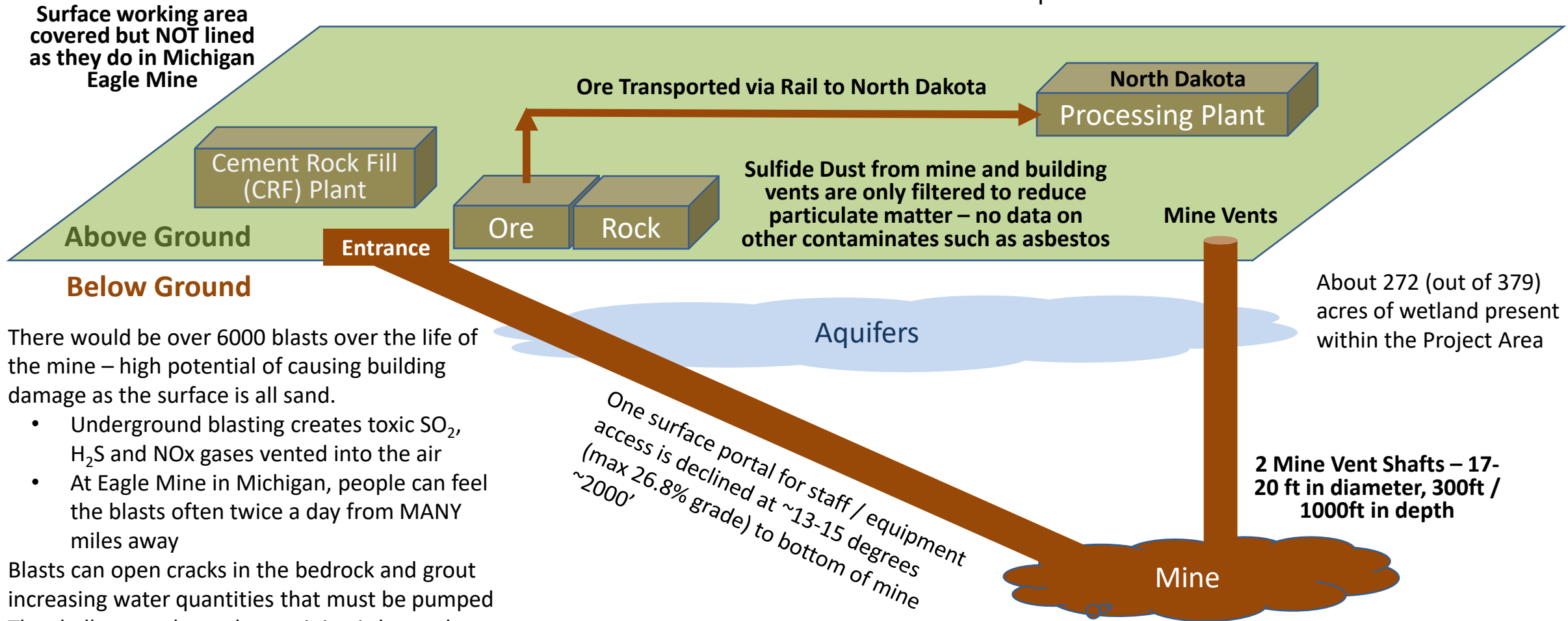
- ❖ The Tamarack North Project covers approximately 20,348 acres - Nearly **32 square miles** – but current EAW is looking at a small portion - 378.8 acres
 - 271.5 acres of wetlands within the Project Area (72% of total)
 - With plans to extract ~10.5 million tons of ore over a 7-10 year period
- ❖ Primary Concerns based on Talon’s EAW Submission to the State of Minnesota (December 2025)
 - Vented airborne dust contaminated with sulfide particles and toxic gases from blasting – Talon only plans to “reduce the amount of particulate matter” with filters
 - Talon must pump 2.3 million or more gallons a day from the mine due to water entering from the aquifers and service water used in operations – Discharge of water as well as lowering of aquifer, lake and well levels are of concern – water model is highly suspect
 - Mine site includes temporary holding piles which, while covered, are not lined and will be subject to spread of sulfates and toxic materials
 - Talon will be blasting daily which may cause local building foundation damage and can be felt for many miles
 - Rail transport will leak sulfides all along the route to the ND plant



