

THE MINERAL INDUSTRY OF MICHIGAN

In 1997, for the third consecutive year, Michigan ranked ninth in the Nation in total nonfuel mineral production value,¹ according to the U.S. Geological Survey (USGS). The estimated value for 1997 was \$1.56 billion, about a 1% increase from that of 1996. This followed a 1.3% increase from 1995 to 1996 (based on final 1996 data). The State accounted for nearly 4% of the U.S. total nonfuel mineral production value.

Michigan continued to be the Nation's second leading iron ore-producing State in 1997, although portland cement moved ahead of iron ore as the State's leading nonfuel mineral, based on value. Construction sand and gravel was third and magnesium compounds was fourth. In 1997, the combined increase in the values of construction sand and gravel, portland cement, and crushed stone more than compensated for significant decreases in the values of iron ore and salt, resulting in the State's net gain for the year. (All listings are presented in descending order of magnitude of increase or decrease.) Also supporting the rise in value were increases in magnesium compounds, common clays, potash, bromine, and masonry cement. Other mineral commodities that decreased in value included gypsum, industrial sand and gravel, and peat. In 1996, the most significant decrease in value resulted from the cessation of copper (and silver) mine production in the State. But the decrease in copper together with a significant decrease in salt and smaller drops in the values of lime, bromine, and industrial sand and gravel were more than balanced out by the increased values of iron ore, portland cement, magnesium compounds, construction sand and gravel, crushed stone, and masonry cement.

Compared with USGS estimates of the quantities produced in the other 49 States in 1997, Michigan remained first in magnesium compounds and iron oxide pigments; second in iron ore, industrial sand and gravel, bromine, and peat; fourth in portland cement and crude gypsum; and sixth in masonry cement. The State rose to second from third in construction sand and gravel, to third from fourth in potash, and was a significant producer of crushed stone, lime, and common clays. Michigan remained fifth in the Nation in the manufacture of raw steel with an estimated output of more than 6.6 million metric tons, as reported by the American Iron and Steel Institute.

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on the minerals or 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 1997 USGS mineral production data published in this chapter are estimates as of January 1998. For some commodities (for example, construction sand and gravel, crushed stone, and portland cement), estimates are updated periodically. To obtain the most current information and for the, please contact the appropriate USGS mineral commodity specialist. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset, and request Document # 1000 for a telephone listing of all mineral commodity specialists, or call USGS information at (703) 648-4000 for the specialist's name and number. This telephone listing may also be retrieved over the Internet at <http://minerals.er.usgs.gov/minerals/contacts/comdir.html>. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved by way of MINES FaxBack or over the Internet at <http://minerals.er.usgs.gov/minerals/>.

The following narrative information was provided by the Michigan Department of Natural Resources (MDNR), Real Estate Division² (RED). Early in 1997, Cleveland Cliffs Iron Co. (CCI) applied to the Michigan Department of Environmental Quality (MDEQ) for permission to place mine waste rock in Tilden Lake. This would allow for continued operation and growth of the Tilden Mine. In late September, MDEQ issued a permit allowing the filling of the 22-hectare lake, 610 meters of unnamed creeks, and 7 hectares of wetlands. A required 10.3 hectares of wetland mitigation along with additional mitigation work must still to be performed.

Production quotas for the Tilden Mine resulted in a planned 6-week shutdown in mid-1997. However, electric power shortages in the Midwest caused the shutdown to go into effect earlier, and also created a slowdown of production at the nearby Empire Mine.

The U.S. Environmental Protection Agency (EPA) reviewed solution mining plans for the White Pine Mine, but, by late May, Inmet Mining Corp., owner of the Copper Range Co. and its White Pine Mine, withdrew their plans and announced they would close and flood the mine, and begin site cleanup of the area. New industries are being sought for the area to help replace the hundreds of jobs lost. One proposal included using part of the top of the mine to grow flowers and vegetables underground. Various uses were proposed for surface buildings.

BHP Copper Co. announced plans to buy Inmet's White Pine Copper Refinery in early 1998. White Pine had been processing imported anodes following closure of the White Pines Smelter and Mine in 1995. The refinery has a capacity of 68,000 tons of copper per year.

The EPA continued to oppose mining sphagnum peat from the Minden Bog in Sanilac County by Michigan Peat Co. The EPA will require the company to obtain a wetland's permit from the U.S. Army Corps of Engineers before mining may continue at the present location or expand. In early June, MDEQ announced that they would no longer oppose the peat mining operation on the 385-hectare bog.

Four mining exploration firms drilled a total of 18 drill holes, totaling about 5,500 meters of exploratory drilling in search of metallic mineral deposits in 1997. The exploration efforts for base and precious metals included lands of both private and public ownership.

At yearend, 70 State metallic mineral leases covering about 7,300 hectares of State-owned fee and mineral ownership lands were in effect. Seventeen direct State metallic leases were applied for in 1996 and issued in 1997. They are located in Houghton and Ontonagon Counties. An additional 130 hectares were applied for, but later withdrawn by the applicant. Presently there are no operating metallic mineral mines located on State-owned lands.

