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.

Michigan ranked eighth in the Nation in total nonfuel mineral production value[1] in 1995, according to the U.S. Geological Survey (USGS). The State was seventh in 1994 (based on final data). The estimated value for 1995 was a little less than $1.5 billion, being virtually unchanged from that of 1994. This followed a 2.1% decrease in 1994 from that of 1993. The State accounted for nearly 4% of the U.S. total nonfuel mineral production value.

Michigan continued to be a major iron ore-producing State, second only to its neighboring State of Minnesota. Iron ore was the State's leading commodity by value, followed by portland cement. Michigan's iron ore production increased in 1995, but its value of mine shipments was slightly lower than in 1994. Significant increases in crushed stone and construction sand and gravel values, 14% and 25% respectively, were essentially offset by the combined 12% decrease in the value of portland cement and moderate decreases in the values of magnesium compounds, salt, and copper. Compared with 1994, other mineral commodities that increased in value in 1995 were as follows: masonry cement, silver, potash, and common clays. Decreases occurred in the values of industrial sand and gravel, crude gypsum, and dimension stone.

Compared with USGS estimates of the quantities produced in the other 49 States in 1995, Michigan remained first in magnesium compounds and iron oxide pigments; second in iron ore, industrial sand and gravel, and bromine; third in construction sand and gravel; fourth in portland cement, crude gypsum, and potash; and eighth in silver. While climbing from 7th to 5th in masonry cement and 10th to 9th in salt, the State dropped from 5th to 6th in copper production. Michigan was first in peat production, having ranked second in 1994 when peat data were tabulated by sales rather than production.

The Michigan Department of Natural Resources (DNR)

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN[1 2]

Mineral		1993		1994		1995[p]	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:							
Masonry	metric tons	216,000	$17,400	235,000	$17,700	238,000	$17,900
Portland	do.	5,120,000	313,000	5,160,000	331,000	4,560,000	293,000
Clays	thousand metric tons	1,230	4,850	1,150	3,370	605	3,560
Gemstones		NA	1	NA	2	NA	2
Gypsum (crude)	thousand metric tons	1,690	14,200	1,790	15,300	1,720	15,200
Iron ore (usable)	do.	12,900	W	13,800	W	W	W
Lime	do.	617	30,100	637	33,000	635	33,000
Peat	metric tons	186,000	6,110	156,000	5,090	[3]187,000	[3]6,570
Sand and gravel:							
Construction	thousand metric tons	[e]45,000	[e]158,000	48,800	160,000	53,000	183,000
Industrial	metric tons	2,570,000	25,100	2,870,000	31,300	3,020,000	29,800
Stone:							
Crushed	thousand metric tons	31,000	112,000	35,000	113,000	40,800	141,000
Dimension	metric tons	W	W	[4]147	[4]35	W	W
Combined values of bromne (1994-95) copper, iron oxide pigments (crude), magnesium compounds, potash, salt, silver, stone [(dimension (1993, 1995), dimension sandstone (1994)], and values indicated by symbol W		XX	823,000	XX	[r]761,000	XX	743,000
Total		XX	1,500,000	XX	[r]1,470,000	XX	1,470,000

[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]Data are rounded to three significant digits; may not add to totals shown.
[3]Data series changed to production beginning in 1995, prior years'shipment data may not be comparable.
[4]Excludes certain stones; kind and value included with "Combined value" data.

was split into two agencies on October 1, according to DNR's Real Estate Division[2] (RED). Environmental, regulatory, and permitting functions were moved into the new Department of Environmental Quality (DEQ), while the traditional land use and conservation functions were retained by the DNR. Most of the Geological Survey Division (GSD) programs and staff are now part of the DEQ, while the RED was retained by DNR. The geologic activities left in the DNR are related to metallic, nonmetallic, and groundwater resources.

The GSD continued to operate the Geological Core and Sample Repository at Marquette. At the end of 1995, there were more than 21,815 containers of material from 1,776 drill holes, representing nearly 194 miles of drilling, and more than 221 containers of outcrop samples and other materials from 63 counties. The State Mine Map and Record Collection is also maintained by the GSD at Marquette. In 1995, GSD reported that five companies drilled 46 mineral exploration and development holes. These holes totaled 63,854 feet of drilling.

