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Rising EV demand puts America's only nickel mine in the spotlight

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ISHPEMING, MI — Right now, 3,200 feet below ground, explosives are blasting apart billion-year-old rock that, eventually, is going to wind up in an electric vehicle.

Broken into chunks, the rock, now called ore, takes a two-hour ride to the surface before getting trucked to a crushing mill, which separates the valuable minerals within [through a flotation process](#) that produces a clumpy gray filter cake.

That concentrate is loaded onto trains and sent to Canada on its way to being smelted and refined into a sulphate used in lithium-ion batteries that power electric cars.



For nearly a decade, that's been occurring around-the-clock in Michigan's Upper Peninsula, where ore from two large deposits under the Yellow Dog Plains near Marquette accounts for 100 percent of the domestic nickel supply in the United States.

Since 2014, the Eagle Mine has put America on the map for global production of a critical mineral that's key to reducing climate-warming carbon emissions from automobiles. The mine, owned by Lundin Mining Co. of Toronto, is the only place in the U.S. where nickel, a mineral which helps increase energy storage in lithium-ion batteries and thus boost the range an electric car can drive on a single charge, is produced.

That status has put a spotlight on Eagle Mine as growing momentum behind electric vehicle (EV) production supercharges demand for battery-grade nickel; a mineral largely sourced in countries like Russia, Brazil, Indonesia and the Philippines where loose environmental regulations and dirty mining practices undercut the EV market's green ethos.

"World class nickel mines in stable political justifications are extremely rare," said Robert Johnston, a research scholar at the Columbia University Center for Global Energy Policy and former CEO of Eurasia Group, who runs the consulting firm's climate and energy practice.

"They've done something right to bring on a major nickel mine in the eastern U.S. in a state that has high standards for environmental and social assessment of these kind of projects," Johnston said.

Environmental opposition fades in the UP

Eagle Mine has produced nickel from two ore bodies for about eight years. "Massive" and "semi-massive" ore containing between 6.5 and 1.5 percent nickel is extracted daily, resulting in about 18,000 tons of nickel concentrate in 2021. The mine also produces about 18,000 tons of copper concentrate and a smaller volume of cobalt, about 380 tons.

Today, Eagle Mine is closer to the end of its life than the beginning. Unless more ore is found, the mine will close in about four years. When it started production in 2014, Eagle was the first new mine in decades to open in Michigan and it was not without plenty of controversy.

The mine produces sulfide ore, which must be crushed and ground to extract minerals from the waste rock, which is known as tailings. Environmental groups, tribes and the private Huron Mountain Club worried that sulfide acid drainage from the mine could leach into groundwater and two rivers, the Salmon Trout and Yellow Dog, located nearby.

Kennecott Minerals Co. discovered the Eagle deposit in 2002 and the company spent more than a decade in permitting and legal challenges that eventually petered out.

Since then, "it's been pretty quiet," said Melanie Humphrey, a geology technician in the oil, gas and mineral's division at the Michigan Department of Environment, Great Lakes and Energy (EGLE), which monitors the mine's waste discharges and permit compliance. "We haven't really received any complaints for quite some time."

In the water resources division at EGLE, Randy Conroy said the mine has been cited for minor discharge issues, but “because they are very responsive and timely in their notifications and corrective actions, it hasn’t really gotten escalated.”

Early concerns about the Salmon Trout River, particularly for a rare species of trout called the coaster brook trout, have not materialized, Conroy said. “The mine discharge eventually makes it there, but the monitoring is not showing it would affect those fish.”



An aerial photo of the Lundin Eagle Mine site near Big Bay, Mich. The nickel and copper mine opened in 2014 and is planning to close in 2026. (Courtesy | Eagle Mine)

Eagle Mine conducts its own ground and surface water monitoring, but the data is verified by the Superior Watershed Partnership, a nonprofit working in conjunction with the Keweenaw Bay Indian Community and the Community Foundation of Marquette County.

Lundin pays for the program and the data is posted online. The environmental testing goes beyond what’s required in the mine’s permit to include analysis of edible berries and plants of cultural importance in the area. The program has generated widespread interest and has been featured in mine engineering textbooks as an example of a best practice.

“It’s been replicated all over the world now. We’ve been contacted by different mines and universities that want to start a program like this,” said Geraldine Grant, a senior planner and biologist with Superior Watershed Partnership. “We get inquiries every year.”

Horst Schmidt, president of the Upper Peninsula Environmental Coalition (UPEC), which opposed the mine, said their group’s attention has turned to fighting a different project, a proposed open pit gold mine along the Menominee River called the Back Forty.

Schmidt offered muted praise for Lundin.

“They are probably better than most of the companies I read about,” Schmidt said.

“They are actually a bona fide mining company and they seem to follow the rules.”

“If they can get away with something I suspect they do.”

Lundin bought the mine from Kennecott parent Rio Tinto in 2013 for \$325 million. In 2016, the company began tunneling to a second ore body about a mile east and 2,500 feet further down. The second deposit, called Eagle East, began producing nickel in 2019. The east deposit extended the mine’s lifespan from 2023 to 2025, after which the shafts would be filled in and buildings torn down. That closure date was recently extended a year, to 2026, after increases in the price nickel made nearby lower-grade ore worth extracting.

