

THE MINERAL INDUSTRY OF WISCONSIN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wisconsin Geological and Natural History Survey for collecting information on all nonfuel minerals.

In 1997, Wisconsin ranked 34th among the 50 States in total nonfuel mineral production value,¹ according to the U.S. Geological Survey (USGS). The State was 32d in 1996. The estimated value for 1997 was \$389 million, a decrease of almost 2% from that of 1996. This followed a 4.8% decrease from 1995 to 1996 (based on final 1996 data). The State accounted for 1% of the U.S. total nonfuel mineral production value.

Crushed stone and construction sand and gravel were, by value, Wisconsin's leading nonfuel minerals in 1997, accounting for 33% and 29%, respectively, of the State's total nonfuel mineral value. Copper was third; all Wisconsin metal mine production—copper, gold, and silver—equaled about 17% of the State's total. In 1997, the combined increases of more than \$15 million in the value of crushed stone, and about \$6 million and \$2 million in construction and industrial sand and gravel, respectively, were not enough to offset a significant drop in the production and value of copper and smaller decreases in gold and silver values. In 1996, a substantial drop in the value of copper accounted for most of Wisconsin's decrease. The largest increases that year occurred in the values of crushed stone, construction sand and gravel, and dimension stone (*table 1*).

Based on USGS estimates of quantities of minerals produced in the 50 States for 1997, Wisconsin remained second in dimension stone and second of 2 States that produce silica stone, and fifth in industrial sand and gravel. The State rose to 11th from 12th of the 13 gold-producing States and dropped from 8th to 9th in construction sand and gravel. Additionally, significant quantities of crushed stone and lime were produced in the State.

The following narrative information was provided by the Wisconsin Geological and Natural History Survey (WGNHS).² In general, the year was marked by significant activity regarding both metallic and nonmetallic mining. Metallic mineral development highlights included the cessation of mining at the Flambeau Mine, the ongoing permitting evaluation for the

Crandon Mine proposal, the reduced levels of mineral exploration and leasing, and the intense public debate over a proposed mining "moratorium" bill. The adoption of revised statutory language to allow for the enactment of new, negotiated administrative rules related to the reclamation of nonmetallic mines was the principal focus of nonmetallic mineral development activity.

Metallic mineral exploration totaled only 10 drill holes during the year. In addition, the level of leasing activity for metallic minerals was at the lowest level since the recording of such leases became mandatory in 1978. The majority of the exploration and leasing activity during the year was related to Flambeau Mining Co.'s evaluation of possible metallic mineral occurrences in west-central Wisconsin, particularly in Clark, Jackson, and Trempealeau Counties. Other companies drilling in 1997 (one hole each) were Sharpe Energy & Resources and BHP Minerals. At yearend, BHP had released most of its acreage under lease in the State and closed its Rhinelander office. Sharpe Energy & Resources continued its interest in the Bend Deposit in Taylor County within the Chequamegon National Forest near Perkinstown.

Crandon Mining Company (CMC), an equity partnership between Exxon Minerals Co. (50%) and Rio Algom Ltd. (50%), continued permitting activities during the year focusing on the evaluation of potential impacts of their joint project on the local groundwater and surface water systems in the immediate area of the companies' proposed underground mine. This area is located 3 miles south of the city of Crandon in Forest County. Over the course of the year, CMC continued to develop and sign agreements with the local governmental bodies in the area, though efforts to pursue agreements with Oneida County and the town of Crescent regarding the development and routing of the proposed wastewater pipeline from the mine were on hold. The Crandon Project is proposed to be a 4,990-ton-per-day zinc-copper mine for development of the 50-million-ton massive sulfide ore body initially discovered in 1975 and announced in 1976 by the former Exxon Coal and Minerals Co. Public discussion regarding the mine continued throughout 1997 with respect to the proposed 61-kilometer treated wastewater pipeline; the construction of a Tailings Management Area to contain 40 million tons of sulfidic tailings; and the transfer of groundwater resources out of the Great Lakes watershed into the Wisconsin River, a part of the Mississippi River watershed.

The Flambeau Mine, operated by Flambeau Mining Co., a subsidiary of Kennecott Corporation, ceased the production of copper ore from the small open-pit mine located in Rusk County, south of the city of Ladysmith (Skillings Mining Review, 1997). Total production from the property since its opening in May 1993 is 1,720,000 metric tons of ore averaging 8.9% copper and 3.43 grams per ton gold. Three different ores were produced—about 363,000 tons of direct smelting copper ore, 136,000 tons of gold-

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, 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/>.

²Thomas Evans, a Geologist with the WGNHS, authored the text of information submitted by that agency. An additional contact is James Robertson, the Director and State Geologist of the WGNHS.

bearing gossan ore, and the rest being a copper milling ore. The direct smelting ore and the gossan were processed at Noranda's Horne smelter in Rouyn, Quebec, and the copper milling ore was sent to Falconbridge's facilities in Timmins, Ontario. The company estimates that 1.8 to 2.7 million tons, averaging 2% to 3% copper, remain below the 69-meter maximum depth of the open pit. The open pit has been filled with waste rock as part of the final reclamation of the site.