State metallic and nonmetallic mineral lease activity consisted of continued stone production on one lease and approval of exploration plans for three other leases. Mineral leasing is managed by the RED, which began reviewing the metallic mineral lease program to simplify and speed up lease processing, and to reduce administrative costs. The sand and gravel and aggregate permit process is currently being evaluated.

One hundred six State-owned DNR pits, managed by its Forest Management Division, were used by local governments and private contractors in 1995. During fiscal year 1994-95, 142 permits were issued for production in 31 counties. About 872,000 cubic yards of sand, gravel, rock, clay, limestone, and decorative stones were produced yielding $346,000 in royalties to the State.

The Abandoned Underground Mine Inventory contract was awarded to the Mineral Technology Research Group, Department of Mining Engineering, Michigan Technological University, Houghton. The 2-year State-funded contract is administered by the DNR/RED. Cooperation from others will be solicited in this effort to delineate potentially hazardous mine areas. Sites having historical, recreational, and economic potential also will be inventoried.

In industry developments, Inmet Mining Corp., of Canada, formerly Metall Mining Corp., closed most of their Copper Range Co., mine operations at White Pine in September. The smelter was closed earlier. About 1,000 employees were laid off. Solution mining is being attempted on an experimental basis. Permitting for large-scale solution mining is in process. The electrolytic refinery continued to refine copper anodes from Canada.

The Caledonia Mine, in Ontonagon County, was mined for native copper, silver, and other mineral collector specimens, and used as a special learning location by Red Metal Minerals, headquartered in Hubbell.

Keweenaw Copper Co., subsidiary of Great Lakes Minerals Inc., received the permits to open a copper mine near Gratiot Lake, Keweenaw County. A processor and a partner were being sought.

The Empire Mine, operated by Cleveland Cliffs Iron Co. (CCI), established a new record for shipping iron ore pellets by railroad, to Geneva, UT some 2,800 miles. CCI operated both the Empire and Tilden Mines and produced several grades of plain and fluxed pellets. Mine tailings were shipped from CCI's idle Republic Mine to LaFarge Corp., Alpena, MI to replace shale in cement manufacturing. All three mines were in Marquette County. Specialty Minerals Inc., the Michigan Limestone Association, Presque Isle Corp., and Osborne Materials Co., all shipped dolomite and limestone to CCI's Empire and Tilden iron ore mines for fluxed pellet production.

Crystal Exploration, Inc., Crystal Falls, MI, and joint venture partner, Ashton Mining of Canada Inc., announced finding several more kimberlite locations in their search for diamonds. Late in 1995, Crystal Exploration, Inc., was bought by Pathfind Resources, Ltd., of Canada, from Crystal Mining NL, of Australia.

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[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 1995 USGS mineral production data are estimates, as of Dec. 1995. For some commodities, especially 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. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset and request Document No. 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.

[2]This report includes information provided by the Real Estate Division of the Michigan Department of Natural Resources.

TABLE 2

MICHIGAN: CRUSHED STONE[1] SOLD OR USED BY PRODUCERS IN 1994, BY USE[2]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	197	$1,360	$6.88
Filter stone	62	241	3.89
Other coarse aggregate	4	18	4.50
Coarse aggregate, graded:			
Concrete aggregate, coarse	5,800	18,400	3.17
Bituminous aggregate, coarse	1,930	7,420	3.85
Bituminous surface-treatment aggregate	102	574	5.63
Railroad ballast	79	374	4.73
Fine aggregate (-3/8 inch):			
Stone sand, concrete	3	8	2.67
Stone sand, bituminous mix or seal	464	882	1.90
Screening, undesignated	376	1,170	3.12
Coarse and fine aggregates:			
Graded road base or subbase	2,950	9,090	3.08
Unpaved road surfacing	1,060	5,260	4.96
Crusher run or fill or waste	70	199	2.84
Other coarse and fine aggregates[3]	2,020	5,310	2.63
Agricultural: Agricultural limestone[4]	242	1,250	5.16
Chemical and metallurgical:			
Cement manufacture	5,980	11,400	1.90
Lime manufacture	W	W	3.28
Flux stone	2,390	7,120	2.98
Other miscellaneous uses: Sugar refining	4	14	3.50
Unspecified:[5]			
Actual	W	W	4.41
Estimated	666	2,440	3.66
Total	35,000	113,000	3.23

