THE MINERAL INDUSTRY OF MICHIGAN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Michigan Department of Environmental Quality, Geological Survey Division, for collecting information on all nonfuel minerals.

In 1998, the preliminary estimated value[1] of nonfuel mineral production for Michigan was $1.75 billion, according to the U.S. Geological Survey (USGS). This was an increase of more than 5% in 1997,[2] and followed a 7.1% increase from 1996 to 1997. The State rose to seventh from ninth in rank among the 50 States in total nonfuel mineral production value, of which Michigan accounted for more than 4% of the U.S. total.

Michigan continued to be the Nation's second leading iron ore-producing State in 1998, and iron ore was by value the State's leading nonfuel mineral. Portland cement (first in 1997) was second, followed by construction sand and gravel and magnesium compounds. In 1998, most mineral commodities increased in value, led by iron ore, up more than $40 million, portland cement up $26 million, magnesium compounds up $12 million, potash up $10 million, and construction sand and gravel and salt up about $6 million each. Reduced values of approximately $9 million in bromine and about $3 million each in crude gypsum and industrial sand and gravel were the only significant decreases.

In 1997, the value of most minerals produced in the State increased, led by construction sand and gravel, portland cement (table 1), iron ore, magnesium compounds, and crushed stone (up $13 million each), and bromine (up $10 million). Smaller yet significant increases also occurred for potash, masonry cement, and crude gypsum. Only salt, miscellaneous crushed stone, dimension dolomite and sandstone, and lime showed decreases (all small) in value.

Compared with USGS estimates of the quantities produced in the other 49 States in 1998, Michigan remained first[2] in magnesium compounds and iron oxide pigments; second in iron ore, industrial sand and gravel, and peat and second of two bromine-producing States; third of three States that produce potash; fourth in portland cement and crude gypsum; and sixth in masonry cement. The State rose to 7th from 10th in salt, dropped to 3d from 2d in construction sand and gravel, 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 about 6.5 million metric tons, as reported by the American Iron and Steel Institute.

The following narrative information was provided by Michigan's Department of Natural Resources (DNR), Land and Mineral Services Division[3] (LMSD). In metal mining, the Tilden and Empire Mines, both located in Marquette County and operated by Cleveland Cliffs Iron Co., continued to produce large quantities of iron ore pellets. Cleveland Cliffs ships several varieties of pellets by train and lake freighter to iron producers in the United States and Canada. The Caledonia Mine located in Ontonagon County and operated by Red Metal Minerals Co. supplied limited quantities of copper and related mineral specimens to collectors and museums worldwide.

Regarding industrial minerals, the Detroit Salt Co., L.C., began mining rock salt at depth in the Detroit area in 1998. The mine had been idle since the previous owner, International Salt Co., halted operations a number of years ago. Quarries throughout the State produce limestone and dolomite for aggregates, as well as for fluxstone, cement manufacture, and other uses. Oglebay Norton Co. bought Specialty Minerals, Inc.'s Port Inland (high calcium and dolomitic limestone) operations in Schoolcraft and Mackinac Counties (Skillings, 1998). The new name of the operating company is Global Stone Port Inland, Inc. Also in Schoolcraft County, Inwood Stone Products produced dimension stone from a small quarry for use in building construction.

Exploration

According to the LMSD, three companies continued very limited scale exploration projects for base and precious metals. According to the Geological Survey Division (GSD) of the Michigan Department of Environmental Quality (DEQ) no exploration drilling was performed under the Mineral Well Act as of late 1998. On the other hand, in regard to dimension stone resources, field investigations of possible new quarries in Michigan were being conducted by H. James Bourque and Associates of Sault Ste. Marie, MI. Funded by the Michigan Jobs Commission, this work was the continuation of an ongoing project to inventory and test potential building stone resources begun a number of years ago by Michigan

[1]The 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 1998 USGS mineral production data published in this chapter are preliminary estimates as of February 1999 and are expected to change. For some mineral commodities (for example, construction sand and gravel, crushed stone, and portland cement), estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. A telephone listing for the specialists may be retrieved over the Internet at http://minerals.usgs.gov/minerals/contacts/comdir.html; by using MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset (request Document #1000 for a telephone listing of all mineral commodity specialists); or by calling USGS information at (703) 648-4000 for the specialist's name and number. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at http://minerals.usgs.gov/minerals; facsimile copies may be obtained from MINES FaxBack.

[2]Values, percentage calculations, and rankings for 1997 may vary from the *Minerals Yearbook, Area Reports: Domestic 1997, Volume II*, owing to the revision of preliminary 1997 to final 1997 data. Data for 1998 are preliminary and expected to change, while related rankings may also be subject to change.

[3]The text of mineral industry information was authored by Milton A. Gere, Jr., Geologist, Minerals Lease Management Section, Land and Mineral Services Division, Department of Natural Resources.

Technological University. Several building stone producers visited some of the potential quarry sites during 1998.