How the Mine Works

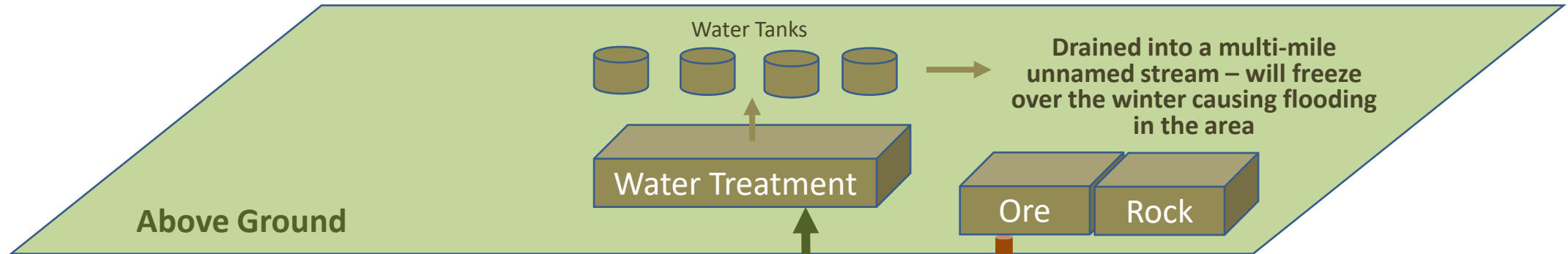
BASIC OPERATION

- Blast out stopes (large caverns / spaces) to collect ore
- Bring ore to the surface and temporarily store
- Ship ore over rail (**120 railcars about every 4 days**) to North Dakota
- Backfill mined out stopes with cement rock fill



- There would be over 6000 blasts over the life of the mine – high potential of causing building damage as the surface is all sand.
 - Underground blasting creates toxic SO₂, H₂S and NO_x gases vented into the air
 - At Eagle Mine in Michigan, people can feel the blasts often twice a day from MANY miles away
- Blasts can open cracks in the bedrock and grout increasing water quantities that must be pumped
- The shallowest planned ore mining is located **about 300 feet below surface**

Water Balance Details



Above Ground

Below Ground

Approximately 2.3 million gallons of water must be pumped from the mine as a result of water leaking in from the aquifers above and mine service water based on the Talon model – but model may not apply in this area as there are no underground mines in Minnesota.

The amount of dewatering may be much higher since blasting increases the number of water bearing features and can crack grout. Stope backfill is not water proof and vent shafts are not lined.

This is sulfide contaminated water that must be filtered – Talon plans a membrane based filter, then combined with polluted stormwater for discharge into a unnamed stream that flows into the Tamarack River. No plan when stream freezes over the winter.

Initial mine water estimates of 2.3M gallons per day are based on hydraulic testing of **four bedrock boreholes** available prior to 2020. (EAW line 2348) This is potentially across the entire multi-square mile area prior to any mine plan – no assurance of accuracy.

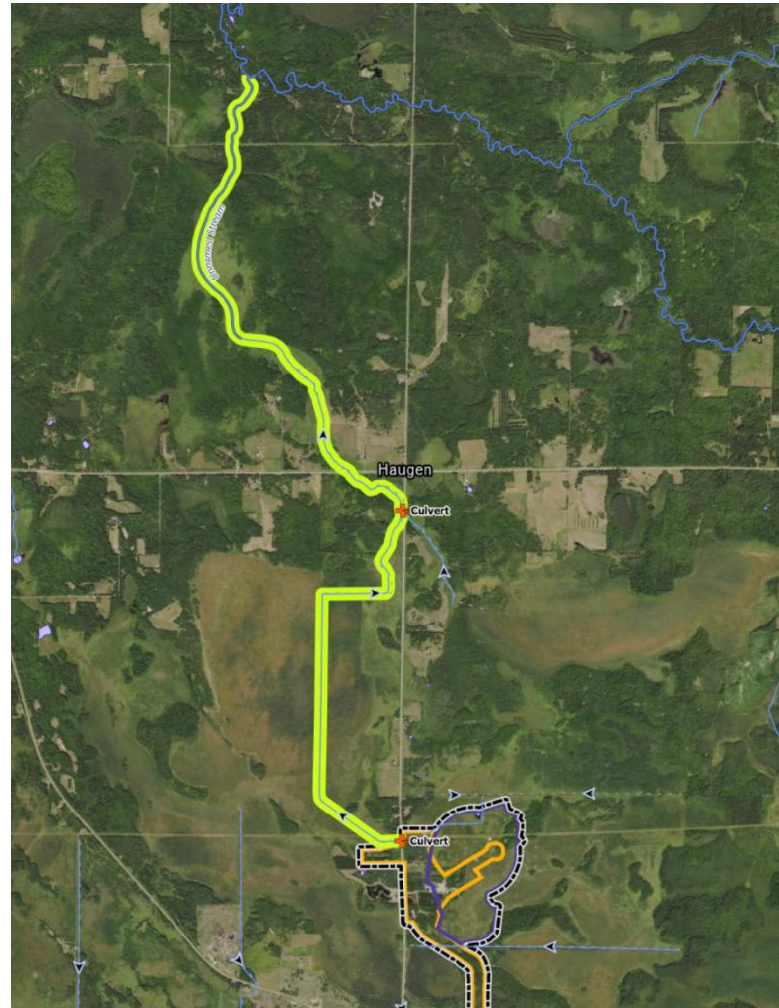
Net water that must be pumped from the mine may be much greater than the 2.3 million gals/day and may affect aquifer, lake and well levels. At Eagle Mine monitor point QAL023B (2024), the mean water level readings were 5.6 feet (ft) below the calculated minimum background baseline level - pumping only 5% of Talon Mine levels

