

MINNESOTA'S IRON MINING INDUSTRY

IRON MINING ASSOCIATION
OF MINNESOTA

Milestones Affecting the Iron Mining Industry in the Great Lakes Region

1845 ..... Iron ore discovered in Michigan by Marje-Gesick, an Ojibway chief. Sault Ste. Marie canal opens Lake Superior to ships from lower lakes.

1855 ..... Bessemer process revolutionizes steelmaking, making inexpensive steel available to waiting markets.

1884 ..... First shipment of iron ore from Minnesota's Vermilion Range.

1890 ..... Iron ore discovered at Mountain Iron, Minnesota, opening Mesabi Range.

1892 ..... First shipment from Mountain Iron mine.

1898 ..... U.S. becomes world's leading iron ore producer with nearly 20 million tons mined.

1904 ..... Iron ore deposits verified on Cuyuna Range by Cuyler Adams.

1905 ..... Atikokan Mine in northwestern Ontario begins production; first Canadian mine in Lake Superior district.

1910 ..... First installation to improve iron ore by washing built at Coleraine, Minnesota.

1922 ..... Plant built to concentrate low-grade magnetic taconite on commercial scale at Babbitt, Minnesota, proves economically unsuccessful.

1930 – 39 .... Development of continuous hot-strip mill makes sheet steel commonly available, opens new markets for steel and creates new demand for iron ore.

1941 ..... Minnesota adopts taconite tax law to encourage development for low-grade deposits. Depletion of natural ore deposits in Lake Superior district presses industry to seek feasible techniques for using lean taconite ores and stimulates exploration for new deposits.

1941 – 45 .... Lake Superior district ships more than 411 million tons, nearly double 1936 – 40 production, showing impact of war on ore reserves.

1948 ..... Pilot plants to pelletize taconite concentrates built at Ashland, Kentucky, and Aurora, Minnesota. High-grade hematite deposits reported in Labrador Trough, a North American deposit rivaling the Mesabi.

1949 ..... Research on concentration of Michigan's low-grade Jaspilite ores at Ishpeming results in acceptable flotation process.

1951 ..... Michigan adopts "specific tax" to encourage development of low-grade deposits.

1952 – 54 .... Depletion of domestic reserves during World War II heightens world-wide exploration. Liberian ore and Labrador ore shipped to U.S. blast furnaces. U.S. economic self-sufficiency in iron ore ends.

1954 – 56 .... Two commercial-scale taconite mining and processing operations built and began producing pellets in Minnesota.

1961 ..... One-hundred-thousand-ton ocean-going ore carrier launched. Deep water ocean port becomes new competitive factor in steelmaking.

1964 ..... "Taconite amendment" to Minnesota constitution pledges fair taxation of taconite industry, spurs additional investment.

1969 ..... One-thousand-foot-long Poe Lock opens at Sault Ste. Marie. Fifty-thousand-ton-capacity Great Lakes carriers begin hauling Lake Superior ores.

1974 ..... Minnesota taconite industry begins expansion to an annual pellet production capability of 65 million tons.

1980 ..... Declining domestic steel production and worldwide overdevelopment of steelmaking facilities and iron ore resources shock North American mining industry, beginning a period of uncertainty for Minnesota taconite.

1983 ..... Natural Resources Research Institute (NRRI) University of Minnesota was established in response to economic downturn in the late 1970s and early 1980s. NRRI has worked with the industry to reduce costs by improving the efficiency of operations as well as to improve the quality of pellets for better performance in the blast furnace.

1985 ..... Butler Taconite, Nashwauk, closes permanently after producing 40.5 million tons over the course of 18 years.

1986 ..... Reserve Mining Company's owners file bankruptcy, plant closes.

1987 ..... Flux pellets, containing limestone, introduced – increase blast furnace productivity.

1990 ..... Cyprus Minerals reopens scaled-down Reserve mine and plant.

