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# 2005 Minerals Yearbook

## MINNESOTA

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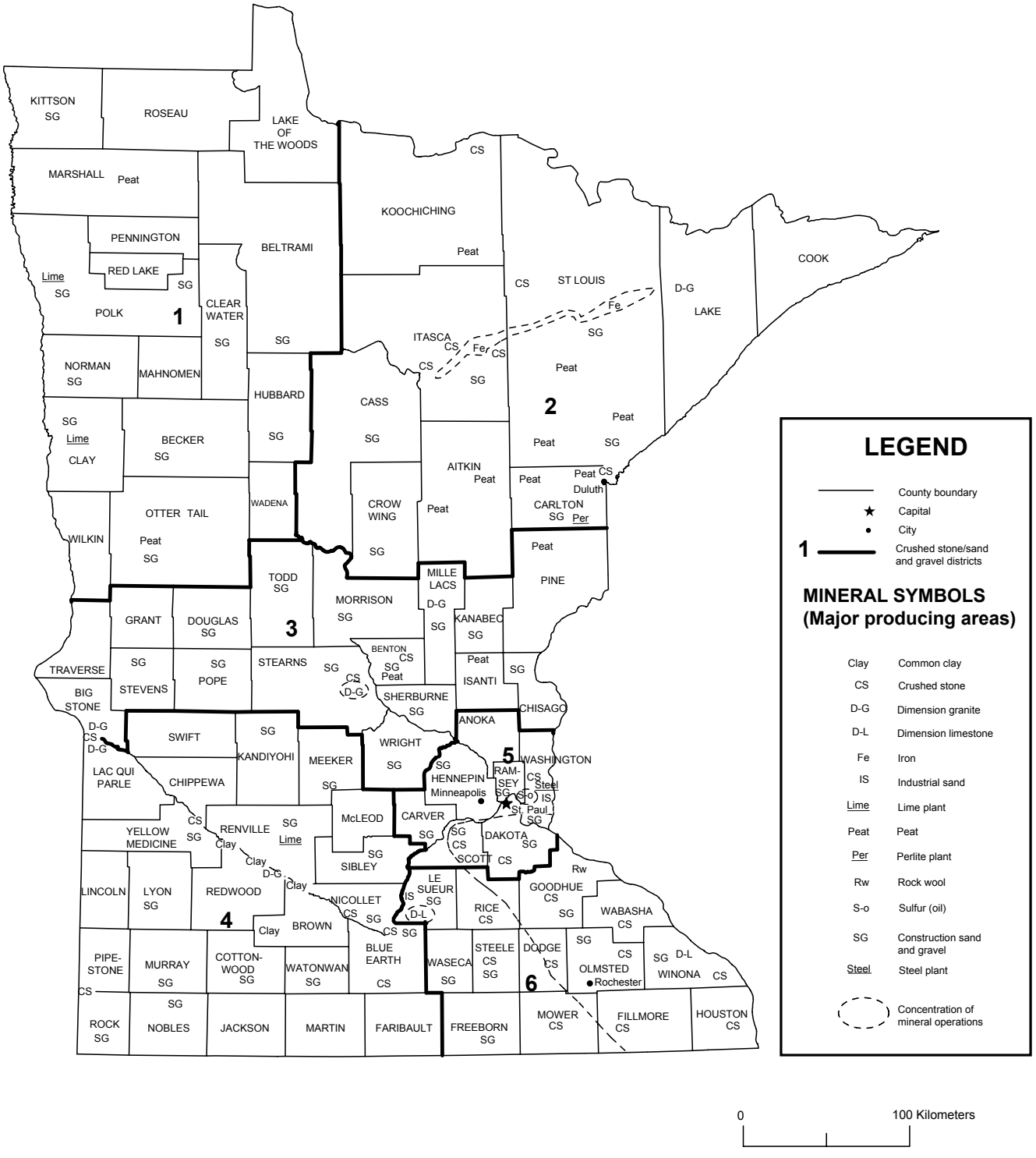
# MINNESOTA




**Source: Minnesota Department of Natural Resources, Division of Lands and Minerals/U.S. Geological Survey (2005)**

# The Mineral Industry of Minnesota

In 2005, Minnesota's nonfuel raw mineral production was valued[1] at $2.19 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $310 million, or 16.5%, increase from the State's total nonfuel mineral value for 2004, which had increased by $560 million, or more than 42%, from 2003 to 2004. Minnesota continued to rank seventh among the 50 States in total nonfuel mineral production value, and the State accounted for 4% of the U.S. total. [Because data for industrial sand and gravel and lime have been withheld (company proprietary data), the actual total values for 2003-05 are noticeably higher than those reported in table 1.]