Legislation and Government Programs

Act 154 of Michigan's Public Acts of 1997 may affect private ownership of severed metallic mineral rights. The December 1997 Act shortened the time between recordings of severed metallic mineral rights under the merchantable record title to 20 years from 40 years. Severed metallic mineral rights not recorded would revert to the surface owner of record. Those with unrecorded severed metallic mineral rights were given a 3-year window in which to record them. The deadline was set for December 22, 2000.

The GSD reported the receipt of large quantities of core donated to its Geological Core and Sample Repository at Marquette. Information regarding sample inventory and visiting information may be obtained from the following DEQ Internet website: http://www.deq.state.mi.us/gsd/core.html#three.

Leasing of State-Owned Mineral Lands.—The State owned approximately 2.4 million hectares of mineral rights and more than 10 million hectares of Great Lakes bottomlands. State-owned mineral lands leasing is managed by the Minerals Lease Management Section (MLMS) of the LMSD. The MLMS reorganized and divided its operations into three units in 1998: the Oil and Gas Leasing Unit, the Metallic and Nonmetallic Minerals and Underground Gas Storage Leasing Unit, and the Revenue Verification Unit.

In 1998, three "direct leases" for metallic minerals were issued and 17 were terminated. Over 4,450 hectares were under lease in this program. Regarding nonmetallic (industrial) minerals, one salt lease and one salt rights sale were processed with finalization of the transactions expected during 1999. A special variation of the standard lease document was then developed for construction sand, gravel, cobbles, boulders, and clay. The new document is intended for use on select large, continuously used, State-owned sand and gravel pits to give long-term responsibility to a specific operator. This will replace a few of the annual permits, which adapt themselves best to smaller, less used pits. Nearly 120 hectares are under lease in the nonmetallic program. Michigan's lease rental, royalty, and other dollars collected in 1998 (derived from leases containing State mineral ownership) accounted for a mineral income of over $38.5 million. The Oil and Gas Leasing Program generated most of the income. The bulk of the income is deposited in the Natural Resources Trust Fund account and is used for recreational land purchases and projects by State and local government bodies.

Abandoned Underground Mines.—The Statewide Abandoned Underground Mine Inventory Project neared completion by yearend. Nearly 800 mines with about 2,000 shafts and openings were inventoried, field reviewed, and site evaluated for public safety needs. The project was funded by the State of Michigan and administered by the LMSD of the DNR under a contract with a professor from Michigan Tech University's Department of Mining Engineering. Cooperation of the various County Mine Inspectors proved valuable to the completion of the project.

In August, representatives from State, local, and Federal agencies and from universities and other organizations attended a conference in Houghton, MI, regarding the inhabitation of bats in Michigan's abandoned mines. At the meeting, sponsored by Bat Conservation International and others, participants discussed bat cage mine closure techniques and related needs. Some of Michigan's many abandoned underground mines are now home to many thousands of bats, which are valuable to insect control, etc. Proper bat cage structures at mine openings would provide public safety and allow bats to continue living and hibernating in selected abandoned mines.

Reference Cited

Skillings Mining Review, 1998, Oglebay Norton Co. concludes Port Inland Quarry acquisition: Skillings Mining Review, v. 87, no. 18, May 2, p. 11.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1996		1997		1998 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	232	20,400 e/	289	23,800 e/	295	25,000
Portland	5,390	397,000 e/	5,700	422,000 e/	5,900	448,000
Clays: Common	652	3,410	712	3,750	726	3,820
Gemstones	NA	1	NA	1	NA	1
Gypsum, crude	1,590	14,400	1,920	17,300	1,820	13,900
Lime	785	42,700	802	42,600	832	42,800
Peat	168	4,650	176	4,990	173	4,260
Sand and gravel:						
Construction	53,800	197,000	62,000	223,000	61,700	229,000
Industrial	2,680	29,400	2,680	30,000	2,760	27,400
Stone: Crushed 3/	38,600	144,000	42,000	157,000	42,000	158,000
Combined values of bromine, iron ore (usable), iron oxide pigments (crude), magnesium compounds, potash, salt, and stone (crushed granite and miscellaneous, dimension dolomite and sandstone)	XX	695,000	XX	734,000	XX	795,000
Total	XX	1,550,000	XX	1,660,000	XX	1,750,000

e/ Estimated. p/ Preliminary. NA Not available. 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 values" data.

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

Kind	1996				1997			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	22	30,300	$115,000	$3.78	21	33,900	$125,000	$3.70
Dolomite	6	8,330	29,100	3.50	6	8,120	31,800	3.92
Granite	1	(2/)	(2/)	(2/)	1	(2/)	(2/)	(2/)
Calcareous marl	1	7	20	2.86	2	W	W	W
Sandstone	1	7	120	17.14	1	W	W	W
Miscellaneous stone	1	(2/)	(2/)	(2/)	1	(2/)	(2/)	(2/)
Total	XX	38,600	144,000	3.72	XX	42,000	157,000	3.74

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/ Excluded from State total to avoid disclosing company proprietary data.