Mine Figures

Figure 8 Depth to Water

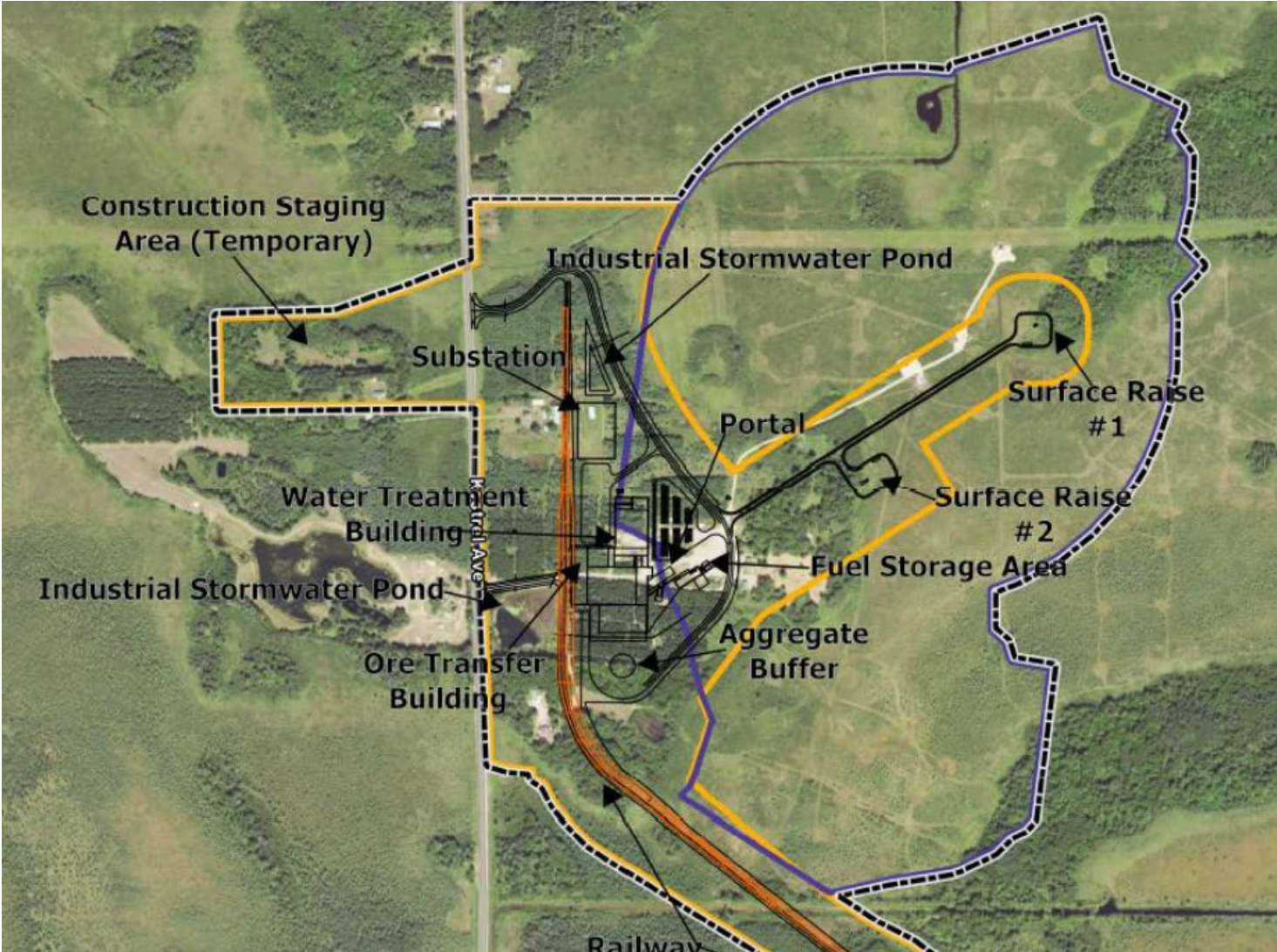


Water Depth At Surface



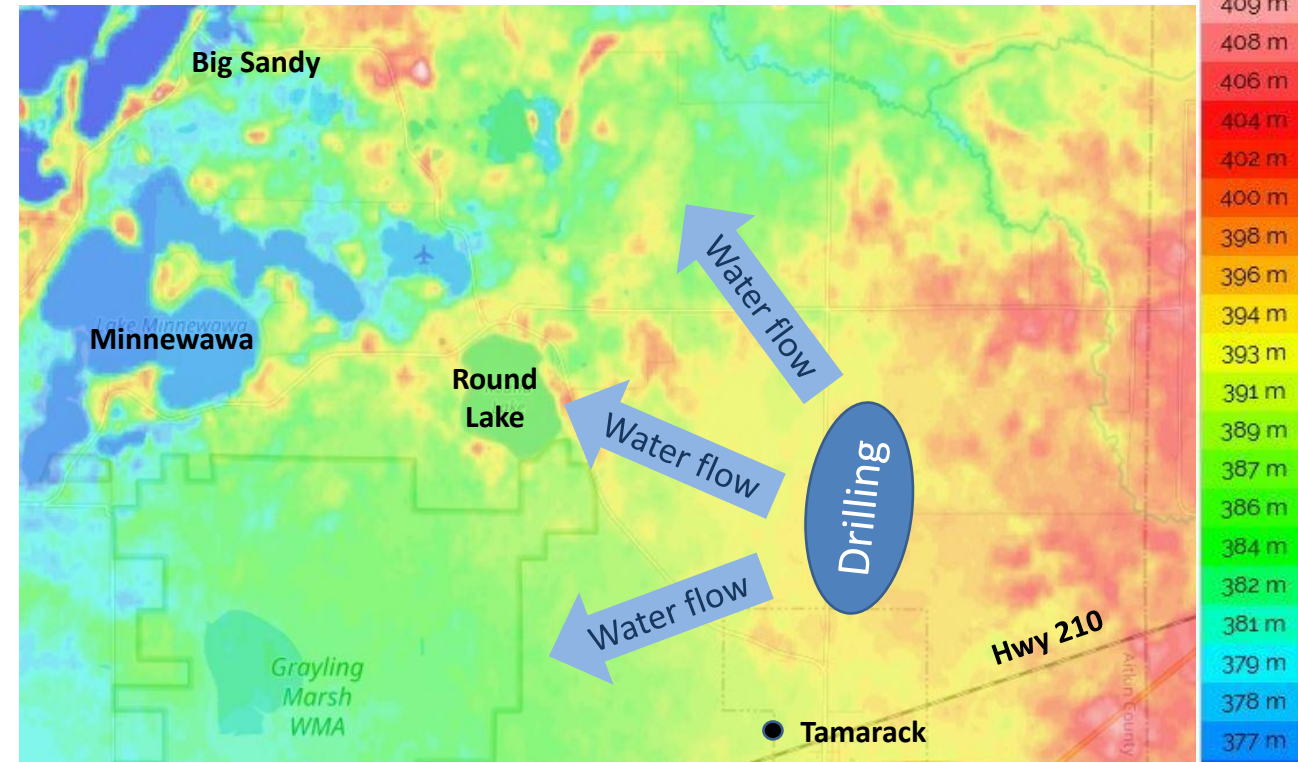
Tamarack Mine Concerns

Aerial Views



Water Management

- ❖ Surface Water Conditions (it's a wetland)
 - Based on soil data from the Natural Resources Conservation Service, depth to water in surficial soils is less than 1 foot in approximately 77% of the Project Area (EAW line 2284)
 - Approximately 302 (out of 447) acres of wetland are present within the Project Area (EAW Line 2220)
- ❖ Talon still using pre-2020 data for mine inflow estimate of 2.3M gallons per day
 - Talon suggests they will address this through grouting but the 2.3M gallon estimate already includes grouting (page 228 of the Talon 2021 PEA)
 - Talon does not include impacts of daily blasting that may crack grout and widen water features
 - Talon does not account for the fact that their stope backfill is not waterproof, nor can they grout the bedrock after a stope is backfilled
 - Talon does not make any provisions for mine inflow from the nearly 1300 ft (20' in diameter) vent shafts



SOURCE: <https://en-gb.topographic-map.com/maps/ilbc/Aitkin-County/>

Initial mine water estimates of 2.3M gallons per day are based on hydraulic testing of four bedrock boreholes available prior to 2020. (EAW line 2348). This was done prior to any mine plan and reflects an area of many square miles – no assurance of accuracy.