Minnesota continued to be the Nation's leading iron ore-producing State in 2005, and, based upon value, iron ore continued to be the State's leading nonfuel mineral, accounting for nearly 84% of its total nonfuel mineral production value. Iron ore was followed by construction sand and gravel, crushed stone, industrial sand and gravel, dimension stone, lime, peat, common clays, and gemstones (in descending order of value).

The State's substantial increase in nonfuel raw mineral production value largely resulted from iron ore's considerably higher average price per metric ton (t) in 2005 compared with that of 2004. In 2005, despite a 2% decrease in production shipments, the commodity's value rose by more than $270 million, or by 17%, compared with that of 2004. This was the second consecutive year in which the value of iron ore increased significantly; in 2004, with a 22% increase in production shipments, the commodity's value rose by more than $530 million, or by more than 50%, compared with that of 2003. Other commodities with particularly significant increases in value were crushed stone and construction sand and gravel. With a marginal increase in the production of crushed stone and despite a 1.5% decrease in that of construction sand and gravel, the values of these commodities rose by $22 million (34%) and $18 million (nearly 8%), respectively. The values of industrial sand and gravel and lime were also up by more than 40% each. Although dimension stone production decreased by 14%, the production value for 2005 increased by $1 million, or 8%. An increase in peat production and a slight increase in its unit value led to an increase in the value of peat (table 1).

In 2005, Minnesota continued to rank first among other producing States in the quantity of iron ore produced, third in the production of peat, and fifth in construction sand and gravel. The State rose in rank to eighth from ninth in the production of industrial sand and gravel, and comparatively significant quantities of dimension stone were produced in the State.

The following narrative information was provided by the Minnesota Department of Natural Resources' (DNR) Division of Lands and Minerals (MDLM).[2] Production data in the following text are those reported by the MDLM, based upon its own surveys and estimates. The data may differ from some production figures reported by the USGS. In 2005, mining in Minnesota actively continued in the traditional nonfuel mineral sectors, and a variety of new mineral-related research and mineral exploration activities took place in the State. Identified deposits of such mineral resources as construction aggregates, dimension stone, direct-shipping grade iron ore, manganese, peat, stone (landscaping), and titanium allowed for prospective opportunities for new mineral development in the State. Minnesota geologically has potential for the occurrence of such mineral resources as base metals and precious metals, diamond, and kaolin, as well as for oil and gas. The level of investment in mineral development activity was significantly higher than in the past few years and many additional mineral development investment opportunities continued to exist in the State.

## Exploration and Development Activities

There were 194 active State metallic minerals leases in Minnesota, covering slightly more than 27,100 hectares (ha) (67,050 acres) as of December 31, 2005. No State metallic minerals lease sales were held in 2005, but 71 leases were awarded through the State's negotiated lease and preference rights processes. Four of these were issued to Lehman Exploration Management, Inc. and encompassed 690 ha in Itasca County. Two, issued to Kennecott Exploration Company (227 ha), were in Kanabec County; two, issued to Prime Meridian Resources, Inc. (389 ha), were in Koochiching County, and four, issued to Kennecott Exploration Company (372 ha), were in Mille Lacs County. The remaining 59 leases were all located in St. Louis County—49 of them (encompassing in total 5,020 ha) were issued to Encampment Resources LLC, and the remaining 10 leases (1,740 ha) were issued to 608457 B.C. Ltd.

A total of 21 leases (nearly 1,880 ha) were terminated in 2005. Four of these (encompassing 100 ha) were located in Lake County, and the other 17 (1,780 ha) were located in St. Louis County.