1994 ..... Cyprus/Northshore is sold to Cleveland Cliffs, Inc.

2001 ..... LTV Steel Mining in Hoyt Lakes closes.

2002 ..... Natural Resources Research Institute (NRRI) initiates major study on converting iron ore to iron nodules.

2003 ..... EVTAC Mining Co. reopens as United Taconite, owned by Cliffs and Chinese steel producer Laiwu Steel, after being closed for a period of time.

2003 ..... U.S. Steel assumes ownership of National Steel Pellet Co., renaming the taconite operation Keewatin Taconite.

2005 ..... U.S. DOE grant to NRRI to continue iron nodule development with its innovative linear hearth furnace concept to evaluate the iron smelting concept at advanced level.

2006 ..... Mittal Steel USA, a subsidiary of Mittal Steel, a steel company based in London, assumes ownership of the Minorca Mine near Virginia, Minnesota. Mittal and European steelmaker Arcelor later merged and became ArcelorMittal.

2007 – 09 .... Advanced oxy-coal and oxy-fuel combustion technologies tested at Coleraine Minerals Research laboratory for use in iron smelting process.

2008 ..... Cleveland Cliffs acquires ownership interest in United Taconite and now wholly owns the operation.

2008 ..... First three quarters of 2008 see all time value and production of steel and iron ore – but one month later production drops due to the economy.

2008 ..... Essar Steel Minnesota breaks ground for a new taconite pellet plant near Nashwauk.

2009 ..... For the first time, though short lived, no mines are operating on Minnesota's Iron Range for more than two weeks.

2009 ..... Magnetation 1 scram mining operation begins mining old "red ore" tailings sites near Keewatin.

2010 ..... Mesabi Nugget commercially produces world's first high-grade iron nuggets using ITmk3® process.

2012 ..... Magnetation 2 and 3 begin production near Taconite and Chisholm.

2015 ..... Northshore Mining produces the first commercial-scale Direct-Reduced Grade pellets in the United States.

2017 ..... Cleveland Cliffs invests $75 million into new assets at United Taconite and begins production of the "Mustang" pellet.

2017 ..... ArcelorMittal Minorca Mine celebrates 40 years of production, 30 years of flux pellets, and the 100 millionth ton of iron ore produced at their facility.

The story of iron began…

Over one and one-half billion years ago a vast, shallow sea covered much of the area we know today as northeastern Minnesota. The great Mesabi Range began in this sea, which contained concentrations of iron and silica. The iron and silica settled to the bottom of the sea and formed thick layers of iron-bearing sediments. As time went on, the sea disappeared, leaving these sediments buried under thousands of feet of sand, clay and mud. As a result of this deep burial, the iron-bearing sediments were subjected to heat and pressure which transformed them into a hard, flinty rock we call taconite. Taconite consists primarily of chert, a form of silica, and of magnetite, a black, magnetic iron mineral.

The Mesabi Range, the largest of three iron ranges in Minnesota, consists of a thick layer of taconite extending from Babbitt on the east, 110 miles southwest to Grand Rapids. The taconite deposit is one to three miles wide and up to 500 feet thick.

During the long period since its formation, Mesabi taconite has been subjected to a variety of geologic processes that have altered its character. Certain areas of taconite were affected by solutions that dissolved out portions of the silica, and the black magnetite was converted to red hematite, or what we call "natural" ore. Natural ore mines, scattered throughout taconite of the Mesabi Range like raisins in a cake, played an important part in Minnesota's history. In some areas, particularly on the western end of the Mesabi Range, magnetic taconite has been changed to red hematite, leaving the silica essentially unchanged, forming non-magnetic taconite and what we call "semi-taconite." However, the great bulk of the Mesabi Range iron formation remains as hard, magnetic taconite – enough to last hundreds of years using conventional mining methods.