Exploratory underground drilling for additional deposits is ongoing. A new discovery could extend the mine life, as well as that of the Humboldt Mill, a repurposed iron mine mill near Ishpeming that went through a \$275 million rehabilitation to return it to functional life.

The mine and mill together employ about 400 people, some of which commute from Iron Mountain, Crystal Falls and Wisconsin. Jeremy Francois, mill operations superintendent, drives in from Pelkie, about an hour to the west.

Jeff Poirier, Eagle Mine’s health and safety advisor, said the mine will continue to employ people even after the ore bodies are depleted.

“Once we’re done operating, there’s still going to be a lot of demolition and site work that goes on. That’s going to require safety people, environmental people to be here. I don’t really think of 2026 as my end date,” Poirier said. “I mean, there’s gonna be a lot that happens after that.”

Surging EV market creates massive nickel demand

External forces have put a spotlight on Eagle Mine.

According to global commodity research firm Roskill, 36 percent of global nickel production is expected to go toward battery production by 2030, versus 6 percent in 2020. The mine has largely supplied the global market for stainless steel, the largest overall use of nickel, but the share going toward EV battery production is rapidly increasing.

Rising demand coupled with recent volatility in nickel pricing caused by supply concerns amid the onset of Russia's war on Ukraine created heightened interest in Eagle Mine this year, said Matt Johnson, external affairs manager at Eagle Mine.

In January, the mine got a big attention boost on social media when Porsche released video of a Guinness World Records effort to achieve a 3-mile altitude change in an electric car, which drove from bottom of Eagle East, the lowest drivable point in America, across the country to Pikes Peak in Colorado, the highest drivable point.

In April, President Biden ordered the Department of Defense to consider five metals — lithium, cobalt, graphite, nickel and manganese — as essential to national security under the Defense Production Act because of their importance to battery technology. Invoking the Cold War-era law to boost mineral development may result in new subsidies for domestic mining and mineral processing, on which the U.S. largely relies on China and other nations.

A single point of production combined with a dearth of domestic smelting and refining capacity for battery-grade nickel “poses a supply chain risk for battery manufacturing globally, not just in the United States,” according to a 2021 White House supply chain review, which recommended the federal government invest in a domestic nickel refinery.

“We got a lot of calls from the government, state and federal, asking our opinions of, you know, ‘what would you do for domestic planning policy,’ and ‘what is your opinion on that?’” Johnson said. “We definitely have an opinion because of our experience.”

Direct inquiries also come from automakers.

“Volkswagen called last week, for example,” said Johnson. The mine works with universities on research into new technologies around sustainable mining.



3,000 feet deep in the Eagle Mine near Big Bay, Mich, a miner uses a bolter machine to place protective wire mesh around the tunnel to prevent rock falls. (Courtesy | Eagle Mine)

Sustainable nickel production is of high interest to automakers as production of electric vehicles ramps up. Sales are skyrocketing for vehicles that run on batteries. From April to June this year, EVs accounted for 5.6 percent of all car sales, which is twice that share a year ago. Demand is outpacing supply as manufacturers struggle with shortages of crucial components like semiconductors and surging prices for battery elements like nickel and lithium.

The market transition to EVs has brought auto manufacturers into direct contact with mining companies to secure raw materials. General Motors has been signing agreements with mining companies like Glencore to source cobalt. Tesla signed a supply deal with Talon Metals for nickel from the proposed Tamarack Mine in Minnesota, which has yet to successfully hurdle the permitting process and is planned to open in 2026.

In 2021, Tesla signed nickel supply deals in Australia and New Caledonia, a small French territory near Fiji. Tesla CEO Elon Musk has made it clear the company wants supply from mines that produce nickel in an “environmentally-sensitive way.” In

Minnesota, the Tamarack project is developing a capture technology that would chemically bind carbon to rocks at the mine, which would allow the company to market its nickel as carbon neutral.

Mining companies like Lundin and Rio Tinto want to be in stable jurisdictions, where environmental standards are more rigid but also transparent and provide a level of certainty, said Johnston, at Columbia. It may take longer to become permitted in the U.S, but “once you are, its much less likely the government will change the terms, nationalize the resources or you’ll be overrun by local protestors.”

Charles Griffith, director of the Ecology Center’s climate and energy program in Ann Arbor, said the accelerating EV demand creates an opportunity to modernize mining laws.

“In the U.S., we still operate under fairly ancient mining laws have not been really updated in a long time,” said Griffith, who works with the Clean Fuels Michigan nonprofit. “This is an opportunity to do mining in a more sustainable way and with more community engagement.”

“That’s probably more likely to happen in the U.S. than some other countries where the laws are even weaker,” said Griffith.

Johnston said Eagle Mine has proven to be an exception to the conventional moan he often hears in Washington, D.C., that you “just can’t build mining projects in the U.S.” because of onerous and lengthy permitting and high environmental standards.

As the world moves toward cleaner transportation, “you have to acknowledge that somewhere those minerals need to be mined and is it better to do it in Michigan with a world class operation and transparency, or in Congo or Indonesia where the mine is being run for economic reasons with little regard for environmental standards,” Johnston said.

“If this project were going through the permitting process now, I think you’d have NGOs lining up to support it.”

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