XPLORLABS®
UL Research Institutes

# Your Point of View or Mine:
## Exploring Effects of Mining

**Are you reading this on a smartphone or laptop? These devices and many others run on lithium-ion batteries. Lithium-ion batteries require metals that we get from underground mining.**

**In northern Minnesota, there is a proposal for a mine that could supply metals for these lithium-ion batteries. This mine could create jobs for some people. However, it would also disturb water sources and wilderness.**

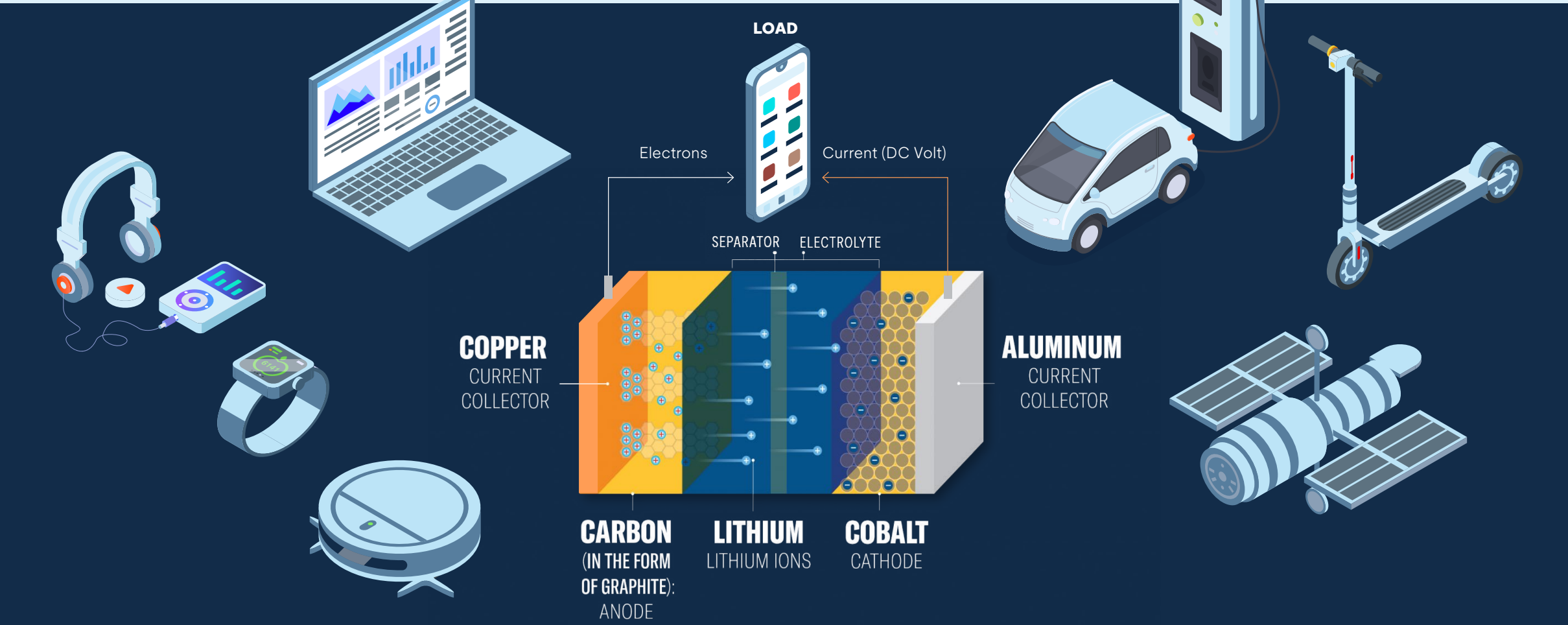
**As you read, pay attention to different points of view about the proposed mine in northern Minnesota. Gather information to help you make sense of mining and its effects on people, places, and culture. There are always multiple things to consider!**

# Copper: The Highway of Lithium-Ion Batteries

Copper (Cu) has become valuable for **lithium-ion battery** technologies because of its physical properties. It is a metal that is **ductile** and a good conductor of electricity. Copper is often used in the current collector of a lithium-ion battery. The current collector allows electricity to flow through the battery and powers the device (load).

***Lithium-ion battery:*** *Type of rechargeable battery that works by transferring lithium ions. Transforms electrochemical energy into electrical energy to power rechargeable devices like cell phones laptops, electric vehicles, and satellites*