Iron is one of the most abundant metals found on earth. Close to five percent of the earth's crust is iron. However, iron, unlike copper or silver, is found in combination with other elements such as oxygen, silicon or sulphur. These iron minerals are found mixed with clay, sand, rock or gravel. So iron is a very common mineral, common enough to be found in your backyard. But only when the iron is concentrated in large enough quantities and sufficient quality can it be mined for commercial use. Use of iron ore dates back more than 5,000 years, and as needs for iron have grown, iron ore deposits have been found all over the world.



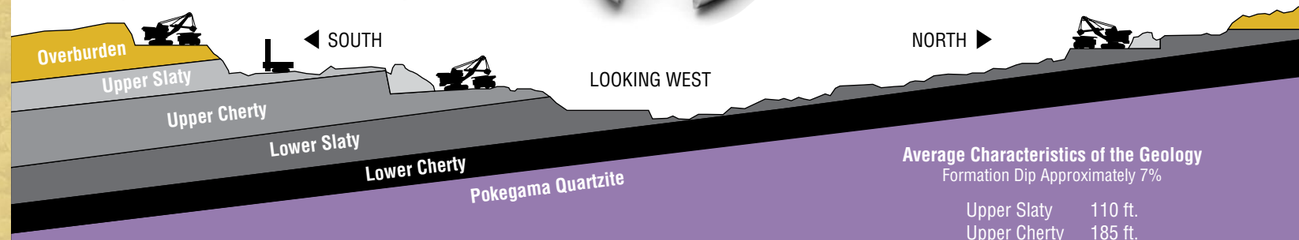
Minnesota's first iron mine opened at Tower-Soudan in 1884. This picture was taken in 1890 before the mine was converted from open pit to underground. Today it is a state park. *Minnesota Historical Society Collection.*

Perhaps the first use of iron ore was for the bright red and yellow colors that characterize many iron ores. Even today, iron ores are used in a minor way for paints and dyes. But the major use of iron, since the Syrians used it for weapons in 3700 B.C., has been as a metal – for tools and implements, for weapons and structures, and in modern times, for all the steel goods made from iron.

Iron has always played an important role in the development of the United States. Iron mines in New England provided iron for the cannons of the Continental Army in the Revolutionary War. These same mines, as well as mines in Kentucky and Ohio, met needs of the American settlers as they pushed westward. As the nation developed and found itself engaged in the Civil War, demands for iron ore were greatly increased. Also, development of an efficient way of converting iron into steel, through use of the Bessemer and Kelly processes in the 1850s, stepped up the need for iron ore. New iron ore mines were found and brought into production in Michigan, and with the opening of locks at Sault Ste. Marie, iron ore deposits of the Lake Superior region – including the largest of them all, the Mesabi Range of Minnesota, were available to the nation.



Iron ore – used as a metal – can be found in almost all modern tools.



Typical cross section of the Mesabi Range

Average Characteristics of the Geology
Formation Dip Approximately 7%

Upper Slaty	110 ft.
Upper Cherty	185 ft.
Lower Slaty	120 ft.
Lower Cherty	125 ft.

Minnesota's Iron Ranges

Minnesota iron ore was first observed in 1850, east of Lake Vermilion, and again in 1865, when Henry H. Eames, Minnesota's state geologist, reported iron ore deposits in the Lake Vermilion area. Then, following a report of gold in the same area, prospectors and explorers headed for northeastern Minnesota. Little gold was found, so the explorers lowered their sights and settled for iron ore, and in the 1870s iron ore samples were being packed out of the deep forests for inspection and analysis.



The Old Vermilion Trail and Winston City sign near Lake Vermilion, Minnesota.

The evidence was convincing, and on July 31, 1884, with a shipment of iron ore from the new Minnesota Mine (later named Soudan) on the Vermilion Iron Range, Minnesota became an iron ore producing state. In the next decade the Mesabi Range came into production with the opening of the Mountain Iron Mine in 1892.