A number of State-sponsored research projects related to mineral resources were underway in Minnesota in 2005. The University of Minnesota Duluth—Natural Resources Research Institute (UMD-NRRI) supported exploration geochemistry projects for base metals, diamond, and precious metals. The Minnesota Geological Survey (MGS), in cooperation with a private partner, was completing a statewide exploration geochemical survey for diamond. In another MGS project, original aeromagnetic survey data were being reanalyzed to produce more currently useful digital products. The MGS also was preparing a report on the use of lithogeochemical principles to identify zones of platinum-group element (PGE) concentration in mafic intrusions. Lithogeochemical analysis

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2005 USGS mineral production data published in this chapter are those available as of December 2006. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Maryanna Harstad, Senior Planner, authored the text of the State mineral industry information provided by the Minnesota Department of Natural Resources' Division of Lands and Minerals.

of alteration zoning could prove valuable in identifying PGE enrichment zones in Minnesota mafic intrusions that are not part of the Duluth Complex.

### *Industrial Minerals*

The industrial mineral and construction materials mining industry in Minnesota, as categorized by the MDLM, was composed of the production of seven general categories of commodities: aggregate, clays, granite, industrial silica sand, limestone, peat, and quartzite. Mineral resources were identified within the State to develop additional mine sites for most of these commodities. Minnesota's population continued to grow, presenting the need for more of these materials. During the period 1990 to 2000, Minnesota's population grew by an average of 54,000 per year, and the State's population in 2000 was 4,919,000 (according to the 2000 U.S. census). Minnesota was the fastest growing State in the Midwest and the Northeast during that period. In 1998, the population of the Greater Twin Cities Metropolitan Area, including surrounding counties, exceeded 3 million. Different modes of transportation were available for producers in the State to move industrial mineral commodities to various markets: Mississippi River barges to carry material to the Gulf of Mexico; bulk carriers to carry material to Lower Lake ports; railroad to transport material to either coast; and trucks to transport material via the interstate highway system. During 2005, all these factors—significant mineral potential, a growing population, and an effective transportation infrastructure—continued to create opportunities for development of industrial mineral resources in Minnesota.

### *Metals*

**Nonferrous Metallic Leasing and Exploration.**—In 2005, advanced stage exploration continued at two copper-nickel-PGE deposits near the western margin of Late Proterozoic-age mafic intrusions collectively referred to as the Duluth Complex. The two deposits were the NorthMet deposit, which was being explored by Polymet Mining Corp., and the Birch Lake deposit, which was being explored by Franconia Minerals Corp.

Polymet Mining completed its nearly 29,000-meter (m) (95,000-foot) infill drilling program and bulk sample drilling. The bulk samples were used to test the flotation and hydrometallurgical equipment and processes proposed for the metal extraction project. The pilot plant sample processing, completed by SGS Lakefield Research Ltd. (Canada), later confirmed the technical feasibility of the planned flotation and hydrometallurgical treatment processes. In addition, Polymet's wetland mitigation program received support from the local county board (Polymet Mining Corp., 2008§[3]).

The Birch Lake property was the main site of an advanced stage exploration project, which also included the Maturi and Spruce Road properties. The drilling of 40 holes and 49 wedges totaling more than 33,300 m has outlined a large tonnage, low-grade copper-nickel-PGE deposit at Birch Lake in a resource area of approximately 260 ha. The ore was contained in the upper portion of an ultramafic unit within the South Kawishiwi intrusive at a depth of 350-750 m. During 2005, infill drilling of four holes with six associated wedges totaling more than 4,000 m revealed a higher grade zone of mineralization and confirmed the general continuity of the deposit. Several intercepts assayed greater than 1% copper and about 2 grams per metric ton (g/t) of combined platinum/palladium. A 2002 estimate of inferred mineral resources (using a hydrometallurgical case and a net smelter return cutoff of $25.35 per metric ton) described 51 million metric tons (Mt) of inferred resources at a grade of 0.675% copper, 0.211% nickel, 0.01% cobalt, and 2.6 parts per million (ppm) silver, 972 parts per billion (ppb) palladium, 460 ppb platinum, and 216 ppb gold. Mineralization consisted of disseminated sulfides with palladium to platinum ratios of 2:1 in drill-core analyses (Franconia Minerals Corp., 2008§).