For the company's more than 4 years of operation the Flambeau Mine employed an average of about 70 persons. In accord with a local agreement, at least 75% of these employees were from the local Rusk County area. Reclamation of the site continues with the objective of returning the site to low-intensity wildlife management. Discussions with local officials regarding alternative uses of the buildings on the site and other potential uses of the site are continuing.

Legislation and Government Programs

The Wisconsin State Governor issued Executive Order #309 naming a Scientific Advisory Council on Metallic Mining, which had been authorized in the Budget bill for the fiscal year (FY) 1997-98 biennium. The five-member council is directed to evaluate proposed mining technologies for metallic mining projects and to make recommendations regarding the effectiveness and feasibility of implementing technologies proposed to be used by metal mines in the State. Such recommendations are to be included in environmental impact statements developed for proposed mining projects.

In 1997, significant public debate and legislative activity focused on Senate bill 3, which was characterized as the mining

moratorium bill. The bill would create an additional condition related to the issuance or rejection of a metallic mineral operating permit, such that an applicant for such a permit must demonstrate that a similar mine has operated for at least 10 years. Additionally, the bill would provide that a similar mine has been reclaimed for at least 10 years without causing environmental pollution. The bill generated considerable controversy and was passed by the Legislature in early 1998, after clarification of the types of mines that could be used by potential applicants for mine permits and the meaning of the term "pollution." The bill was then forwarded to the Governor for signature.

The Budget bill for the FY 1997-98 biennium contained Act 27, which included statutory language creating the authority for a statewide nonmetallic mining reclamation requirement. The statutory language was needed to allow promulgation of proposed NR 135, an administrative rule that had been developed and negotiated among several parties, including environmental groups, local governmental officials, and industry representatives. The technical advisory committee to the (now former) Nonmetallic Mining Council was the principal vehicle used to develop these revised rules, which was needed following significant adverse reaction to a previous draft version of NR 135 that had gone out for public hearings. The Nonmetallic Mining Council was disbanded in the same Budget bill by 1997 Wisconsin Act 2.

Reference Cited:

Skillings Mining Review, 1997, Flambeau Mining Co. Completes Four Years of Production at Ladysmith Copper/Gold Mine, v. 86, no. 36, September 6, pp. 4-6.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones	NA	65	NA	505	NA	927
Lime	568	33,900	551	32,000	557	32,400
Sand and gravel:						
Construction	32,200	102,000	32,600	105,000	33,500	111,000
Industrial	1,670	33,300	1,660	32,300	1,730	34,400
Stone:						
Crushed	26,000	108,000	26,000	113,000	29,000	128,000
Dimension metric tons	128,000	14,500	143,000	16,600	144,000	16,700
Combined value of copper, gold, peat, silica stone (1995-96), silver	XX	124,000	XX	96,800	XX	65,200
Total	XX	416,000	XX	396,000	XX	389,000

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.

TABLE 2
CRUSHED STONE SOLD OR USED BY PRODUCERS IN WISCONSIN, 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 2/	171 r/	21,100 r/	\$88,700 r/	\$4.20 r/	167	20,800	\$92,600	\$4.45
Dolomite	2 r/	100 r/	435 r/	4.35 r/	3	263	1,400	5.31
Granite	9	1,210	3,110	2.58	6	1,350	2,690	2.00
Traprock	3	1,970	8,980	4.56	3	W	W	4.68
Sandstone and quartzite	3	1,560	6,800	4.35	4	W	W	4.39
Total	XX	26,000	108,000	4.16	XX	26,000	113,000	4.34

r/ Revised. 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 3
WISCONSIN: 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	98	\$553	\$5.64
Filter stone	150	725	4.83
Other coarse aggregate 3/	935	4,540	4.86
Coarse aggregate, graded:			
Concrete aggregate, coarse	1,350	7,080	5.23
Bituminous aggregate, coarse	445	2,510	5.63
Bituminous surface-treatment aggregate	163	616	3.78
Railroad ballast	40	239	5.98
Other graded coarse aggregate	48	239	4.98
Fine aggregate (-3/8 inch):			
Stone sand, concrete	14	61	4.36
Screening, undesignated	533	1,950	3.65
Other fine aggregate 4/	43	191	4.44
Coarse and fine aggregates:			
Graded road base or subbase	7,400	29,800	4.03
Unpaved road surfacing	996	1,960	1.96
Crusher run or fill or waste	407	1,400	3.43
Other coarse and fine aggregates	140	617	4.41
Other construction materials 5/	491	2,740	5.58
Agricultural:			
Agricultural limestone	381	4,080	10.70
Other agricultural uses	W	W	3.17
Chemical and metallurgical:			
Lime manufacture	W	W	3.97
Flux stone	28	138	4.93
Special:			
Other fillers or extenders	16	87	5.44
Other specified uses not listed	W	W	3.00
Unspecified: 6/			
Actual	6,250	28,500	4.56
Estimated	5,880	24,100	4.09
Total	26,000	113,000	4.34

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

1/ Includes dolomite, granite, limestone, limestone-dolomite, sandstone and quartzite, and traprock.

