

## Why Explore or Invest in Minnesota

A century of large-scale iron mining has barely scratched the surface of Minnesota's mineral wealth. Thousands of square miles of Minnesota—encompassing promising greenstone belts, sedimentary basins and intrusive rocks await exploration. We invite you to explore or invest in Minnesota. Here are eight reasons to accept our invitation:

- 1. Minnesota has excellent mineral potential.** Much of Minnesota's geologic terrane is a continuation of the mineral-rich Canadian Shield of Ontario and Quebec, which has yielded iron, gold, silver, zinc, copper, nickel, diamonds, and titanium
- 2. Minnesota has land for exploration.** Nearly 12 million acres of state-owned mineral rights, including 3.5 million acres of public school trust lands.
- 3. Minnesota has an extensive geological database.** Geologic maps and geophysical and geochemical surveys results are available. Drill core totaling more than three million feet is available for viewing and analysis.
- 4. Minnesota has a century-long tradition of large-scale iron mining.** Since the first load of iron ore was shipped from northern Minnesota more than 130 years ago, Minnesotans have realized the benefits of mineral development. The state's strong environmental regulations are well established and administered equitably.
- 5. Over \$1 billion in capital has been invested in mining and mine development in the last 8 years.** Mining companies are investing in their Minnesota future.
- 6. Investors are in a stable democracy with secure financial and legal systems and a safe place to live.**
- 7. Minnesota has trained workers and support industries for the mining supply chain.**  
A skilled labor force and network of support industries have grown to support Minnesota's iron mining industry; so when you need labor or supplies, you won't have far to look.
- 8. Minnesota has roads, rails, ports, and power.** No matter where you go in Minnesota, you're never far from the highways, railroads, ports, and utilities you need to get your development off the ground.

### Minnesota Has Excellent Mineral Potential

Minnesota's diverse bedrock geology ranges from early Archean to Cretaceous (Fig. 1). The state's greatest mineral potential lies in its extensive Precambrian geology, of which four terranes are particularly promising:

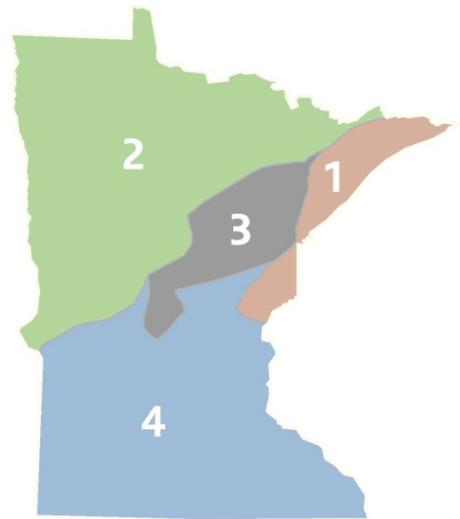


Figure 1. Generalized geologic bedrock map of Minnesota.

- 1. The Duluth Complex and associated Mid-Century Rift rocks.** This terrane contains most of the state's active non-ferrous mineral leases. The Minnesota Department of Natural Resources (DNR) estimates the identified copper-nickel resource of the area at about 4.4 billion tons averaging 0.66% copper and 0.2% nickel. This terrane also has significant titanium resources. Drilling has indicated the presence of other strategic minerals, such as chromium, vanadium, cobalt, and platinum-group elements.
- 2. The Superior Province, which encompasses the northwestern third of Minnesota and represents a continuation of the mineral-rich Canadian Shield.** Canadian gold discoveries have stimulated leasing in the Minnesota portion of the Superior Province. Most exploration in this area has been for gold, zinc-copper massive sulfides with various by-products, and magmatic sulfide deposits containing copper, nickel, and platinum-group elements. Iron ore has been mined here.
- 3. Variably metamorphosed Middle Precambrian sedimentary and volcanic rocks, including the Mesabi and Cuyuna iron ranges, with known reserves of iron and manganese.** Recent exploration has focused on base metals. There is a large iron mining district here that is currently idle.
- 4. Southern Minnesota's Archean migmatitic gneisses, younger sedimentary rocks, batholithic granitic rocks, and deformed volcanics.** Limited exploration has focused on Precambrian magmatic copper, nickel, PGM deposits and Paleozoic lead-zinc deposits in the southeast, base metals and precious metals in the Precambrian basement, and manganese in the southwest.

## Minnesota Has An Extensive Geological Database

When you explore Minnesota's geology, you have direct access to an extensive geological database. An important source of information is the large, well-cataloged drill core library, which houses for your inspection and analysis more than three million feet of diamond drill core, referenced to exact descriptions of hole locations. The library includes drill core samples taken from across the state during the past century. There is a new(2014) interactive map at [mcc.mn.gov](http://mcc.mn.gov).