Another copper-nickel deposit, the Mesaba project near Babbitt in northeastern Minnesota, which is held by Teck Cominco, Ltd., has been dormant since Polymet Mining reached an agreement with Cliffs-Erie L.L.C. for use of the nearby former LTV Steel Mining Co.'s mining and plant facilities. The mine and plant were to be designed around Teck Cominco's hydrometallurgical process.

Wallbridge America Corp. proposed the drilling of as many as 13 core holes in its Maturi Extension copper-nickel property in the Lake County part of the Duluth Complex. Drilling was planned to begin in the spring of 2006.

In other exploration activities, Kennecott Minerals Co. drilled 18 core holes totaling nearly 4,200 m in mafic-ultramafic features outside the Duluth complex in Carlton, Kanabec, Mille Lacs, Morrison, and Stearns Counties. Kennecott also performed additional geophysical surveys over its target in Aitkin and Carlton Counties.

The MDLM maintains an archive of drill core and related exploration data at its office in Hibbing, St. Louis County. Scanned copies of these archives may be accessed through the DNR's Web site at URL http://minarchive.dnr.state.mn.us.

## Commodity Review

### *Industrial Minerals*

**Clay and Shale.**—Clay was produced from seven mines (four of which were opened after 1995) for two general purposes. Kaolin was mined for use in portland cement production and for the production of bricks and tiles. Common clay and shale were also mined for bricks and tiles.

**Construction Aggregate (Construction Sand and Gravel and Crushed Stone).**—Construction aggregate was or has in past years been mined in all of the State's 87 counties. Construction aggregate production in Minnesota included three general categories of material: sand and gravel mined from glacial deposits or alluvial deposits; crushed dolomite or limestone mined from bedrock in southeastern Minnesota; and crushed rock mined elsewhere from diabase, gabbro, gneiss, granite, quartzite, rhyolite, taconite, and trap rock. The materials were used for many construction purposes: asphalt pavement, precast concrete products, railroad ballast, ready-mixed concrete, riprap, road base, stone (landscape), and other

[3]References that include a section mark (§) are found in the Internet References Cited section.

fill material. Some of the same quarries that produced crushed carbonate rock also produced granular carbonate (limestone or dolomite) rock, which was used for soil amendment or in the manufacture of cement.

Each year, millions of tons of potential byproducts from taconite mining are stockpiled and reclaimed. The UMD-NRRI was leading a 3-year $1.6 million program to accelerate the use of taconite byproducts in larger quantities for construction aggregates for Minnesota and other States.

The DNR maintains a Web site for information about Minnesota aggregate resources at URL http://www.dnr.state.mn.us/lands_minerals/aggregatemaps.html. The site includes such items as aggregate resource maps for twelve counties; the seven-county Minneapolis St. Paul metropolitan area aggregate resource map and a related report by the MGS and the Minneapolis St. Paul Metropolitan Council on the projected availability of aggregate resources; and the final report to the Minnesota Legislature of the Aggregate Resources Task Force from February 1, 2000.

**Limestone, Agricultural.**—The Minnesota Department of Agriculture (MDA) analyzes the granular carbonate soil amendment, commonly called agricultural limestone, or ag-lime, to report the neutralization potential. The analytical data for every ag-lime producer is available on the MDA Web site at URL http://www.mda.state.mn.us by searching for "Ag-lime analysis report," The MDA compilation lists 2004 total sales in Minnesota of more than 741,000 t (817,000 short tons) of ag-lime, of which 47%, or more than 348,000 t (384,000 short tons) was primary production from Minnesota quarries.

**Peat.**—Peatlands occur throughout Minnesota except in the extreme southwestern and southeastern corners of the State. The majority of the State's approximately 2.4 million ha (6 million acres) of peatland (about 50% in public ownership) occurs in the northern half of the State. Minnesota also contains the largest deposit of sphagnum peat of the lower 48 States. Horticultural peat was commercially mined primarily in the northern half of the State, and the products are used mainly in the gardening, greenhouse, and landscaping industries. Seven companies held peat leases on State lands. Ten companies were regulated under the Permit to Mine program, which consisted of operations larger than 16 ha (40 acres); the extent of these operations totaled approximately 1,780 ha (4,400 acres) of peatland.