In quick succession, iron mines were discovered and opened in the Biwabik and Hibbing areas, and near Virginia and Eveleth. Most early mines were operated underground, but the large deposits were soon converted into open-pit operations, forerunners of the big iron ore mines typical of the Mesabi Iron Range. As mining moved westward along the Mesabi, a third Minnesota iron range was being explored and developed. The Cuyuna Range, east and north of Brainerd, shipped its first iron ore in 1911.

Discovery and development of Minnesota's three iron ranges came at an important time for our nation and for the world, for the 20th Century with its world wars and great economic growth would demand tremendous quantities of iron ore.

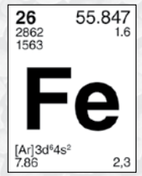
Iron Ore to Build a Growing Nation

Since the turn of the 20th Century, the nation's iron and steel needs have been largely met with iron ore shipped from more than 400 producing iron ore mines located on Minnesota's three iron ranges. During the century's first decade, 208 million tons of iron ore were shipped down the Great Lakes, and in the next 10 years, reflecting the demands of World War I, total shipments exceeded 360 million tons. The tempo continued through the 1920s, when shipments for the 10-year period approached 365 million tons, and it was clear that as the national economy expanded, iron mines of Minnesota would be busy. And busy they were. Earth and rock overburden had to be removed to expose the iron ore. Carefully engineered plans had to be followed to develop mines in an orderly, efficient way.

Equipment – steam shovels, drills, wagons, trucks and machinery – had to be moved into the mines. Railroads had to be built so that ore could be moved out of the mines. Mining is a complicated process involving care in planning, organization and operations. As the major source of iron ore for a fast-developing nation, Minnesota's iron ranges reflected the growth of that nation. But growth is sometimes reversed, and as the Great Depression settled upon the nation, activity slackened in Minnesota's mines. Only 250 million tons of iron ore were shipped during the 1930s.



IRON



Atomic Number: 26

Symbol: Fe

Atomic Weight: 55.847

Sources: Iron is a relatively abundant element in the universe. The sun and many types of stars contain iron in quantity. The Earth's core is thought to be composed mainly of iron. Iron is the fourth most abundant element in the Earth's crust. The most common iron ore is hematite (Fe_2O_3), from which iron metal is obtained by reduction with carbon. Iron is also found in minerals such as taconite and magnetite, which are commonly seen as black sand along beaches and stream banks.

Some Mining Terms

Agglomeration: The term describing the preparation and heat treatment to prepare iron ore pellets and other iron ore products for shipment and use in a blast furnace.

Beneficiation: A series of processing steps which improve the physical and chemical properties of the ore, usually used in describing treatment of natural ore.

Concentrate: The finely ground iron-bearing particles that remain after separation from impurities, a term usually applied to taconite processing, although correct when describing other ores.

Natural Ore: Ore that at one time was fed to blast furnaces, typically containing about 50% iron in natural state. Hematite is a common natural ore. Furnaces are no longer designed to handle natural ore.

Reclamation: The plans and process taken by a mine to preserve the natural resources, control possible adverse environmental effects of mining, and to restore land for future.

Taconite: One of the many rocks of low iron content, now generally applied to similar geological formations. Taconite replaced natural high-concentrate ore for use in steel blast furnaces

Tailings: Rock particles containing little or no iron, separated from iron-bearing particles during various stages of crushing, grinding and concentration. Technology is developing that can now remove more iron from the tailings, called scram mining.

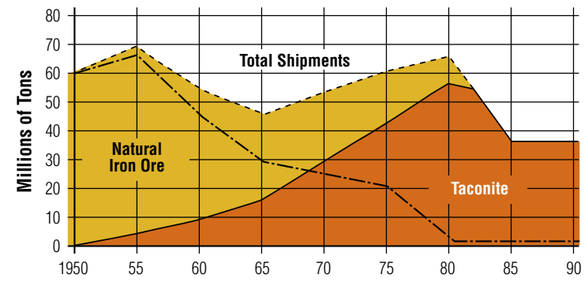
Wars Deplete Natural Ores, Mining Technology Changes

The vital importance of Minnesota's iron ore resources was not lessened by the depression of the 1930s. This was clear as both the nation and the free world relied on Minnesota iron ore throughout World War II. In all, more than 338 million tons of Minnesota iron ore were shipped during the war years to make ships, tanks, guns and other steel armaments.