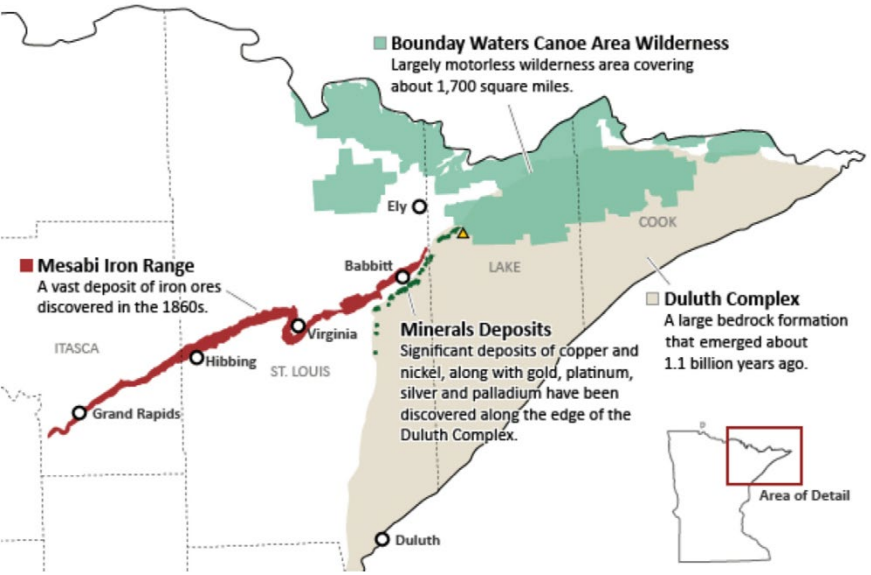
***Ductile:*** *A physical property of matter that allows a material to be stretched into a wire*



## How Mining Shaped Northern Minnesota

Northern Minnesota's history of mining started in the 1860s on the Iron Range. Underground on the Iron Range there was a lot of iron ■ **ore**. By the end of World War II, most of the larger pieces of iron ore were mined out, so a process was developed to separate iron from a rock mixture called ■ **taconite**. Iron and taconite were very important for making steel through the 1980s. Once steel was in less demand, many people lost their jobs, and communities struggled. While Minnesota still manufactures the most taconite in the country, there are less mining jobs in the region because of low demand. However, northern Minnesota may have new mining potential with the world's largest copper-nickel ■ **deposit**.

### Mineral Deposits in Northern Minnesota





## Why Copper-Nickel Mining in Northern Minnesota?

Between 2019 and 2023, U.S. copper production decreased, but demand increased. The U.S. has only 28 copper mines, so it relies on imports from other countries to meet demand. In February 2005 many people were intrigued when the company, NewRange, began the process to re-purpose an abandoned taconite plant to be able to process copper-nickel deposits. Copper-nickel mining and processing in Northern Minnesota is projected to bring in hundreds of well-paying jobs. They would provide a boost to the economies of towns across Minnesota's Iron Range.

## 1 SENSEMAKING

Materials for lithium-ion batteries are mined around the world. In 2023, the United States imported eight times more copper than they exported.
exported: $863,000,000
imported: $6,910,000,000

1. Why does mining for the metals that make these batteries seem necessary?

2. Consider mining copper within the United States versus importing it from other countries. What are possible advantages of importing copper? What are possible disadvantages?

## Environmental Impacts of Mining in Northern Minnesota

Copper-nickel ore is extracted from the earth by **open-pit** or underground mining. These mines result in changes to the land. After mining, the ore still needs to be processed. By crushing it into smaller pieces and washing it with water and various chemicals, the copper-nickel separates from other parts of the mixture. Another concern in mining is the creation of **acid mine drainage (AMD)**. Acid mine drainage is produced from the chemical reaction to separate Copper and Nickel. It is highly **corrosive**.

Mining impacts the environment in many ways. For example, mines produce waste, or **tailings**. Tailings from iron mines were once dumped into Lake Superior, causing death to wildlife. Lake Superior is the world's largest freshwater lake and source of much of the region's drinking water. Many people living within a **watershed** are impacted by its health. In addition to an impact on land and water, mining also impacts air quality. Air quality can be negatively impacted from mining dust and heavy machinery exhaust.

Scientists and engineers work together to create a remediation plan that minimizes the death of aquatic plants and animals, and pollution of the local ground and surface waters. Often, local regulations also require reclamation plans that transform mined area of land to productive use. This might look like converting industrial sites into parks or converting an abandoned mine waste site into wetlands.

***Open-Pit Mines:*** *A surface mining technique of extracting rock or minerals from the earth from an open-air pit*

***Acid Mine Drainage:*** *The formation and movement of highly acidic water rich in heavy metals*

***Corrosive:*** *Capable of damaging or destroying other substances on contact through a chemical reaction*

***Tailings:*** *Mine waste leftover after the ore is extracted*

***Watershed:*** *A land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean*

## The NewRange Mine and the Boundary Waters

The NewRange Copper-Nickel mine would be in the same watershed as Minnesota's Boundary Waters Canoe Area Wilderness (BWCA). The BWCA is a wilderness area covering over 1,000,000 acres. It includes over 1,100 lakes and 150 miles of the US-Canadian border. The BWCA sees 250,000 visitors per year, more than any wilderness area in the US.