**Special Silica Stone.**—Silica sand, from sandstone bedrock formations east of the Twin Cities and north of Mankato, was used in the petroleum industry, in the construction industry, in foundries, in glassmaking, and for sand blasting.

**Stone, Dimension.**—Dimension stone production in Minnesota included granite, limestone, and quartzite. Two granite producers operated nine quarries within the State near the cities or towns of Babbitt, Bellingham, Isle, Morton, Ortonville, and St. Cloud. Dimension stone end products generally were of two categories: building stone and memorials. The building stone products included interior and exterior facing, paving and curbing tile, countertops, and furniture. The memorial stone products included monuments, markers, mausoleums, and crypt fronts. Three limestone producers operated eight quarries within the State in the vicinity of Mankato and Winona. The limestone was commonly used to produce building stone products. Quartzite was quarried near Jasper in southwestern Minnesota and was used for abrasive products and dimensional products. Abrasive products included grinding media cubes and pebbles. Dimensional products included acid-resistant blocks, building stone, memorials, and mill and chute liners. Cold Spring Granite Co.'s green stone, Lake Superior Green, was used in the National D-Day Memorial in Bedford, VA, and the company's black stone, Mesabi Black, has significantly increased in popularity in recent years. The National Museum of the American Indian, Washington, D.C., which opened in September 2004, contains two types of stone from Minnesota. Pipestone, a soft red and pink stone called catlinite, was mined in the State and carved into ceremonial pipes for Native Americans around the United States and Canada by a private individual producer, and Oneota dolomite was produced by Vetter Stone Co. under the trade name Kasota-Mankato stone (Cecil, 2005§).

Landscape stone products have become a popular and valuable commodity in the Twin Cities area. Many dolomite quarries offered landscape stone products, and the New Ulm Quartzite Quarry offered purple quartzite landscape stone products. Natural glacial boulders and smaller fieldstone were supplied from many sources from as far away as the Mesabi Iron Range. Cliffs Natural Stone sells a line of landscape stone products obtained from various sources on the eastern Mesabi Iron Range. Cliffs Natural Stone has a State lease for a stockpile of flagstone material near Hoyt Lakes. Various types of State-owned stockpile material are sold to local companies for use as construction aggregates, such as road base material and as landscape stone. State leases continue to be available from many other stockpiles along the 140 kilometers (90 miles) of the Mesabi Iron Range.

### *Metals*

**Iron Ore.**—Minnesota continued to rank first in the Nation in iron ore production in 2005 and accounted for about 76% of domestic iron ore production and shipments to the U.S. steel industry (table 1). Iron-ore pellet production continued to rank among the State's leading industries, contributing more than $1 billion annually to Minnesota's economy. Based upon USGS annual production data, iron ore production in 2005 in Minnesota totaled nearly 40.6 Mt (table 1). The MDLM estimated that iron ore production in 2006 would show a small increase and that production for 2007 would likely also be very close to industry capacity.

Increased profits and an improved steel market in the past several years have allowed Minnesota's six iron ore operations to implement mine and plant improvements. United States Steel Corp. completed the construction of two new wet scrubbers. The first became operational in early 2006 at the company's Keewatin Taconite plant and the second was brought online in June 2006 at the Minntac plant. At these operations, iron-bearing taconite rock is mined and processed into taconite pellets for use in steelmaking. The new scrubbers allowed the operators to substitute western coal or biomass for natural gas to fuel the pellet furnaces, resulting in an energy cost savings.

Cleveland-Cliffs Inc. announced plans to restart two long-idled pellet lines at Northshore Mining and United Taconite. United Taconite's Line 1 pellet furnace, shut down since 1999, was reactivated during the second quarter of 2005. Northshore's Line 5 pellet furnace had not operated since the shutdown of Reserve Mining Co. in 1986. Cleveland-Cliffs planned to restart the idled furnace by the first quarter of 2008.