Water Management

- ❖ Talon provides no information of potential impacts of pumping 2.3 M gallons or more from the mine
 - Talon would discharge this water and polluted runoff into an unnamed stream that flows into the Tamarack River.
 - However, the degree and efficacy of water treatment are unknown and depends both on regulatory rigor and the levels of the pollutants in the water, both of which are also unknown.
 - Aquifer levels and surface water impacts are of concern (no studies provided to address how much lower aquifers may be or impacts on wells)
 - Lower aquifer levels may cause subsidence on the surface
- ❖ At Eagle Mine monitor point QAL023B, the mean water level readings in 2024 were a maximum of **5.6 feet (ft) below the calculated minimum background baseline level**
 - Many other water level monitoring points observed water levels up to 1.4' below minimum baseline.
 - Mine attributed this drop in water levels to pumping of the mine services well and groundwater infiltration into the mine
 - This drop in water levels is then due to an average pumping requirement of 80,000 to 150,000 gallons a day – what happens at the Talon Tamarack site where it's estimated that 2,300,000 gallons might be pumped per day ... **approximately 20 times more than Eagle Mine**
- ❖ Eagle mine listed at least 20 monitoring events that show levels of pollution and water chemistry changes outside the planned benchmark range – some with sulfate levels that exceed MN wild rice standards by x1500

Gravel Needed to Backfill Stopes (mined out caverns)

- ❖ “3.9 million tons (3.5 million tonnes) of backfill would be required. Of this, approximately 1.3 million tons (1.2 million tonnes) would be supplied by waste rock, which would account for approximately 1/3 of the requirements. Externally sourced aggregate would be required starting in the third year of production as the mine development begins to taper off once the decline ramp is completed. (EAW Line 1008)
- ❖ Daily need for gravel would then be **1,430 tons per day** at 365 days a year for 5 more years of mining
- ❖ Size of haul trucks not specified but Talon does use 20 ton haul trucks for initial excavation of the decline ramp (EAW line 561).
- ❖ Can you find this much aggregate near Tamarack?
- ❖ Rail design has no contingency for rail delivery of this much aggregate (13+ rail cars per day)



Surface Areas Used for Operations Not Lined

- ❖ Talon has “enclosed” in buildings most operations related areas and ore storage
- ❖ But floors may be just gravel or concrete (said to be “impervious”) (EAW line 2425)
 - However, concrete is NOT impervious to water flow and will crack at expansion joints over the life of the mine
 - Even residential building codes require cement / tile shower floors be lined!
 - Flooding, ceiling leaks and water usage for dust management will still contaminate the soil
 - Buildings must still be ventilated but Talon has only committed to “reduce particulate matter”
 - AND NOT to filter out airborne toxins
- ❖ At Eagle Mine TDRSA (Temporary Development Rock Storage Area) is lined with both a primary and secondary lining
 - A leak detection system is installed between the liners to monitor primary lining integrity
 - A total of approximately 55 gallons of water was purged from the leak detection sump in 2020, a larger volume than 2019.
 - Thus we see that the lining system does leak after only a few years of operation
 - **The leak levels are currently very small at this point but as noted in the document, increasing slightly over time.**

Venting / Air Quality

- ❖ Talon only plans air filtering “to reduce the amount of particulate matter” (EAW line 905)
- ❖ Vented airborne dust from blasting and ore/rock handling and storage is contaminated with sulfide particles and other toxic minerals – Eagle Mine monitors for at least 33 toxic substances
- ❖ Asbestos can be present in taconite mines, which can increase the risk of asbestos exposure for workers – Talon makes no statement that they are even looking for asbestos in the mine dust.
 - <https://cancer.umn.edu/news/connection-between-iron-range-miners-and-asbestos-related-disease>
- ❖ Since sulfates are not well filtered, accumulation will occur in the local area causing storm water to be contact water and polluting the local environment potentially creating greater mercury concentrations
- ❖ Eagle Mine does a very poor job at managing dust – a possible cause of the water contamination demonstrated in the Eagle Mine Exception report



Mining dust has saturated and stained the Flags on the Eagle Mine bulletin board.