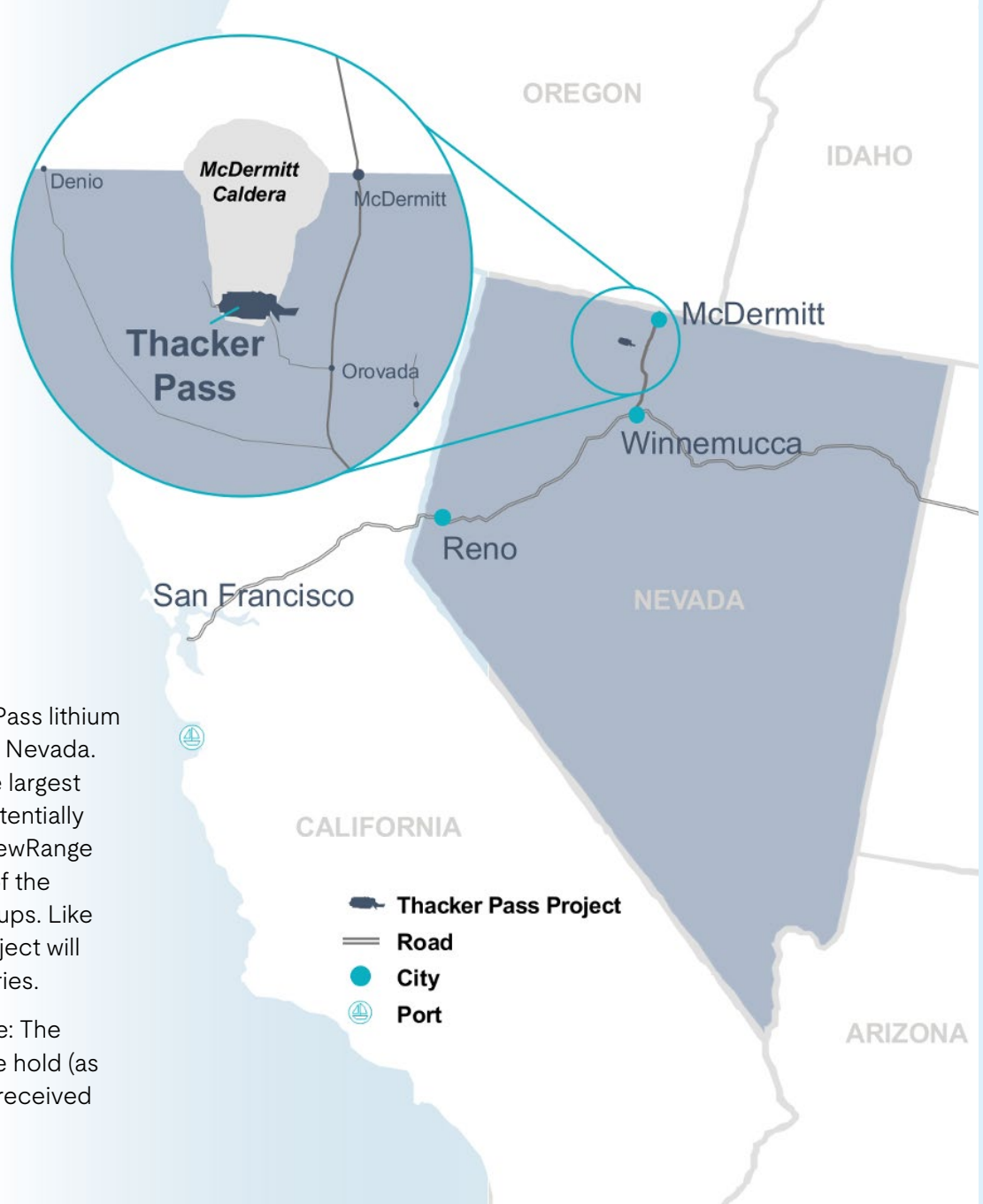
As a result, the BWCA supports the economies of towns and individuals. The area is biologically diverse. It is home to endangered species like the Canada lynx and gray wolf. Animals like moose, beaver, bears, deer, bobcats, native fish and birds rely on the undisturbed ecosystems for survival. If waterways are contaminated, it jeopardizes the entire ecosystem.

# 2 SENSEMAKING

Mining companies must make plans that describe actions they will take to preserve or recover the area surrounding mines.

1. What steps can mining companies take to minimize negative impacts on the environment? ...culture? ...communities?

2. Some people recognize that mining is necessary, but don't want it happening close to them. NIMBY stands for "Not in My Backyard." This is the motto for many people in northern MN. If mining doesn't occur in "my back yard," then where might it occur and what could be the trade-offs?




## Further Study

Work has begun on the Thacker Pass lithium mining project in the U.S. state of Nevada. Thacker Pass is thought to be the largest lithium deposit in the U.S. and potentially one of the largest in the world. NewRange and Thacker Pass feature many of the same issues and stakeholder groups. Like NewRange, the Thacker Pass project will mine metals for lithium-ion batteries.

However, there is a key difference: The NewRange project is on indefinite hold (as of April 2024), and Thacker Pass received final approval in June of 2023

## YOUR TURN!

Research the arguments for and against the Thacker Pass mine and answer these questions below.

1. Both mines have a common goal: mining components for lithium-ion batteries.
Why was one approved and the other not?

2. Do you think the correct decisions have been made about Thacker Pass and NewRange?
Why or why not?

3. Research some local mines (or proposed mines) in your state. What do they extract?

How do these mines impact your state?