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

[1]Includes calcareous marl, dolomite, limestone, limestone-dolomite, miscellaneous stone, sandstone, and traprock.

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

[3]Includes macadam and other graded coarse aggregate.

[4]Includes other agricultural uses.

[5]Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 3

MICHIGAN: CRUSHED STONE SOLD OR USED, BY KIND[1]

Kind	1993				1994			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	r23	r25,000	r$88,400	r$3.54	2 24	2 27,900	2 $90,000	2 $3.23
Dolomite	r5	r5,360	r21,900	r4.09	6	6,810	22,200	3.26
Sandstone	3	W	W	2.53	3	W	W	2.91
Traprock	3	W	W	1.52	1	19	43	2.26
Calcareous marl	1	W	W	1.40	2	W	W	3.58
Miscellaneous stone	1	W	W	1.33	1	W	W	1.40
Total	XX	31,000	112,000	3.60	XX	35,000	113,000	3.23

rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.
[1]Data are rounded to three significant digits; may not add to totals shown.
[2]Includes "Limestone-dolomite," reported with no distinction between the two.

TABLE 4

MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1994, 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	234	1,450
Coarse aggregate, graded[3]	3,500	7,240	W	W	W	W
Fine aggregate (-3/8 inch)[4]	W	W	14	44	W	W
Coarse and fine aggregate[5]	135	W	1,760	W	2,260	9,740
Agricultural[6]	W	W	W	W	116	W
Chemical and metallurgical[7]	W	W	8,140	19,600	W	W
Other miscellaneous uses[8]	—	—	4	14	—	—
Unspecified:[9]						
Actual	—	—	W	W	W	W
Estimated	132	185	98	227	436	2,020
Total	9,150	22,400	18,800	57,900	7,100	32,700

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to three significant digits.
[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.
[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), and screening (undesignated).
[5]Includes graded road base or subbase, unpaved road surfacing, crusher run (select material or fill), and other coarse and fine aggregates.
[6]Includes agricultural limestone and other agricultural uses.
[7]Includes cement manufacture and flux stone and lime manufacture.
[8]Includes sugar refining.
[9]Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 5

MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1994, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand)	7,840	$29,800	$3.80
Plaster and gunite sands	50	210	4.20
Concrete products (blocks, brick, pipe, decorative, etc.)	597	2,600	4.35
Asphaltic concrete aggregates and other bituminous mixtures	6,140	20,300	3.31
Road base and coverings[2]	9,890	27,300	2.76
Fill	6,030	10,100	1.68
Snow and ice control	458	1,400	3.05
Filtration	121	555	4.59
Other[3]	175	842	4.81
Unspecified:[4]			
Actual	11,000	45,400	4.11
Estimated	6,440	21,400	3.33
Total or average	48,800	160,000	3.28

[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 railroad ballast and roofing granules.
[4]Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 6

MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1994, 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]	325	1,540	531	2,120	7,630	29,000
Asphaltic concrete aggregates and road base materials[3]	1,790	3,930	2,450	6,780	17,800	48,100
Snow and ice control	108	282	128	373	222	740
Other miscellaneous uses[4]	—	—	145	618	151	779
Unspecified:[5]						
Actual	15	119	176	631	10,800	44,600
Estimated	1,070	3,200	1,130	3,690	4,230	14,500
Total	3,310	9,070	4,570	14,200	40,900	137,000

[1]Data are rounded to three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes fill and road and other stabilization (cement and lime).
[4]Includes filtration, railroad ballast, and roofing granules.
[5]Includes production reported without a breakdown by end use and estimates for nonrespondents.

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