Talon has not provided any information on what toxic substances exist in the mine air or contact water

Blasting

- ❖ Talon notes that “Vibration modeling would be conducted to simulate the propagation of blast induced vibrations to predict the impact at nearby sensitive receptors, such as residences. This information would be provided in the EIS. (EAW line 3298)
 - Given the potential impact on the environment that could result in mine plan changes, modeling should be done prior to EIS
 - Blasting would normally occur at shift boundaries when the mine is evacuated of personnel – 2-3 times a day ... potentially **over 6,000 blasts** in a 7 year life of mine period
- ❖ Parts of Oklahoma now have the same earthquake risk as California due to “blasts” from fracking
- ❖ Blasting operations produce toxic gaseous products including carbon monoxide (CO) and the oxides of nitrogen (NOx)
stacks.cdc.gov/view/cdc/161251/cdc_161251_DS1.pdf

- A new study found a scarily direct link to fracking
 - (<https://www.businessinsider.com/earthquakes-fracking-oklahoma-research-2018-2>)
 - A large increase in small tremors (similar to the blasting) due to fracking have resulted in significant road and building damage.
- **In Oklahoma, Fracking May Have Damaged Hundreds Of Traditional Vertical Wells**
 - <https://www.hppr.org/hppr-environment/2017-09-24/in-oklahoma-fracking-may-have-damaged-hundreds-of-traditional-vertical-wells>
- **Oklahoma Tightens Regulations to Curb Fracking Earthquakes**
 - <https://www.eli.org/vibrant-environment-blog/scoop-stack-causing-cracks-oklahoma-tightens-regulations-curb-fracking>

Blasting may occur anytime of day or night, 2-3 times a day, disrupting life and likely causing building damage over time

Concerns – Rail Transport

- ❖ For rail transport to North Dakota, “each 120-car unit train would haul approximately 13,900 tons (12,600 tonnes) every 4.1 days on average - 90 trains per year” (EAW line 1520-1522)
- ❖ Talon is currently expecting to use conventional gondola railcars with covers made of solid and impervious material (EAW line 1540)
- ❖ The BNSF Railway would exchange the loaded **unit train** with a unit train of empty enclosed railcars returning from the processing facility in the on-site rail yard on a regular basis. About 30 of the empty unit train cars would be loaded each day and consolidated on the release track until the next 120-car unit train is filled and released for shipment. (EAW line 1525)



Covered gondola cars still have openings in the bottom for drainage that can leak materials.

These have to be flipped upside down to empty since there is no bottom hatch. This will require a 'rotary car dumper' in North Dakota.

BUT how does this work when the wet ore has frozen in the rail car?

Concerns – Wetland / Peat Damage

- ❖ Approximately 302 acres of wetland are present within the Project Area (EAW line 2220)
- ❖ Wetlands will be destroyed around project structures and the rail line from Tamarack.
- ❖ Talon specifically says “Construction and operation of the Project would result in the direct impact of approximately 71 acres of upland and wetland wildlife habitat and could further habitat fragmentation in the Project Area. (EAW line 2857)
- ❖ In addition, Talon says “the wetland complex in the Project Area may have been used as burial sites, raising the possibility of inadvertent discoveries. (EAW line 2936)



Other Issues

❖ Talon defers any analysis of hazardous waste to the EIS

- Hazardous wastes generated and/or stored during construction and/or operation of the Project, including the methods of disposal, would be described in the EIS. (EAW Line 2755)
- Thus Talon apparently does not know what hazardous waste products will be produced nor how to mitigate effects
- Talon has no hazardous waste plan nor do they discuss issues related to cross contamination of hazardous waste
- But they should have a hazardous waste list prior to EIS ... how can you identify the environmental impact without this information? And mitigation may change the mine plan affecting other parts of the EIS work

❖ The Michigan Eagle Mine monitors for over 30 substances in water ... no word on what Talon will do.

❖ Talon defers any analysis of wildlife in the project are to the EIS

- Natural resources field surveys are currently being conducted within and across the Project Area. Information gathered during these surveys would be included in the EIS. (EAW Line 2781)
- Thus Talon does not know very much about the wildlife in the project area
- But they need to know this prior to EIS since – how can you evaluate the impact of operations before such information?

Talon proposes to defer all work needed for an environmental impact until the environmental impact stage – but this is too late as mitigations can change the mine plan affecting the environmental impact of the project

But Don't We Need Nickel Mining for a Green/Sustainable Future?

❖ But don't we need nickel for solar panels, cell phones and all our electronic toys?

NO – Solar panels and electronic devices use silicon ... from chips to solar cells ... made from sand ... and aluminum / plastic cases

- ❖ NOTE that mining by its very nature is NOT sustainable – minerals do not grow back like trees
- ❖ What we NEED is more recycling to create a sustainable economy
- ❖ Global nickel resources are estimated to be 54% laterite (iron) deposits and only 35% in magmatic sulfide (high sulfide) deposits
(<https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-nickel.pdf>)
 - Why mine highly toxic sulfide minerals in Minnesota when the majority of nickel reserves are found in iron deposits?