Minnesota Steel Industries LLC planned to construct an integrated steelmaking facility near Nashwauk, Itasca County. The project was planned to include a taconite mine, concentrator, pellet plant, direct-reduced iron plant, and an electric furnace steelmaking facility. This will be the only single-site integrated steelmaking operation in North America. Environmental review, as well as permitting for the facility, began in January 2005. The draft environmental impact statement was due to be published in February 2007. Construction was expected to begin in 2007, with production planned for 2009.

## Government Programs and Activities

### *Environmental and Technological Research Programs*

The MDLM's Environmental Cooperative Research Program addresses environmental and land use impacts associated with mining. Typical research projects are cosponsored by industry, Federal agencies, or other units of government on a cost-share or in-kind service basis (Minnesota Department of Natural Resources Division of Lands and Minerals, 2002§). Projects during 2005 included various studies designed to reduce mercury emissions from taconite plants. The State of Minnesota's most recent biennial appropriation (July 2005 to June 2007) for mineral cooperative environmental research was $172,000; matching monies or in-kind contributions were a requirement of the appropriation process.

The MDLM's Iron Ore Cooperative Research Program funds research supporting rapid improvements in iron ore and taconite processing. Research projects funded during the July 2005 to June 2007 biennium included taconite concentrator modeling, novel methods for improving filtration, and blast vibration mapping. The State appropriation was $550,000 per biennium.

The MDLM also was responsible for managing the Minerals Diversification Program, which funds research supporting the long-term health of the State's mining economy. This is intended to be achieved through improvements to the existing industry and by encouraging environmentally sound exploration for and development of new mineral resources. Research projects funded during the most recent biennium included bedrock and quaternary geology of the Mesabi Range (scheduled for completion in June 2006) and compilation of U.S. Steel exploration data. The State biennial appropriation for this program was $344,000.

### *Availability of State Mineral Industry Data*

Drill core and other exploration information may be found under the title of "Public Access to Minerals Information" at URL http://minarchive.dnr.state.mn.us. The DNR Web site (at URL www.dnr.state.mn.us) includes such information as monthly data releases; information on mineral lease availability; aggregate resource maps, including a seven county Minneapolis St. Paul metropolitan area aggregate resource map and report on projected availability of aggregate resources; and many online documents pertaining to mineral and mining research and exploration.

## Internet References Cited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Polymet Mining Corp., 2008, Project overview—The NorthMet-Erie property, accessed May 21, 2008, at URL http://www.polymetmining.com/s/Projects.asp.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MINNESOTA[1, 2]

(Thousand metric tons and thousand dollars)

| Mineral | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Clays, common | 20 | 22 | 20 | 22 | 20 | 22 |
| Gemstones | NA | 6 | NA | 6 | NA | 6 |
| Iron ore, usable shipped | 34,000 | 1,030,000 | 41,400 | 1,560,000 | 40,600 | 1,830,000 |
| Lime | W | (3) | W | (3) | W | (3) |
| Peat | 60 | 5,070 | 63 | 5,210 | 68 | 5,670 |
| Sand and gravel: | | | | | | |
| Construction | 48,900 | 212,000 | 54,900 | 235,000 | 54,100 | 253,000 |
| Industrial | W | (3) | W | (3) | W | (3) |
| Stone: | | | | | | |
| Crushed | 9,880 | 61,800 | 10,400 r, 4 | 64,900 r, 4 | 10,500 | 86,900 |
| Dimension | 16 | 11,900 | 22 | 12,400 | 19 | 13,400 |
| Total | XX | 1,320,000 | XX | 1,880,000 r | XX | 2,190,000 |

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.
[3]Value excluded to avoid disclosing company proprietary data.
[4]Excludes certain stones; value excluded to avoid disclosing company proprietary data.