With the end of the war, the need for iron ore increased – 304 million tons were shipped from Minnesota during the five years following the war, and 344 million tons were shipped during the next five years, 1950 – 55. Some of it was used to meet the needs of the Korean War, but much of it helped to meet the great consumer demand that built during World War II – for automobiles, new buildings, roads, home appliances and other items required by a rapidly growing nation.

The graph on the right shows dramatic changes in Minnesota iron ore production beginning in the 1955 – 60 period. Iron mining was entering a new phase. The sharp decline in natural ore shipments resulted primarily from depletion of our better grades of natural ore. At the same time, steelmakers, seeking greater production, were more and more demanding about the quality of ore they were feeding into their blast furnaces. Also, world-wide exploration efforts, spurred by growing use of iron and steel, were beginning to turn up vast new sources of iron ore.

Shipments of iron ore from Minnesota, 1950 – 1990. Figures plotted are five-year averages for period ending in years shown.



Fortunately for Minnesota, iron mining companies had developed a number of processes that could be used to upgrade intermediate and low-grade ores. Processing plants had operated in Minnesota for many years, built to remove silica and other impurities from ore, and to produce ore uniform in size.

By 1958 more than 80 different processing plants were at work in Minnesota. Yet these efforts did not improve Minnesota's iron ore enough to compete with high-quality iron ore produced in other countries. Minnesota, once the nation's and world's dominant supplier of iron ore, had, by 1960, become just one of the numerous sources.

But the influence of rival ore-producing areas was only one side of the story. In the 1955 – 60 period, the natural iron ore curve on the graph was beginning to change, as Minnesota began to meet the challenge with another iron ore resource – taconite.



During both world wars, high-grade natural ore was taken from mines to support the war effort. As high-grade ores were depleting, new processes were developed where lower bearing iron rock, known as taconite, could be mined and iron concentrate was made into a pellet form.

Minnesota Department of Natural Resources
Division of Lands and Minerals

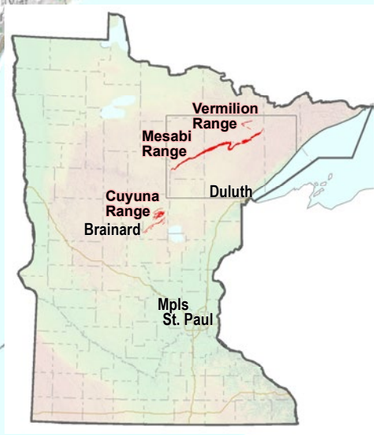
Mesabi Range Mining Operations

- Taconite / Iron Ore Operation
- Taconite Pit
- Natural Ore Pit
- Iron Formation

0 3 6 12 18 Miles

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Ely
Vermilion Range
BWCA
Tower
Maturi Cu-Ni-PGE Deposit
Birch Lake Cu-Ni-PGE Deposit
Babbitt
Northshore Mining (Mine)
Mesaba Cu-Ni-PGE Deposit
Northmet Cu-Ni-PGE Deposit
Mesabi Nugget
Cliffs Erie Area
Cliffs NR R.R.
Taconite Harbor
15 miles
Northshore Mining R.R.
U. S. Steel Minntac
ArcelorMittal Minorca
Virginia
(Mine)
United Taconite
(Plant)
Hibbing Taconite
Hibbing
Mining Resources Niles-Duncan
U. S. Steel Keetac
Former Essar Steel Minnesota Site
ERP Iron Ore: Mesabi Chief
ERP Iron Ore: Canisteo
ERP Iron Ore: Holman-Plummer
Grand Rapids
Itasca Co.
St. Louis Co.
Burlington Northern Santa Fe R.R.
Canadian National R.R.
Canadian National R.R.
Base of the Duluth Complex
St. Louis Co.
Lake Co.
Canadian National R.R.
Northshore Mining (Plant)
Silver Bay
Two Harbors
Duluth
Lake Superior