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

3/ Includes macadam.

4/ Includes stone sand (bituminous mix or seal).

5/ Includes roofing granules and terrazzo and exposed aggregate.

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

TABLE 4
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 1996,
BY USE AND DISTRICT 1/ 2/

(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) 3/	52	175	W	W	W	W
Coarse aggregate, graded 4/	145	606	W	W	489	1,860
Fine aggregate (-3/8 inch) 5/	65	200	W	W	W	W
Coarse and fine aggregate 6/	3,060	13,100	2,180	9,410	2,400	9,290
Other construction materials 7/	2	5	2,560	13,800	344	1,080
Agricultural 8/	140	856	(9/)	(9/)	(9/)	(9/)
Chemical and metallurgical 10/	--	--	(9/)	(9/)	(9/)	(9/)
Special 11/	(9/)	(9/)	--	--	(9/)	(9/)
Unspecified: 12/						
Actual	(9/)	(9/)	809	3,880	77	322
Estimated	1,550	6,750	703	2,830	2,100	7,940
Total	5,500	24,100	6,430	32,600	5,620	21,400
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:						
Coarse aggregate (+1 1/2 inch) 3/	W	W	W	W	W	W
Coarse aggregate, graded 4/	W	W	W	W	54	264
Fine aggregate (-3/8 inch) 5/	--	--	20	42	--	--
Coarse and fine aggregate 6/	1,370	2,870	W	W	W	W
Other construction materials 7/	44	233	404	1,780	78	420
Agricultural 8/	--	--	(9/)	(9/)	40	357
Chemical and metallurgical 10/	--	--	--	--	--	--
Special 11/	--	--	--	--	--	--
Unspecified: 12/						
Actual	1,440	6,110	(9/)	(9/)	594	2,630
Estimated	155	701	37	169	1,340	5,680
Total	3,010	9,910	3,350	15,500	2,100	9,350

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

1/ Production reported in District 8 was included with "District 6" to avoid disclosing company proprietary data; no Crushed Stone was produced in District 7.

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

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

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

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

6/ Includes graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, crusher run (select material or fill), and other coarse and fine aggregates.

7/ Includes roofing granules.

8/ Includes agricultural limestone and other agricultural uses.

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

10/ Includes flux stone and lime manufacture.

11/ Includes other fillers or extenders and other specified uses not listed.

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

TABLE 5
WISCONSIN: 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)	7,470	\$29,300	\$3.93
Plaster and gunite sands	32	210	6.56
Concrete products (blocks, bricks, pipe, decorative, etc.)	376	2,010	5.35
Asphaltic concrete aggregates and other bituminous mixtures	1,660	4,900	2.96
Road base and coverings 2/	5,420	17,200	3.18
Fill	1,440	2,550	1.78
Snow and ice control	158	524	3.32
Other miscellaneous uses 3/	270	1,260	4.67
Unspecified: 4/			
Actual	7,990	26,200	3.27
Estimated	7,780	21,000	2.70
Total or average	32,600	105,000	3.22

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

TABLE 6
WISCONSIN: 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/	1,290	5,550	3,830	14,900	1,090	4,020
Asphaltic/ bituminous mixtures	W	W	183	719	225	509
Road base and coverings 3/	W	W	2,000	7,720	494	1,340
Fill	170	420	604	1,270	W	W
Snow and ice control	8	31	16	77	W	W
Other miscellaneous uses 4/	653	2,190	138	543	139	309
Unspecified: 5/						
Actual	1,430	4,890	4,870	15,900	65	206
Estimated	571	1,780	2,120	5,500	1,820	4,730
Total	4,120	14,900	13,800	46,600	3,840	11,100
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	194	1,250	W	W	654	2,460
Asphaltic/ bituminous mixtures	98	305	W	W	230	661
Road base and coverings 3/	336	1,020	102	169	896	2,610
Fill	280	353	--	--	207	236
Snow and ice control	5	35	W	W	54	89
Other miscellaneous uses 4/	--	--	80	238	29	101
Unspecified: 5/						
Actual	344	758	191	628	--	--
Estimated	379	1,150	72	227	884	2,720
Total	1,640	4,870	445	1,260	2,950	8,880
	District 7		District 8			
	Quantity	Value	Quantity	Value		
Concrete aggregate and concrete products 2/	W	W	588 6/	2,570 6/		
Asphaltic bituminous mixtures	W	W	603 6/	1,950 6/		
Road base and coverings 3/	W	W	871 6/	2,350 6/		
Fill	W	W	52	84		
Snow and ice control	32	80	17	71		
Other miscellaneous uses 4/	641	1,760	7	42		
Unspecified: 5/						
Actual	--	--	1,090 6/	3,780 6/		
Estimated	728	2,020	1,200	2,880		
Total	1,400	3,860	4,430 6/	13,700 6/		

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses."

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 filtration, railroad ballast, and roofing granules.

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

6/ Includes production within the State with no district reported.