Nickel Institute notes

(<https://nickelinstitute.org/en/blog/2025/march/nickel-industry-part-3-processing-nickel-laterites-high-pressure-acid-leaching/>)

- Most nickel world-wide is in laterite (iron oxide) deposits NOT high sulfur deposits
- High Pressure Acid Leaching (HPAL) is ramping up in capacity to supply battery markets from laterite nickel
- HPAL has relatively low greenhouse gas emissions, especially if sulphuric acid is made on site.

Price of nickel falling to pre-EV craze days
... as non nickel EV batteries ramp up

But Don't We Need Nickel?

- ❖ Tamarack North Mine Will Make NO difference in the Global Supply of Nickel
 - Only 0.22% of the world's supply of Nickel comes from the US (Michigan Eagle Mine)
 - US only possesses 0.24% of the worldwide reserves of Nickel (Michigan and Tamarack)
 - Instead of shipping this nickel onto global markets / China, should we not save our meager reserves for the future?

Tamarack Nickel will make no difference in the global supply of nickel ... but will serve to increase profits for foreign owned mining companies

From the USGS <https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-nickel.pdf>

IS THERE A TALON TESLA AGREEMENT?

- Talon Metals provides additional detail on their so called "Tesla Supply Agreement" in their document, *MANAGEMENT'S DISCUSSION AND ANALYSIS*, Dated: November 14, 2024.
- On page 35 of this document from Talon, the "Conditions Relating to the Tesla Supply Agreement" are provided.
- Essentially - Clearly, Talon DOES NOT have the supply agreement they claim.

They simply have an agreement to enter into negotiations for a supply agreement if they are producing nickel this year (2025 - which is clearly impossible.)

<https://www.sedarplus.ca/csa-party/records/document.html?id=e474af18cde2046e058b9ddef7e93f498fd780c00db38ddbc0dd7f664cbe92f4>

E-Waste Recycling – Sustainable Solution to Obtain Minerals

- ❖ “Don't we need critical minerals?” This is the wrong question. Of course we need minerals. The real question is, "What is the best way to acquire the minerals we need?”
- ❖ A key part of the solution is recycling...A promising picture with USGS nickel-recycling data with nickel recovered from scrap accounting for approximately 60% of apparent consumption in 2025. More effort needs to be made with copper recycling.
- ❖ A new startup on the Iron Range, Reclaiming Critical Metals, or RCM, is working to provide a Minnesota solution by recovering metals from discarded electronics in an environmentally friendly process.
- ❖ CollectEd- Dr. Roopali Padke, Macalestar College - The how and why of battery collection and recycling for individuals, schools and communities



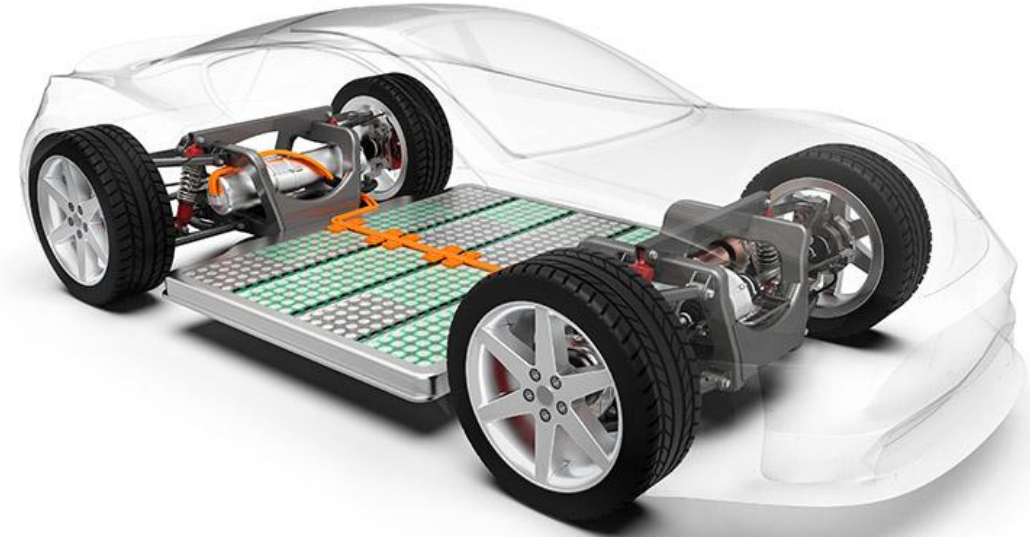
Minerals do not grow on trees. Mining is not sustainable. US based nickel mining makes no difference in world-wide market.