TABLE 2
MINNESOTA: CRUSHED STONE SOLD OR USED, BY KIND[1]

| Kind | 2004 | | | 2005 | | |
|---|---|---|---|---|---|---|
| | Number of quarries | Quantity (thousand metric tons) | Value (thousands) | Number of quarries | Quantity (thousand metric tons) | Value (thousands) |
| Limestone | 35 | 4,220 r | $23,900 r | 36 | 3,440 | $28,400 |
| Granite | 4 | 2,510 r | 16,000 r | 4 | 2,690 | 22,100 |
| Dolomite | 6 | 3,670 | 25,100 | 6 | 3,920 | 32,800 |
| Quartzite | 1 | W | W | 1 | 419 | 3,570 |
| Total | XX | 10,400 r | 64,900 r | XX | 10,500 | 86,900 |

rRevised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MINNESOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, BY USE[1]

(Thousand metric tons and thousand dollars)

| Use | Quantity | Value |
|---|---|---|
| Construction: | | |
| Coarse aggregate (+1½ inch): | | |
| Macadam | W | W |
| Riprap and jetty stone | 88 | 1,540 |
| Filter stone | 200 | 1,790 |
| Coarse aggregate, graded: | | |
| Concrete aggregate, coarse | (2) | (2) |
| Bituminous aggregate, coarse | (2) | (2) |
| Bituminous surface-treatment aggregate | (2) | (2) |
| Railroad ballast | (2) | (2) |
| Total | 1,030 | 9,190 |
| Fine aggregate (-⅜ inch): | | |
| Stone sand, bituminous mix or seal | (2) | (2) |
| Screening, undesignated | (2) | (2) |
| Other fine aggregate | 1 | 6 |
| Total | 235 | 2,030 |
| Coarse and fine aggregates: | | |
| Graded road base or subbase | 1,150 | 8,890 |
| Unpaved road surfacing | (3) | (3) |
| Crusher run or fill or waste | 47 | 177 |
| Other coarse and fine aggregates | 67 | 424 |
| Total | 1,270 | 9,490 |
| Agricultural, limestone | W | W |
| Unspecified:[4] | | |
| Reported | 2,290 | 18,700 |
| Estimated | 5,300 | 44,000 |
| Total | 7,600 | 62,500 |
| Grand total | 10,500 | 86,900 |

W Withheld to avoid disclosing company proprietary data; included in "Grand total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Withheld to avoid disclosing company proprietary data; included in "Total."
[3]Withheld to avoid disclosing company proprietary data; included with "Other coarse and fine aggregates."
[4]Reported and estimated production without a breakdown by end use.

TABLE 4
MINNESOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

| Use | District 2 | | District 3 | | District 4 | |
|---|---|---|---|---|---|---|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Construction: | | | | | | |
| Coarse aggregate (+1½ inch)[3] | -- | -- | W | W | -- | -- |
| Coarse aggregate, graded[4] | -- | -- | W | W | -- | -- |
| Fine aggregate (-⅜ inch)[5] | -- | -- | W | W | -- | -- |
| Coarse and fine aggregates[6] | -- | -- | W | W | -- | -- |
| Agricultural[7] | -- | -- | -- | -- | -- | -- |
| Unspecified:[8] | | | | | | |
| Reported | -- | -- | -- | -- | 1,010 | 7,780 |
| Estimated | 5 | 42 | 359 | 3,000 | 865 | 7,400 |
| Total | 5 | 42 | 2,010 | 17,200 | 1,880 | 15,100 |

| | District 5 | | District 6 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| Construction: | | | | |
| Coarse aggregate (+1½ inch)[3] | W | W | W | W |
| Coarse aggregate, graded[4] | W | W | W | W |
| Fine aggregate (-⅜ inch)[5] | W | W | W | W |
| Coarse and fine aggregates[6] | W | W | W | W |
| Agricultural[7] | W | W | W | W |
| Unspecified:[8] | | | | |
| Reported | 1,160 | 9,950 | 113 | 970 |
| Estimated | 2,600 | 23,000 | 1,400 | 13,000 |
| Total | 4,810 | 41,200 | 1,760 | 13,400 |

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]No crushed stone produced in District 1.

[3]Includes filter stone, macadam, and riprap and jetty stone.

[4]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.

[5]Includes screening (undesignated), stone sand bituminous mix or seal, and other fine aggregate.