²Milton Gere, Geologist, authored the text of mineral industry information provided by the MDNR's Real Estate Division.

Three applicants requested to lease State mineral lands under the Nonmetallic Mineral Leasing program to mine salt in Wayne County, and limestone/dolomite in Luce and Mackinac Counties.

The Mackinac County location was denied during the field review stage. The other two sites are continuing into the review stages in early 1998. Presently there are two State Nonmetallic Mineral Leases in effect. Plans to provide a Direct Lease version continues to be reviewed. Two existing Nonmetallic Mineral Leases and related items cover 119 hectares of State-owned land.

The Statewide Geological Core and Sample Repository continued to add materials to its collection at Marquette. Drill core, cuttings, and hand samples from 67 of Michigan's 83 counties collected from mineral exploration, oil and gas well, and water well activities make up this vast collection. The repository also houses the old metallic mine map and data collection. This "rock library" facility is run by the Geological Survey Division of DEQ and is open for public use by appointment.

Geological records and information derived from lapsed State Metallic Mineral Leases are collected and maintained for future reference. This inventory is kept by the RED's Minerals Lease Management Section, Lansing, MI, and is available to the public for review.

The Statewide Abandoned Underground Mine Inventory Project is expected to continue until completed. All idled and truly abandoned underground mine sites, excluding the previously inventoried coal mines, are included. This will aid public safety and future planning in areas previously mined. Reviews of

available mine maps have indicated about 750 or more mines with nearly 2,000 openings to the surface exist on public and private lands. Field investigation will help determine safety remediation needs. The inventory is funded by the State through the RED. The inventory work is contracted to the Department of Mining Engineering, Michigan Technical University, at Houghton, Michigan.

Public Act 149 of 1997 created a Revised Mine Reclamation Act covering open pit metallic mines. The Act and enforcement are funded by a production fee paid by the mining operators. The MDEQ's Geological Survey Division enforces this Act.

Public Act 154 of 1997 reduced the mineral rights title period for certain severed mineral rights including metallic minerals to 20 years. It is an Act intended to assist in reuniting severed mineral and surface interests to a common fee ownership.

Quincy Mine Hoist Association, Hancock, MI, started operating their new tramway between the historic old Quincy No. 2 Copper Mine hoist and the mine adit for their tourist mine tour. At one time, the Quincy was the deepest mine in North America, exceeding 2,800 meters depth on the incline.

Besides a rich mineral history, Michigan has bountiful untapped metallic and nonmetallic mineral and fuel resources. Presently, production at Michigan's several limestone, dolomite, other stone and gypsum quarries and mines continues. Also, the sand, gravel, industrial sand, and related producers are busy, as are the producers of lime, cement, and various salt products.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	229	16,700	232	20,400 e/	237	21,200 e/
Portland	5,400	361,000	5,390	397,000 e/	5,500	413,000 e/
Clays, common	623	3,430	652	3,410	698	8,330
Gemstones	NA	2	NA	1	NA	1
Gypsum, crude	1,510	14,900	1,590	14,400	1,540	11,000
Iron ore, usable	13,500	W	W	W	W	W
Lime	653	34,600	584	30,300	590	30,700
Peat	173	5,510	168	4,650	167	4,090
Sand and gravel:						
Construction	53,500	178,000	53,800	197,000	59,300	222,000
Industrial	2,940	30,600	2,680	29,400	2,720	27,700
Stone, crushed	37,500	127,000	38,600 3/	144,000 3/	41,000 3/	160,000 3/
Combined values of bromine, copper (1995), iron oxide pigments (crude), magnesium compounds, potash, salt, silver (1995), stone [crushed granite and miscellaneous (1996-97), dimension dolomite and sandstone], and values indicated by symbol W	XX	750,000	XX	695,000	XX	664,000
Total	XX	1,520,000	XX	1,540,000	XX	1,560,000

e/ Estimated. p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Excludes certain stones; kind and value included with "Combined value" data.

TABLE 2
MICHIGAN: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1995				1996			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	21	29,200	\$97,500	\$3.35	22	30,300	\$115,000	\$3.78
Dolomite	6	8,110	28,700	3.54	6	8,330	29,100	3.50
Granite	--	--	--	--	(2/)	(2/)	(2/)	(2/)
Traprock	1	13	26	2.00	--	--	--	--
Calcareous marl	2	W	W	4.08	1	7	20	2.86
Sandstone	2	W	W	13.20	1	7	120	17.14
Marble	1	W	W	3.00	--	--	--	--
Shell	1	W	W	6.68	--	--	--	--
Miscellaneous stone	1	W	W	1.40	(2/)	(2/)	(2/)	(2/)
Total	XX	37,500	127,000	3.38	XX	38,600	144,000	3.72

W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to three significant digits, except unit value; may not add to totals shown.