A New Iron Ore Resource

For years, the basic iron-bearing rock of the Mesabi Range, taconite, resisted man's attempts to make it useful. As early as 1871, Peter Mitchell, a Michigan prospector, opened a test pit in the hard taconite near Babbitt. But the rock was too hard and dense, and its iron content too low. Besides, there was plenty of good natural ore to be mined.

In 1913, a young engineer at the University of Minnesota, E. W. Davis, began working with the tough, magnetic taconite of the eastern Mesabi. One of his theories was that powerful magnets might unlock iron-bearing particles from taconite rock.

After years of experimenting, a small plant was built near Babbitt in 1922. But the plant was ahead of its time. Costs were too high and the market for the product was depressed. The plant closed in 1924. But Davis continued his work, and several mining and steel companies joined in taconite research in anticipation of the day Minnesota's natural ore resources could no longer supply the nation's needs.

Taconite research was further stimulated in 1941 with passage of the taconite tax law by the Minnesota Legislature. Such public support, plus years of study and testing in small-scale "pilot" plants, led to the first two large investments in Minnesota's taconite. These were begun in the early 1950s by Reserve and Erie Mining companies. Key steps in taconite mining and processing are outlined in the photos below. After extensive environmental impact statements and obtaining mining permits, the rock is quarried by drilling and blasting, crushed to the size of gravel, then ground to a fine powder. Particles containing iron are separated by magnets, rolled into pellets the size of marbles and heat hardened so they can be shipped and used in the blast furnace.

The finished pellets contain over 65% iron, the result of a costly and complex process which discards two-thirds of the rock originally mined. The discarded rock, called tailings, is permanently contained in large basins. Some of it may be mined again as technology develops to remove remaining iron left in the tailings.

Transportation is the final link in iron ore production and an important factor in making it competitive. Typically ore moves by train to a Lake Superior port, then by ship to lower Great Lakes steelmaking centers. Through the years, continual efforts have been made to improve efficiency of iron ore transportation. Faster, larger vessels haul cargoes up to 60,000 tons – three times the capacity of ore boats in the 1960s – and a far cry from the Schooner Columbia, the first vessel to lock through the canal at Sault Ste. Marie in 1849 with 120 tons of iron ore

While mining a site, reclamation projects are underway to ensure the land can be used again in the future. The process commonly includes reshaping the land and restoring topsoil as well as planting native grasses, trees, and ground covers. Reclamation is closely regulated by both state and federal law and requires financial assurances by the mines as part of the permit to mine.

Steps to Produce Taconite



Drilling



Blasting



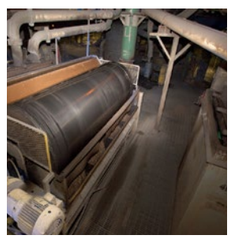
Loading



Hauling



Pellet Forming



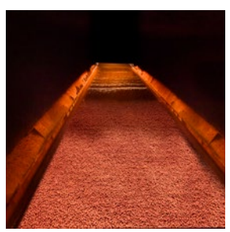
Magnetic Separation



Grinding



Crushing



Heat Hardening



Mine Reclamation



Shipping



Steel Making



The Hull-Rust Mahoning mine is located in Hibbing, MN. This mine supplied as much as a fourth of the steel used by the U.S. in World War II.

The Transition to Taconite

The early 1960s brought economic hardship to iron range communities; natural ore production was declining, and the pace of taconite growth was disappointing. Nothing could be done to reverse the trend in natural ore. The only solution was to spur expansion of the taconite industry.