[6]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[7]Includes agricultural limestone.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
MINNESOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005, BY MAJOR USE CATEGORY[1]

| Use | Quantity (thousand metric tons) | Value (thousands) | Unit value |
|---|---|---|---|
| Concrete aggregate (including concrete sand) | 4,510 | $23,400 | $5.20 |
| Plaster and gunite sands | 99 | 684 | 6.94 |
| Concrete products (blocks, bricks, pipe, decorative, etc.) | 169 | 1,900 | 11.26 |
| Asphaltic concrete aggregates and other bituminous mixtures | 5,230 | 24,700 | 4.72 |
| Road base and coverings | 8,970 | 28,200 | 3.14 |
| Road and other stabilization (cement and lime) | 96 | 670 | 6.95 |
| Fill | 3,210 | 9,830 | 3.06 |
| Snow and ice control | 169 | 847 | 5.03 |
| Roofing granules | 26 | 208 | 8.16 |
| Other miscellaneous uses[2] | 85 | 609 | 7.21 |
| Unspecified:[3] | | | |
| Reported | 21,400 | 116,000 | 5.40 |
| Estimated | 10,100 | 46,400 | 4.57 |
| Total or average | 54,100 | 253,000 | 4.68 |

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes filtration and railroad ballast.

[3]Reported and estimated production without a breakdown by end use.

TABLE 6

MINNESOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

| Use | District 1 | | District 2 | | District 3 | |
|---|---|---|---|---|---|---|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate (including concrete sand) | 1,360 | 8,380 | 935 | 4,310 | 516 | 2,430 |
| Concrete products (blocks, bricks, pipe, decorative, etc.)[2] | W | W | W | W | 73 | 463 |
| Asphaltic concrete aggregates and other bituminous mixtures | W | W | 206 | 759 | 1,310 | 4,640 |
| Road base and coverings[3] | 2,100 | 6,830 | 977 | 3,120 | 2,560 | 8,230 |
| Fill | 486 | 1,060 | 194 | 574 | 506 | 1,430 |
| Snow and ice control | W | W | W | W | 37 | 430 |
| Other miscellaneous uses[4] | 1,270 | 6,390 | 58 | 280 | 80 | 489 |
| Unspecified:[5] | | | | | | |
| Reported | (6) | 4 | 475 | 2,200 | 10,700 | 53,600 |
| Estimated | 1,780 | 8,120 | 2,770 | 12,700 | 1,890 | 8,600 |
| Total | 6,990 | 30,800 | 5,610 | 23,900 | 17,700 | 80,300 |

| | District 4 | | District 5 | | District 6 | |
|---|---|---|---|---|---|---|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| Concrete aggregate (including concrete sand) | 725 | 3,800 | 405 | 1,770 | 289 | 2,130 |
| Concrete products (blocks, bricks, pipe, decorative, etc.)[2] | 17 | 74 | W | W | W | W |
| Asphaltic concrete aggregates and other bituminous mixtures | 770 | 5,560 | 570 | 3,550 | W | W |
| Road base and coverings[3] | 777 | 2,500 | 590 | 2,990 | 236 | 1,000 |
| Fill | 621 | 1,920 | 1,190 | 3,900 | 218 | 953 |
| Snow and ice control | 10 | 50 | W | W | W | W |
| Other miscellaneous uses[4] | 16 | 179 | 139 | 1,860 | 241 | 1,430 |
| Unspecified:[5] | | | | | | |
| Reported | 295 | 1340 | 5,350 | 37,100 | 1,320 | 7,180 |
| Estimated | 686 | 3,090 | 1,370 | 6,250 | 1,660 | 7,650 |
| Total | 3,920 | 18,500 | 9,600 | 57,500 | 3,960 | 20,300 |

| | Unspecified districts | |
|---|---|---|
| | Quantity | Value |
| Concrete aggregate (including concrete sand) | 278 | 614 |
| Concrete products (blocks, bricks, pipe, decorative, etc.)[2] | -- | -- |
| Asphaltic concrete aggregates and other bituminous mixtures | 943 | 2,720 |
| Road base and coverings[3] | 1,820 | 4,190 |
| Fill | -- | -- |
| Snow and ice control | 27 | 45 |
| Other miscellaneous uses[4] | -- | -- |
| Unspecified:[5] | | |
| Reported | 3,270 | 14,200 |
| Estimated | -- | -- |
| Total | 6,340 | 21,800 |

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration, railroad ballast, and roofing granules.

[5]Reported and estimated production without a breakdown by end use.

[6]Less than ½ unit.