THE MINERAL INDUSTRY OF MICHIGAN

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

For the fourth year in a row and the fifth in the last 7 years, Michigan was fourth in the Nation in total nonfuel mineral value,[1] according to the U.S. Bureau of Mines. The estimated value for 1994 was $1.6 billion, an 8% increase that of 1993. This followed an 5% decrease in 1993 from that of 1992. The State accounted for nearly 5% of the U.S. total. Michigan continued to be a major iron ore producing State, second only to the Nation's leader, Minnesota. In estimated mineral production for 1994, Michigan rose from fourth to second in construction sand and gravel and remained first in magnesium compounds and iron oxide pigments; second in iron ore, industrial sand and gravel, and peat; and fourth in portland cement, copper, gypsum, and potash. Among a diverse selection of minerals produced in Michigan, industrial minerals represented about 61% of the State's nonfuel mineral value, portland cement representing one-third of the overall total; and iron ore, copper, and silver the remaining 39%. Compared with 1993, the value of iron ore, portland cement, construction sand and gravel, magnesium compounds, copper, salt, lime, industrial sand and gravel, masonry cement, gypsum, common clays, peat, potash, bromine, and dimension stone increased. The value of crushed stone, silver, and iron oxide pigments decreased.

According to the Michigan Department of Natural Resources, a minimum of 37 exploration holes were drilled in 1994. Targeted commodities included diamonds, base metals, and stone; some interest in precious metals also was shown. Four companies leased nearly 1,480 hectares (about 3,700 acres) of State-owned land during the 1994 Metallics Minerals Lease Sale. The Copper Range Company began experimental solution mining at its White Pine Mine to recover copper from abandoned parts of the mine. Because of difficulties in meeting air quality

TABLE
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN[1]

Mineral		1992		1993		1994[p 2]	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:							
Masonry	thousand metric tons	212	$20,381	216	$17,376	238	$19,200
Portland	do.	4,998	262,063	5,116	313,246	5,700	349,000
Clays	do.	1,265	4,345	1,234	4,848	1,140	11,700
Gemstones		NA	1	NA	1	NA	W
Gypsum (crude)	thousand metric tons	1,606	13,889	1,687	14,230	1,850	15,700
Iron ore (usable)	do.	12,881	W	12,940	W	13,100	W
Lime	do.	577	31,253	596	30,926	598	31,000
Peat	do.	181	5,894	186	6,114	188	6,190
Salt	do.	W	W	W	W	1,010	112,000
Sand and gravel:							
Construction	do.	43,539	143,107	e45,000	e157,500	49,800	182,000
Industrial	do.	r1,954	r22,585	2,567	25,129	W	W
Stone (crushed)	do.	e35,017	e125,500	31,019	111,763	e30,500	e111,000
Combined value of bromine,[e] calcium chloride [natural[2] (1992)], copper, iron oxide pigments (crude), magnesium compounds, potash, silver, stone (dimension), and values indicated by symbol W		XX	961,038	XX	823,112	XX	784,000
Total		XX	r1,590,056	XX	1,504,245	XX	[3]1,620,000

[e]Estimated. [p]Preliminary. [r]Revised. 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]Calcium chloride (natural) canvassing discontinued beginning 1993.

[3]Data do not add to total shown because of independent rounding.

standards, the company announced plans to close the smelter in early 1995, after which copper concentrates would be shipped to Canada for smelting and copper anodes returned to White Pine for electrolytic refining. Construction of a new White Pine smelter capable of meeting air quality standards was to be evaluated. Great Lakes Minerals Inc. announced a partnership with Brookline Minerals, Inc. for the anticipated opening of their Keweenaw Copper Company mine in Keweenaw County in early 1995. The copper sulfide ore will be processed at Copper Range's White Pine Mine. Lafarge Corp. began shipping iron tailings from Cleveland Cliffs Iron Company's idle Republic Mine to its Alpena, MI, cement plant. The taconite iron tailings and fly ash were being used in place of shale in cement manufacturing. The company closed one of four iron ore pellet processing lines at its Empire Mine in late 1994. Six geologists from China met with industry, State, Federal, and university personnel during a tour of Michigan and Wisconsin; they visited Michigan's "Copper Country" to learn about U.S. copper deposits and mineral leasing methods. The year 1994 marked the 150th anniversary of the discovery by surveyors in 1844 of iron ore in the Great Lakes area, near what is now Ishpeming, MI.

[1]The term value means the total monetary value as represented by either mine shipments, mineral commodity sales, or marketable production as is applicable to the individual mineral commodities.