Minnesota's total production of iron ore and pellets reached a low point in the 1960s, then began climbing toward former levels, until the '80s.

Taconite's growth has not come easily because capital requirements are extremely large, competition is keen, and a changing steel industry has brought periods of uncertainty to the iron ore market. The 40 million tons annual taconite production capacity attained by 1974 cost investors $1.2 billion, and development came slowly.

While Minnesota was launching a taconite industry, other states and nations began to develop their resources of taconite or similar material. In fact, Minnesota, where the taconite process was pioneered, fell behind in its competition for taconite investment.

Minnesota met the challenge in 1964 when a constitutional amendment passed, assuring taconite companies that they would not be singled out for state tax increases.

The pledge of fair tax treatment helped win further taconite investment. New projects totaling over $400 million were announced following the statewide referendum. Within 10 years, taconite plant capacity grew 165%, from 15 million to 40 million tons per year.

The taconite industry began to grow again in 1974, "the second taconite decade." In that year, construction began on two new plants, and three expansions were announced. This brought total capacity to about 65 million tons annually at an additional investment of over one billion.

Shortly after the 1970s expansion, the domestic steel industry faltered due to declining markets, recession, and foreign competition. North America found itself with a 25% oversupply of iron ore. Production slipped to 70% of capacity in 1980 and fell below 40% in the next few years. Two plants closed during the mid-1980s, one permanently. The other reopened under new owners at a reduced output.

Times change, however, and during the 1990s production increased again due to new efficiencies and technologies. As the 21st Century dawned, another mine closed permanently, but others increased their production capabilities. Today, production remains near capacity, spurred by growth in the world steel market. Much of that international growth comes from China.

Competing with the World

For more than 50 years, Minnesota supplied almost two-thirds of the iron ore which helped to build the nation. The iron ore resources of other states and nations were developed and Minnesota's percentage of the iron ore market began to decline. Mines in Venezuela, Peru, Chile, Brazil and Liberia started producing iron ore in the 1950s and began to displace Minnesota ore in its traditional markets.



Canadian ore also became a factor and large processing facilities similar to our taconite plants were built. Some of these installations in eastern Canada compete with Minnesota products.

Operations in Michigan, too, increased their capacity to turn out pellets.

Foreign ore production became more competitive because of changes in ocean transportation. Ships more than five times as big as the largest on the Great Lakes sharply reduce the shipping cost per ton, even for very long distances.

All these influences on our mining industry underscore the need to keep Minnesota ores competitive in cost as well as in quality.

Dedicated. Responsible. Innovative.

Iron mining has built upon experience, technology and hard work. To make it the industry it is today, those fundamentals are continuously passed to future generations to assure iron mining will be here today and tomorrow.

Iron Ore in Your Future

Iron ore research, iron ore processing, iron ore production and all of the work involved, have one purpose: to provide the basic raw material for the iron and steel industry – iron ore. Without steel production, there would be little need for iron ore. Steel, of course, is of vital importance to our economic health and to our standard of living. But steel, too, must compete with other materials and products – with other metals, with wood, concrete, glass, plastics and with steel produced in foreign nations. It is this concern by companies and employees that has resulted in a unified effort to make our steel competitive with other materials and foreign steel.

Just as steel producers must provide high-quality steel at the lowest possible cost, the iron ore industry must produce products that can compete on a cost and quality basis while competing in a global market. Spurred by competition and market demands, the iron ore industry is finding new ways to develop, produce and market iron ore. This means iron ore will continue to play a basic and vital role in our nation and the world. Minnesota iron ore continues to be one of the state's most important products. Research, a skilled workforce, public support and constant efforts to control quality and production costs are the most important factors in keeping this Minnesota industry competitive in the world market.

Modern wind turbines contain over 300 tons of steel.