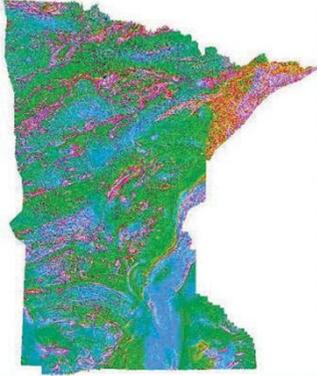


Figure 2. Minnesota Geological Survey computer-generated aeromagnetic map. Image is reduced in size and density; color added.

Logs, assays, geophysical, and geochemical surveys are available to you in Department of Natural Resources' (DNR) exploration company terminated lease files. The DNR's Division of Lands and Minerals can provide information about state land leasing, royalty rates, reclamation guidelines, and other pertinent information.

Geologic maps and outstanding high-resolution aeromagnetic maps of (Fig. 2) the entire state have been published by the Minnesota Geological Survey. Aeromagnetic data are available on colored and black-and-white contour maps, on computer-generated shaded relief maps, and to download for your own interpretation.

Extensive information is freely available on the Minnesota Geological Survey web site, as well as on the DNR website <http://minarchive.dnr.state.mn.us>. (Fig. 3). More and more records are being made digital and web accessible.



Figure 3. These public documents provide a rich source of information for future exploration, environmental research, and historical minerals research.

## Minnesota Has Land For Exploration

If you have a target mineralization model in mind, you can test it in the nearly 12 million acres of mineral rights the state administers. Neither the state nor the federal government uses the claim-staking method in Minnesota. Each year the state awards leases for state-owned mineral rights according to competitive royalty bids. Under some circumstances, state leases can be negotiated. Fifty-year leases cover exploration and mining; so you can secure a good land position early in your program (Fig.4).

Moreover, mineral leases are available on many of the 3.4 million acres of federal land in Minnesota. Some 82 percent of this land is managed by the U.S. Forest Service in the Chippewa National Forest in north-central Minnesota and the Superior National Forest in the northeast.

Leases also can be negotiated on millions of acres of privately held mineral rights in the state.

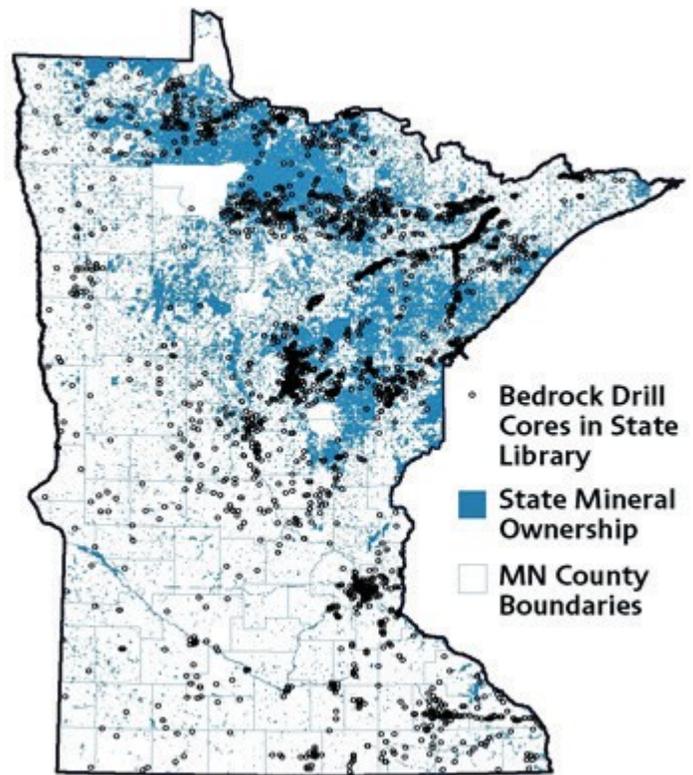


Figure 4. Public land and mineral rights are scattered throughout Minnesota but are most concentrated in the north. Exploratory drilling has been heaviest in the northeast, especially on the Mesabi, Vermilion, and Cuyuna iron ranges. The map depicts 40-acre tracts where drilling has occurred and from which drill core is available for inspection.

## Minnesota Has a Century-Long Tradition of Mining

Though excellent mineral potential is essential to an exploration program, it alone is not enough. A company also must be reasonably assured that there are low risks for capital investment.

In Minnesota, this assurance comes in the form of well-defined procedures that have evolved during a century of mining for taconite, iron, dimension stone, silica sand, and other materials. This long association with mining has taught Minnesotans that mineral development and high environmental standards are both feasible.

Minnesota's strong environmental regulations, well-established permitting procedures, and long-standing leasing laws are in place. Staff members from the DNR's Division of Lands and Minerals and other state regulatory agencies are available to meet with your company to explain these rules and advise you on permitting procedures. Capital investment within Minnesota is low risk compared to many other jurisdictions around the world.



