

THE MINERAL INDUSTRY OF SOUTH DAKOTA

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

South Dakota ranked 36th in the Nation in 1997 in total nonfuel mineral production value,¹ according to the U.S. Geological Survey (USGS). The State was 35th in 1996. The estimated value for 1997 was \$339 million, a 5% decrease from that of 1996. This followed a 7.5% increase from 1995 to 1996 (based on final 1996 data). The State accounted for almost 1% of the U.S. total nonfuel mineral production value.

Gold remained South Dakota's leading nonfuel mineral by value; the quantity and value have been withheld for 1996 and 1997 to avoid disclosing company proprietary data. In 1997, the combined increased values of crushed stone, portland cement, and construction sand and gravel (in descending order of increase) were significantly less than the decrease in the value of gold, resulting in a net decrease for the year. Most other mineral commodities showed small increases in value or virtually remained the same except for crude gypsum and silver, which had small decreases. In 1996, increases in lime, portland cement, gold, and crushed stone accounted for most of the increased value. All other minerals had small increases except masonry cement and feldspar which decreased.

Based on USGS estimates of the quantities produced in the 50 States during 1997, South Dakota remained fourth in gold, seventh in feldspar, and eighth in dimension stone. The State dropped from third to fourth in the production of crude mica.

The following narrative information was provided by the South Dakota Geological Survey² (SDGS) of the State's Department of Environment and Natural Resources (DENR). According to information gathered by the SDGS, the gold mines in the northern Black Hills produced 16.4 metric tons of gold in 1997, about 6% less than that of 1996. The average price of gold in 1997 was \$331.29 per troy ounce, yielding a gross value of about \$175 million. While the amount of gold produced in 1997 dropped by only about 6% from that of the previous year, the lower gold price equated to a 19% drop in gross value.

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>.

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Wharf Resources Ltd. completed its State mine permit application for its proposed Clinton Project. The Clinton Project is a 21.1-ton-per-year gold project with an average grade of 1.1 grams per ton, yielding 19 million tons of ore and 50 million tons of waste. It is scheduled for a hearing in front of the South Dakota Board of Minerals and Environment in May 1998. If approved, the project will continue production at Wharf's mine through 2007. Ore from the Clinton Project would be processed at Wharf's existing heap leach facility, which has operated in South Dakota since 1982.

During the 1997 reporting period, 426 companies had active mine licenses for nonmetallic industrial minerals in South Dakota. An operator must obtain a license to mine for sand, gravel, pegmatite minerals, materials used in the process of making cement or lime, and rock to be crushed and used in construction. There was also a total of 52 mine permits that covered the mining of other nonmetallic minerals such as slate, bentonite, and dimension stone.

Sand and gravel was the major nonmetallic industrial mineral commodity produced, with 12.1 million tons reportedly removed. Sand and gravel is produced in nearly every county in South Dakota and is used mainly for road construction projects. Sioux quartzite was the next largest nonmetallic industrial mineral commodity produced, with 2 million tons reported removed. It is quarried from four locations in southeastern South Dakota. Most of the quartzite is crushed and used in construction. Some larger blocks are used for riprap, railroad ballast, and occasionally for decorative purposes. Pegmatite mining, mainly in the southern Black Hills, produced 7,060 tons of pegmatite minerals such as feldspar, mica, and rose quartz. The South Dakota Cement Plant reported mining 1.1 million tons of limestone, 182,000 tons of shale, 50,900 tons of gypsum, and 63,700 tons of sand. A total of 235,000 tons of granite was mined by Dakota Granite Co. and Cold Spring Granite Co. from quarries near Milbank, SD. Because of its beauty and distinctive red color, the mahogany granite is used primarily for floor tiles, monuments, and building construction. Much of it goes to international markets. Total sales from 1997 production were \$35.2 million. There was 62,000 tons of bentonite mined in the western portion of South Dakota.

Four exploration permits were issued in 1997 to Wharf Resources, Homestake Mining Co., Brohm Mining Corp., and Naneco Minerals Inc. Exploration was primarily for gold and silver. A total of 2,157 test holes were permitted for drilling in Lawrence and Permington Counties; a three-fold increase over the number of exploration drill holes permitted in 1996. The majority of holes will be drilled to depths less than 760 meters, and a few diamond core holes may be drilled to depths of up to 4,600 meters. Approximately 13 kilometers of new roads were permitted to access drill sites.