TABLE 3
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 1997, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	98	$1,040	$10.65
Filter stone	89	395	4.44
Other coarse aggregate	19	78	4.11
Coarse aggregate, graded:			
Concrete aggregate, coarse	4,330	15,700	3.63
Bituminous aggregate, coarse	568	3,180	5.60
Bituminous surface-treatment aggregate	512	2,110	4.11
Railroad ballast	83	424	5.11
Other graded coarse aggregate	542	2,920	5.38
Fine aggregate (-3/8 inch):			
Stone sand, concrete	1	3	3.00
Stone sand, bituminous mix or seal	1,160	4,180	3.61
Screening, undesignated	546	1,990	3.65
Coarse and fine aggregates:			
Graded road base or subbase	2,630	11,200	4.24
Unpaved road surfacing	1,680	7,600	4.53
Crusher run or fill or waste	5	24	4.80
Other construction materials	(3/)	(3/)	(3/)
Agricultural:			
Agricultural limestone	103	768	7.46
Other agricultural uses	9	36	4.00
Chemical and metallurgical:			
Cement manufacture	6,520	13,900	2.13
Lime manufacture	(3/)	(3/)	(3/)
Flux stone	5,510	21,900	3.97
Unspecified: 4/			
Actual	15,700	63,100	4.02
Estimated	283	1,090	3.85
Total	42,000	157,000	3.74

1/ Data are rounded to three significant digits, except unit value; may not add to totals shown.
2/ Includes calcareous marl, dolomite, limestone, and sandstone; excludes granite and miscellaneous stone from State total to avoid disclosing company proprietary data.
3/ Withheld to avoid disclosing company proprietary data; included in "Total."
4/ Includes reported and estimated production without a breakdown by end use.

TABLE 4
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1997, 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	(3/)	(3/)	W	W
Coarse aggregate, graded 4/	W	W	2,190	7,380	W	W
Fine aggregate (-3/8 inch) 5/	W	W	738	2,820	W	W
Coarse and fine aggregate 6/	W	W	1,090	3,930	W	W
Other construction materials 7/	2,960	10,600	--	--	5,580	27,100
Agricultural 8/	(3/)	(3/)	(3/)	(3/)	(3/)	(3/)
Chemical and metallurgical 9/	(3/)	(3/)	8,750	25,300	1,100	2,980
Unspecified: 10/						
Actual	(3/)	(3/)	(3/)	(3/)	(3/)	(3/)
Estimated	(3/)	(3/)	--	--	283	1,090
Total	9,860	35,200	22,200	76,200	9,980	45,900

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/ Withheld to avoid disclosing company proprietary data; included in "Total."
4/ Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, and railroad ballast.
5/ Includes stone sand (bituminous mix or seal), stone sand (concrete), screening (undesignated), and other fine aggregate.
6/ Includes graded road base or subbase, unpaved road surfacing, and crusher run (select material or fill).
7/ Includes drain fields.
8/ Includes agricultural limestone and other agricultural uses.
9/ Includes cement manufacture, flux stone, and lime manufacture.
10/ Includes reported and estimated production without a breakdown by end use.

TABLE 5
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1997,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand)	8,380	$30,400	$3.63
Plaster and gunite sands	386	1,750	4.52
Concrete products (blocks, bricks, pipe, decorative, etc.)	246	1,020	4.15
Asphaltic concrete aggregates and other bituminous mixtures 2/	9,190	30,800	3.35
Road base and coverings	10,300	29,700	2.87
Fill	5,850	13,600	2.33
Snow and ice control	553	2,190	3.95
Roofing granules	4	53	13.25
Filtration	40	331	8.28
Other miscellaneous uses 3/	630	3,500	5.56
Unspecified: 4/			
Actual	15,600	70,300	4.51
Estimated	10,800	39,400	3.65
Total or average	62,000	223,000	3.60

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 reported and estimated production without a breakdown by end use.

TABLE 6
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1997,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sands)	261	1,620	946	3,000	7,170	25,800	--	--
Plaster and gunite sand	W	W	W	W	372	1,660	--	--
Concrete products	20	144	67	316	159	559	--	--
Asphaltic concrete aggregates 2/	W	W	W	W	8,380	28,300	202	445
Road base and coverings	630	1,850	1,650	4,330	7,970	23,300	91	200
Fill	455	790	582	822	4,820	12,000	--	--
Snow and ice control	57	160	165	333	331	1,690	--	--
Other miscellaneous uses 3/	268	1,070	W	W	W	W	--	--
Unspecified: 4/								
Actual	--	--	W	W	W	W	--	--
Estimated	1,540	5,280	1,490	4,940	7,770	29,100	--	--
Total	3,260	10,000	6,350	19,500	52,100	192,000	293	645

W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes road and other stabilization (cement and lime).
3/ Includes filtration, railroad ballast, and roofing granules.
4/ Includes reported and estimated production without a breakdown by end use.