2/ Excludes granite and miscellaneous stone from State total to avoid disclosing company proprietary data.

TABLE 3
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1996, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	92	\$998	\$10.85
Filter stone	85	374	4.40
Other coarse aggregate	23	106	4.61
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,910	6,100	3.20
Bituminous aggregate, coarse	584	2,550	4.37
Bituminous surface-treatment aggregate	393	1,880	4.77
Railroad ballast	103	524	5.09
Other graded coarse aggregate	W	W	6.70
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	341	1,260	3.70
Screening, undesignated	413	1,370	3.31
Other fine aggregate	1	1	1.00
Coarse and fine aggregates:			
Graded road base or subbase	1,510	5,660	3.75
Unpaved road surfacing	1,270	5,660	4.46
Crusher run or fill or waste	25	72	2.88
Other coarse and fine aggregates	10	36	3.60
Other construction materials 3/	221	1,470	6.66
Agricultural:			
Agricultural limestone	111	779	7.02
Poultry grit and mineral food	(4/)	(4/)	2.86
Chemical and metallurgical:			
Cement manufacture	4,430	20,800	4.68
Lime manufacture	(4/)	(4/)	2.44
Flux stone	4,190	16,700	3.99
Other miscellaneous uses, sugar refining	229	978	4.27
Unspecified: 5/			
Actual	21,700	73,500	3.39
Estimated	436	1,630	3.75
Total	38,600	144,000	3.72

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."

1/ Includes calcareous marl, dolomite, limestone, and sandstone; excludes granite and miscellaneous stone from State total to avoid disclosing company proprietary data.

2/ Data are rounded to three significant digits, except unit value; may not add to totals shown.

3/ Includes drain fields.

4/ Withheld to avoid disclosing company proprietary data; included in "Total."

5/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 4
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1996, BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:						
Coarse aggregate (+1 1/2 inch) 2/	W	W	W	W	W	W
Coarse aggregate, graded 3/	W	W	1,860	5,850	W	W
Fine aggregate (-3/8 inch) 4/	W	W	W	W	252	595
Coarse and fine aggregate 5/	W	W	1,080	3,830	W	W
Other construction materials 6/	1,060	3,350	594	2,450	--	--
Agricultural 7/	(8/)	(8/)	(8/)	(8/)	(8/)	(8/)
Chemical and metallurgical 9/	(8/)	(8/)	(8/)	(8/)	(8/)	(8/)
Other miscellaneous use 10/	--	--	229	978	--	--
Unspecified: 11/						
Actual	7,150	18,700	9,690	35,600	4,840	22,200
Estimated	--	--	--	--	436	1,630
Total	9,760	26,000	19,900	77,600	8,950	40,100

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes filter stone, riprap and jetty stone, and other coarse aggregate.

3/ Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, and railroad ballast.

4/ Includes stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregate.

5/ Includes graded road base or subbase, unpaved road surfacing, and crusher run (select material or fill).

6/ Includes drain fields.

7/ Includes agricultural limestone and other agricultural uses.

8/ Withheld to avoid disclosing company proprietary data; included in "Total."

9/ Includes cement manufacture, flux stone, and lime manufacture.

10/ Includes sugar refining.

11/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 5
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand)	8,120	\$32,800	\$4.04
Plaster and gunite sands	72	296	4.11
Concrete products (blocks, bricks, pipe, decorative, etc.)	724	3,290	4.54
Asphaltic concrete aggregates and other bituminous mixtures	4,970	20,200	4.07
Road base and coverings 2/	8,360	24,000	2.87
Fill	3,630	9,400	2.59
Snow and ice control	522	1,810	3.46
Filtration	86	467	5.43
Other miscellaneous uses 3/	1,220	15,200	12.47
Unspecified: 4/			
Actual	15,100	50,300	3.32
Estimated	11,000	39,000	3.55
Total or average	53,800	197,000	3.66

1/ Data are rounded to three significant digits, except value per ton; may not add to totals shown.

2/ Includes road and other stabilization (cement and lime).

3/ Includes railroad ballast.

4/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.

TABLE 6
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996,
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 and concrete products 2/	322	2,290	759	3,070	7,830	31,000
Asphaltic concrete aggregates and road base materials 3/	515	1,600	2,210	5,970	10,600 4/	36,600 4/
Fill	314	506	521	669	2,800	8,230
Snow and ice control	79	229	167	419	275 4/	1,160 4/
Other miscellaneous uses 5/	20	136	216	1,310	1,070	14,200
Unspecified: 6/						
Actual	69	255	741	2,560	14,300	47,500
Estimated	1,860	5,680	1,700	5,820	7,410	27,500
Total	3,180	10,700	6,320	19,800	44,300 4/	166,000 4/

1/ Data are rounded to 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 production within the State with no district reported.

5/ Includes railroad ballast.

6/ Includes production reported without a breakdown by end use and with estimates for nonrespondents.