TABLE 2

MICHIGAN: CRUSHED STONE[1] SOLD OR USED BY PRODUCERS IN 1993, BY USE

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	83	$472	$5.69
Filter stone[2]	84	413	4.92
Coarse aggregate, graded:			
Concrete aggregate, coarse	2,072	8,364	4.04
Bituminous aggregate, coarse	183	875	4.78
Other graded coarse aggregate[3]	71	409	5.76
Fine aggregate (-3/8 inch): Other fine aggregate[4]	395	1,465	3.71
Coarse and fine aggregates:			
Graded road base or subbase	3,024	10,134	3.35
Unpaved road surfacing	725	3,457	4.77
Crusher run or fill or waste	844	3,685	5.72
Other construction materials[5]	88	373	4.24
Agricultural:			
Agricultural limestone[6]	217	1,233	5.68
Chemical and metallurgical:			
Cement manufacture[7]	9,912	30,950	3.12
Unspecified:[8]			
Actual	11,095	41,315	3.72
Estimated	2,226	8,619	3.87
Total	31,019	[9]111,763	3.60
Total[10 11]	34,193	111,763	3.27

[1]Includes calcareous marl, dolomite, limestone, miscellaneous stone, sandstone, and traprock.
[2]Includes other coarse aggregate.
[3]Includes bituminous surface-treatment aggregate and railroad ballast.
[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), and screening (undesignated).
[5]Includes other coarse and fine aggregates.
[6]Includes other agricultural uses.
[7]Includes flux stone and lime manufacture.
[8]Includes production reported without a breakdown by use and estimates for nonrespondents.
[9]Data do not add to total shown because of independent rounding.
[10]One short ton is equal to 907 kilograms or 2,000 pounds. To convert metric tons to short tons, divide metric tons by 0.907185.
[11]Total shown in thousand short tons and thousand dollars.

TABLE 3

MICHIGAN: CRUSHED STONE SOLD OR USED, BY KIND

Kind	1991				1993			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	r24	r26,395	$90,078	r$3.41	25	26,722	$96,241	$3.60
Dolomite	3	4,085	14,743	3.61	3	3,638	14,097	3.87
Marble	1	W	r(1)	r(1)	—	—	—	—
Calcareous marl	3	14	52	3.71	1	W	W	1.40
Traprock	4	13	36	2.76	3	W	W	1.52
Sandstone	1	W	346	W	3	W	W	2.53
Miscellaneous stone	1	W	r(1)	r(1)	1	W	W	1.33
Total[2]	XX	r30,737	r105,254	r3.42	XX	31,019	111,763	3.60
Total[3 4]	XX	r33,882	r105,254	r3.11	XX	34,193	111,763	3.27

rRevised. W Withheld to avoid disclosing company proprietary data; included with "Total." XX Not applicable.
[1]Excludes marble and miscellaneous stone values from State total to avoid disclosing company proprietary data.
[2]Data may not add to totals shown because of independent rounding.
[3]One short ton is equal to 907 kilograms or 2,000 pounds. To convert metric tons to short tons, divide metric tons by 0.907185.
[4]Total shown in thousand short tons and thousand dollars.

TABLE 4

MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1993, BY USE AND DISTRICT

(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)[1]	W	W	W	W	W	W
Coarse aggregate, graded[2]	W	W	W	W	998	5,153
Fine aggregate (-3/8 inch)[3]	W	W	W	W	W	W
Coarse and fine aggregate[4]	W	W	W	W	2,096	9,820
Other construction materials	863	2,935	3,421	10,698	189	1,041
Agricultural[5]	(6)	(6)	—	—	(6)	(6)
Chemical and metallurgical[7]	(6)	(6)	8,328	24,887	(6)	(6)
Unspecified:[8]						
Actual	2,316	9,496	6,591	22,886	2,189	8,933
Estimated	1,550	5,501	62	323	614	2,795
Total[9]	5,215	19,694	18,404	58,793	7,400	33,276
Total[10 11]	5,749	19,694	20,287	58,793	8,157	33,276

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."
[1]Includes filter stone, riprap and jetty stone, and other coarse aggregate.
[2]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.
[3]Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregate.
[4]Includes graded road base or subbase, unpaved road surfacing, crusher run (select material or fill), and other coarse and fine aggregates.
[5]Includes agricultural limestone and other agricultural uses.
[6]Withheld to avoid disclosing company proprietary data; included with "Total."
[7]Includes cement manufacture, flux stone, and lime manufacture.
[8]Includes production reported without a breakdown by use and estimates for nonrespondents.
[9]Data may not add to totals shown because of independent rounding.
[10]One short ton is equal to 907 kilograms or 2,000 pounds. To convert metric tons to short tons, divide metric tons by 0.907185.
[11]Total shown in thousand short tons and thousand dollars.