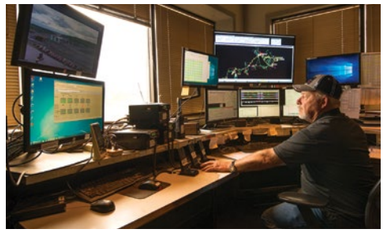
Photo courtesy of Minnesota Power

Safeguarding the Environment

Minnesota's iron mining industry is concerned about the environment. Before any mining commences, thorough environmental reviews are conducted, and permits to mine include environmental control requirements. Compliance requirements include: water use, dust control, erosion prevention, overburden stockpiles, air emission control, and reclamation of the land. Low-grade iron bearing materials are separated and stockpiled for possible future use by developing technologies.

Minnesota's iron mining and taconite companies have programs designed to meet these needs. Tree planting, seeding of tailings basins embankments and stockpiles, recirculation of water, and dust control systems are some of them.

The dimensions of mining make Minnesota's Iron Range unique and fascinating. Thousands of tourists come to the Iron Range each year to watch mining operations, to marvel at the open pits, and to tour taconite plants. So, in a way, Minnesota's iron mining industry is part of another industry – the tourism industry. Always bring your camera when you visit the Iron Range.



Iron mining relies on computer technology to govern and monitor mining and processing. Computers increase productivity and help maintain uniform pellet quality.



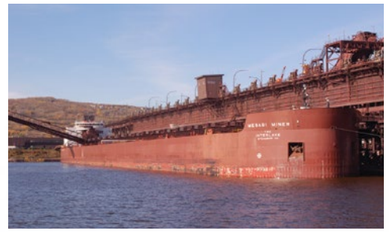
Pellet quality is proven and hardened in taconite plant furnaces.



Mining companies control erosion on tailings basins by plantings that stabilize and nourish the surface. When inactive, tailings ponds and reclaimed mine land support vegetation and wildlife.



Taconite pellets are transported to Lake Superior ore docks then shipped by boat to steel mills in the eastern United States and Canada.



New ore boats carry 60,000 tons; equal to total production of the Soudan Mine in 1884. They are built to fit the largest locks at Sault Ste. Marie.



The condition of the iron mining industry is tied directly to the health of the steel industry – from removing the ore to pouring molten steel.



The mining process includes continuous reclamation even as the sites are mined. Companies reclaim land for future use by the public. They include fields, wetlands, forests and lakes to be enjoyed by everyone.

Iron Mining Association of Minnesota
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Duluth, MN 55802 • (218) 722-7724

www.taconite.org

Iron and Steel Producers:

ArcelorMittal Minorca
Owner: ArcelorMittal
Managing Agent: ArcelorMittal
www.arcelormittal.com

Hibbing Taconite
Owners: ArcelorMittal, Cleveland Cliffs, Inc., U.S. Steel
Managing Agent: Cleveland Cliffs, Inc.
www.clevelandcliffs.com

Mesabi Nugget
Owner: Steel Dynamics Delaware
www.steeldynamics.com

Mining Resources, LLC
Owner: Steel Dynamics, Magnetation
Managing Agent: Steel Dynamics
www.steeldynamics.com

Northshore Mining
Owner: Cleveland Cliffs, Inc.
Managing Agent: Cleveland Cliffs, Inc.
www.clevelandcliffs.com

United Taconite
Owner: Cleveland Cliffs, Inc.
Managing Agent: Cleveland Cliffs, Inc.
www.clevelandcliffs.com

U.S. Steel – Keewatin Taconite
Owner: U.S. Steel
Managing Agent: U.S. Steel
www.ussteel.com

U.S. Steel – Minntac
Owner: U.S. Steel
Managing Agent: U.S. Steel
www.ussteel.com

Other Sources of Information:

The Making of Iron Ore into Steel
American Iron and Steel Institute
1140 Connecticut Ave. NW, Suite 705
Washington, D.C. 20036
(202) 452-7100

Mining Iron Ore, Other Metals and Fuels
National Mining Association
101 Constitution Ave. NW, Suite 500 East
Washington, D.C. 20001
(202) 463-2600