**Figure 5. More than 100 million tons of taconite ore are mined per year in Minnesota.**

## Minnesota Has Trained Workers and Support Industries

Minnesotans know mining (Fig. 5). When you explore for minerals or mine in Minnesota, you have access to skilled, educated workers, established mining-supply companies, and experienced consultants.

Minnesota has an extensive system of universities, technical-vocational institutions, and public and private colleges. Its labor force is highly educated. Minnesota's high-school completion rate is better than 90 percent. About half of these graduates pursue some kind of postsecondary education. Decades of iron mining have fostered the growth of mining-related industries. The taconite mining industry purchases goods and services from hundreds of supplier/vendor businesses in more than 200 communities. Whether you need drill bits, shovel repairs, or geophysical consultants, you can find them in Minnesota. The supply chain is strong.

### Explore the Possibilities

*Minnesota offers what you need to get your mineral-development program off the ground:*

- Land for exploration
- Excellent mineral potential
- An extensive geological database
- A tradition of mining and established regulations
- Trained workers and experienced support industries
- Existing utilities and transportation

*So, when you launch your next mineral-exploration project, consider the reasons to invest in Minnesota.*

## Minnesota Has Roads, Rails, Ports and Power

Any site you explore or mine is within reach of freight haulers and power lines (Fig. 6). Highways reach all corners of the state. Even in the sparsely settled north, little land is more than a few miles from all-weather highways suitable for large trucks.

More than 4,500 miles of railroad track connect all Minnesota cities larger than 25,000 and link the state to major cities and ports throughout the country. Minnesota has four class-one rail carriers: Burlington Northern Santa Fe, Canadian National, Canadian Pacific, and Union Pacific. Several regional lines operate in Minnesota as well.

Minnesota's northern country borders the state's four Great Lakes cargo ports. Duluth-Superior, a foreign-trade zone operated by a port authority, ships taconite pellets, coal, grain, and other commodities. The other three ports—Two Harbors, Taconite Harbor, and Silver Bay—handle taconite pellets. Ocean vessels have access to these ports via the St. Lawrence Seaway.

Mississippi River ports in southeastern Minnesota ship coal, chemicals, stone, clay, gravel, and other raw materials to the Gulf of Mexico.

Reliable electricity is available at competitive rates across the state through a network of power suppliers. Natural gas pipelines of substantial capacity span southern Minnesota and much of northern Minnesota.

## For more information, contact:

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### *Drill Core Library, Economic Geology, Exploration, Reclamation*

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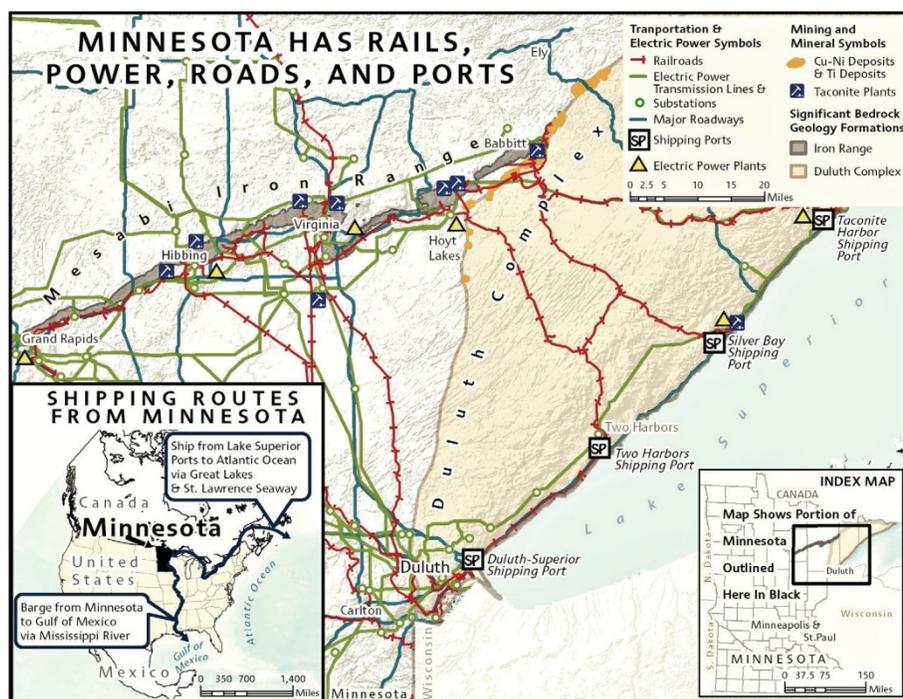


Figure 6. Roads, rails, Lake Superior ports, and power plants that are related to mining on the Mesabi Iron Range and the developing Cu-Ni-PGE mineral deposits of the Duluth Complex