US Nickel Mining Will Make NO difference in the Global Supply

- **Only 0.22% of the world's supply of nickel** comes from the US (Michigan Eagle Mine)
- **US only possesses 0.24% of the worldwide reserves of nickel** (Michigan and Tamarack)

But Don't We Need Nickel for EVs?

- ❖ EV Batteries - Nickel costs \$19,000 per tonne (4/2026) and its use makes EVs unaffordable for most people
 - EV batteries using Li-Ion technology can cost \$20,000 when nickel was \$10,000 per tonne ... now battery costs have sky rocked!
 - Nickel batteries can never be a solution to affordable EVs
- ❖ EV and Power Grid Battery companies have all made a shift to cheaper, longer lasting Lithium Ferrous Phosphate (LFP batteries)
- ❖ CATL is trialing a Sodium Ion EV battery – no nickel AND made with locally sourceable inexpensive materials
- ❖ In the longer term – for higher energy density applications - Lyten Corp and others are trialing a Lithium-Sulphur battery (no nickel) that has 2-3 times the energy density of the old Nickel based Lithium-Ion batteries – for much longer range vehicles.

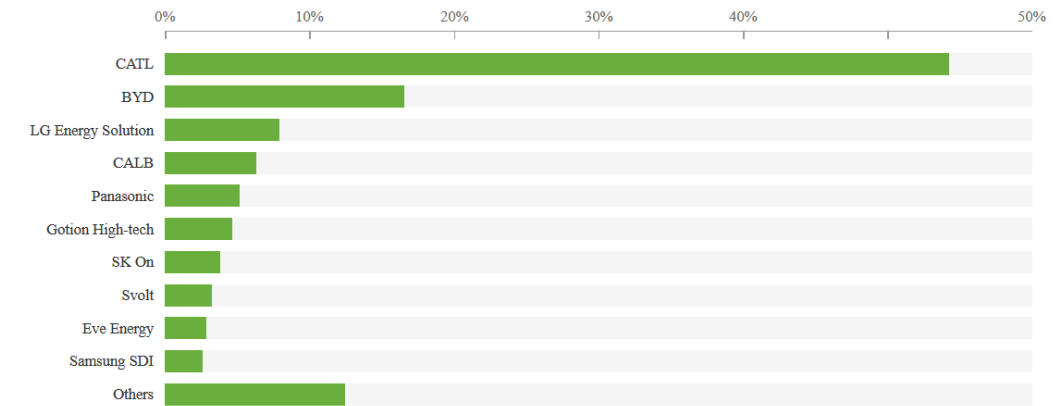


Industry is moving away from Nickel & Cobalt based EV batteries due to the high cost of these materials

EV and Power Grid Battery Status

- ❖ LFP (Lithium Ferrous Phosphate) has surpassed nickel based Li-Ion battery production for EV/Power grid application
 - In China, LFP batteries continued to dominate production, accounting for roughly 80.9% of total production, rising 41.7% YOY
 - Batteries using ternary materials (nickel, cobalt manganese), now represent about 19% of the total.
- ❖ Key U.S. LFP Factory Developments:
 - Tesla (Nevada): Opened a new LFP factory in Nevada to produce cells for energy storage products (Megapacks) using equipment acquired from Chinese suppliers (CATL).
 - Ford (Michigan): Developing the Blue30val Battery Park in Marshall, Michigan, to begin production in 2026.
 - GM & Partners (Tennessee/Indiana): Partnering with Samsung SDI for a \$3.5 billion plant in Indiana (2027)
 - LG Energy Solution: Producing LFP batteries for energy storage in Michigan with plans for further conversions to make LFP cells
 - American Battery Factory (ABF): Developing a network of LFP gigafactories in the U.S. using a 3 GWh modular design.

Market share of world's top EV battery makers (Jan 2026)



Source: SNE Research

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LFP Batteries are much cheaper, have a much longer cycle life, less likely to catch fire and can be charged to 100% (offsetting the energy density advantage of Li-Ion)

<https://autonews.gasgoo.com/articles/ev/chinas-battery-sector-shifts-toward-quality-growth-as-exports-energy-storage-gain-momentum-2032374620768808960>

Other Details

❖ Do sodium ion batteries use nickel?

- While some researchers have used nickel in sodium ion batteries, the main sodium ion battery producers have claimed not to need nickel
- Natron Energy ... a US leader in sodium ion batteries state they do not use nickel (<https://natron.energy/our-technology/sustainability>)
- CATL Sodium Ion batteries are said to contain NO lithium, cobalt or nickel
- <https://www.reuters.com/technology/chinas-top-ev-battery-maker-catl-touts-new-sodium-ion-batteries-2021-07-29/>

