TAMARACK WATER ALLIANCE

Invitation to Tamarack Water Alliance Community Zoom Meeting - Wed. March 9, 2022, 10am CT

Welcome to the Tamarack Water Alliance third monthly newsletter. We thank you for signing up for these updates. Everyone is invited to attend our open community virtual Zoom meeting on Wednesday, March 9, 2022 at 10am CT. This is an opportunity for you to be informed about what we have learned about the risks of the proposed Talon Metals Mine and to discuss some organizing priorities. Please bring your questions, concerns, and ideas. We will provide a list of Op-Eds we'd like to encourage people to write and/or further research.

For this month's newsletter, we focus on the dangers of nickel-sulfide mining, recognizing that iron mining typical of the range in Minnesota does not produce the same negative consequences as nickel-sulfide mining. With nickel-free electric vehicle batteries on the way, is this dangerous type of mining really necessary? To date, sulfide mining has a 100% track record of failure to protect water quality in water-rich environments.

We hope you will share this information with others and keep in touch as we build a community that can protect water and health from the dangers of sulfide mining.

Is Nickel-Sulfide Mining Pollution Necessary Since Nickel-free Electric Vehicle Batteries Are On The Way?

Unlike the iron mined on the Minnesota Iron Range, minerals near Tamarack are found as sulfide deposits (a mixture of sulfur and other minerals). These sulfide ores contain metals (such as nickel, copper and cobalt) that are bonded to sulfur, forming sulfide minerals. 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 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 can seep into the rich aquifers of the area and then into streams and lakes at levels that are toxic to fish and other aquatic life. This type of pollution is commonly referred to as Acid Mine Drainage (AMD) and has the potential to devastate entire ecosystems. The close proximity of nickel 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 water rich Tamarack area are linked by multiple aquifers.

So you might ask, why do we permit nickel sulfide mining in water rich areas? Iron based mines to do not suffer from this type of pollution. Talon Metals asserts that the Nickel is needed for EV batteries to drive the world wide effort to convert our energy economy toward a fully sustainable model.

Is nickel really needed for EV batteries in the 2026+ time frame when Talon might expect to be producing nickel from the Talon mine? Actually no … read on.

Electric Vehicles (EVs) are the current rage in the transportation sector; and for good reason. The new electric motors that power an EV can be more than 90% efficient as compared to gas vehicles which today have efficiencies in 20-30% range. Electric motors are also simpler with fewer parts and lower maintenance costs. Wear and tear on the brakes is also minimized since braking energy can be directed to recharging the batteries rather than be lost as heat. And there's no gasoline to buy. You can charge your EV while you sleep right at your home.

However, the fly in the EV "ointment" is that EV's need affordable, energy dense batteries. Currently, there is no battery technology that can match the energy density of gasoline. But hope is on the way.

Today, the most energy dense EV batteries use Lithium along with nickel manganese cobalt (NMC) or nickel cobalt aluminum (NCA). However, nickel and cobalt are very expensive. This makes these batteries suitable for use only in expensive long range models that most of us can't afford. Auto manufactures realize this and are now using lower cost lithium iron phosphate (LFP) batteries that have no nickel or cobalt in their standard and midrange EV models.

In July of 2021, Elon Musk (Tesla) noted that Tesla is making a "long-term shift" toward cheaper LFP based battery technology for its standard / mid-range products (no nickel). In addition to lower costs, LFP batteries offer several other advantages including higher thermal stability and better cycle life. Ford CEO Jim Farley and Volkswagen CEO Herbert Diess have said that their companies will use LFP batteries as well (no nickel). By eliminating nickel from the battery mix, these companies are achieving more reasonable EV cost points while increasing battery safety and improving battery life despite the decrease in power density. See **https://www.mining.com/cobalt-nickel-free-electric-car-batteries-are-a-runaway-success/** and **https://techcrunch.com/2021/07/28/what-teslas-bet-on-iron-based-**

batteries-means-for-manufacturers/.

But the story does not stop there. CATL, the world's largest supplier of EV batteries, recently announced that it's launching a sodium-ion alternative for EV batteries in 2023 (no Nickel). These cells are able to recharge faster than their lithium-ion cousins, and have much better low temperature performance, a significant factor in Northern Minnesota. The energy density of sodium-ion batteries still falls short of the best lithium-ion batteries but CATL says it plans to increase energy density to be on par with LFP based batteries next year. See **https://cleantechnica.com/2021/07/30/catl-reveals-sodium-ion-battery-with-160-wh-kg-energy-density/**.

But we still need batteries with higher energy density to compete with gas based vehicles. To that end, a number of companies are working on next-generation lithium-sulfur (Li-S) battery technologies that are 5-10 times more energy dense than existing Lithium Nickel based batteries. For example, the Lyten company says that their Lithium-sulfur batteries are safer, charge faster, have better low temperature performance and are much more energy dense than Li-ion packs. See **https://news.umich.edu/1000-cycle-lithium-sulfur-battery-could-quintuple-electric-vehicle-ranges/** and **https://lyten.com/what-is-a-lithium-sulfur-battery/** as well as https://www.motortrend.com/features/lyten-lithium-sulfur-battery/.

Most automakers also have their eye on solid state lithium batteries. Many industry players are placing a big bet on this technology going forward. QuantumScape, a leader in solid state battery technology, has a market value of $9.3B even though they have no revenue. Solid-state lithium-metal battery technology has the potential to lower cost, significantly increase the cell energy density, reduce charge time, and enable longer battery life. Production lines for solid state EV batteries are expected to ramp up in 2023 and be fully online by 2025.

Another factor influencing the use of Nickel in car batteries is the announced transition by Toyota from its existing use of Nickel Metal Hydride (NiMH) batteries used in Toyota hybrids to Lithium based solid state batteries during the second half of the decade. See **https://www.greencarreports.com/news/1134692_toyota-solid-state-battery-hybrid-by-2025-prius**. Note also that the automaker has said affordability, not range, will be the emphasis for its future EVs (i.e minimized use of expensive nickel).

With many more affordable and efficient high energy technologies in the works, its clear that nickel will soon lose its luster in the EV battery marketplace as cheaper, more reliable and more energy dense EV battery technologies move into production.

Does the EV industry need Nickel in the 2026+ timeframe … not at all!

Learn more about the concerns of the Talon Metals mine at **https://tamarackmine.org** and **https://tamarackwateralliance.org/**.

"Once again the mining industry has shown its true colors. This time it is Cleveland-Cliffs, which decided to lay off hundreds of workers because it feels its paying too much (in labor costs) ... Mining companies have shown from the very beginning that they are indifferent to their workers and our communities and focus only on their profits...One thing is certain, and that is that the future of this region is not with the Cleveland-Cliffs, Glencores, and PolyMets of the world but rather in preserving Minnesota's greatest strengths: its natural resources and its people."

—Tom Berkelman was the DFL state representative from Duluth from 1977 to 1983, Arne Carlson was the 37th governor of Minnesota from 1991 to 1999. They wrote this recent Duluth News Tribune article
Local View: Mining Isn't Minnesota's Future; Natural Resources Are
(https://www.duluthnewstribune.com/opinion/columns/local-view-mining-isnt-minnesotas-future-natural-resources-are)

Image: by Lynn Anderson

Who We Are

Tamarack Water Alliance (tamarackwateralliance.org) 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.

A proposal by a foreign owned mining company 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.

We will be sending this monthly newsletter to keep you informed about this project, to share information and opportunities to act, and to invite you to gatherings where you can connect with others who share a passion for clean water and community health.