The DENR issued three notices of violation to two large-scale

gold mines in 1997. Brohm Mining was issued two notices of violation for two separate releases of acidic water into Strawberry and Bear Butte Creeks. In settlement of these violations, Brohm has paid penalties and agreed to take steps to prevent future acid water discharges. Wharf Resources was issued one notice of violation for exceeding nitrate ground water quality standards and cyanide surface water quality standards. While the cyanide levels exceeded the limit in their permit, they were considered nontoxic to the environment. In settlement of the notice, Wharf agreed to pay a penalty of \$40,000 and give the Department of Game, Fish, and Parks \$160,000 over the next 3 years for stream improvement projects in the northern Black Hills. In addition, Wharf agreed to and has constructed a biological treatment plant to reduce nitrate concentrations at the mine to acceptable levels. Preliminary analyses have shown that the nitrate treatment plant is very effective at removing nitrate from mine waters.

The large-scale gold mines were successful in reclaiming 200 hectares of mining disturbed land that was required by law to be completed by September 1, 1997. In fact, the gold mines reclaimed about 251 hectares of mining disturbed land by July, 2 months before the September deadline. The South Dakota Board of Minerals and Environment held a 3-day public hearing in July, which included tours of the reclaimed areas. The purpose of the

public hearing was to review the effectiveness of State mine reclamation standards. The board, on a unanimous vote, found that the current reclamation standards are adequate and no additional requirements were needed. The board commended the large-scale gold mines for their hard work and dedication to successful reclamation.

The pit impoundment at LAC Minerals Ltd.'s Richmond Hill Mine, designed to reclaim impacts from acid rock drainage that took place at the site in 1992, continued to perform exceptionally well based on results of extensive post-closure performance monitoring of the facility. Relocation and capping of reactive sulfide wastes provides the added benefit of avoiding the need for long-term active water treatment. The site will require a minor amount of maintenance and routine post-closure monitoring.

The DENR completed an inventory of inactive and abandoned mines in the Black Hills. Approximately 900 historic minesites were identified, of which about 200 are located on U.S. Forest Service land and 700 on private land. A final report, an electronic database of abandoned mine information, and maps of the site locations are available by calling 605-773-4201. The electronic database is downloadable from the DENR's Minerals and Mining Program web page at <http://www.state.sd.us/denr/des/mining/mineprg.htm>.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH DAKOTA 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clay, common	136	W	147	W	147	W
Gemstones	NA	173	NA	98	NA	93
Gold 3/ kilograms	17,100	214,000	W	W	W	W
Gypsum, crude	--	--	W	W	44	312
Sand and gravel: Construction	8,730	26,200	8,750	27,700	8,940	29,000
Silver 3/ metric tons	4	668	5	816	5	714
Stone: Crushed	5,420 4/	25,700 4/	5,640	28,700	7,000	36,000
Combined value of cement, feldspar, iron ore (usable), lime, mica (crude), stone [crushed granite and miscellaneous (1995), dimension granite], and values indicated by symbol W	XX	65,300	XX	300,000	XX	273,000
Total	XX	332,000	XX	357,000	XX	339,000

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/ Recoverable content of ores, etc.

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

TABLE 2
SOUTH DAKOTA: 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	4	2,680	\$9,550	\$3.56	4	2,850	\$11,500	\$4.05
Granite	(2/)	(2/)	(2/)	(2/)	1	1	7	7.00
Quartzite	6	2,740	16,200	5.90	7	2,790	17,200	6.16
Miscellaneous stone	(2/)	(2/)	(2/)	(2/)	--	--	--	--
Total	XX	5,420	25,700	4.74	XX	5,640	28,700	5.09

XX Not applicable.

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

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

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

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch), riprap and jetty stone 4/	215	\$1,350	\$6.28
Coarse aggregate, graded:			
Concrete aggregate, coarse	480	2,670	5.55
Bituminous aggregate, coarse	200	874	4.37
Bituminous surface-treatment aggregate	137	709	5.18
Coarse and fine aggregates:			
Graded roadbase or subbase	296	1,450	4.90
Crusher run or fill or waste	23	113	4.91
Other construction materials 5/	288	1,140	3.97
Chemical and metallurgical:			
Cement manufacture	982	1,790	1.82
Lime manufacture	W	W	4.52
Glass manufacture	W	W	25.00
Unspecified: 6/			
Actual	2,020	13,100	6.47
Estimated	783	4,570	5.83
Total	5,640	28,700	5.09

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

1/ To avoid disclosing company proprietary data, no district tables were produced for 1996.

2/ Includes limestone, quartzite, and granite.

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

4/ Includes filter stone and other coarse aggregate.

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

TABLE 4
SOUTH DAKOTA: 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 and concrete products 2/	1,040	\$5,170	\$4.96
Asphaltic concrete aggregates and other bituminous mixtures	511	2,310	4.52
Road base and coverings	2,640	6,600	2.50
Fill	498	960	1.93
Snow and ice control	21	53	2.52
Other miscellaneous uses	123	204	1.66
Unspecified: 3/			
Actual	834	3,250	3.89
Estimated	3,090	9,150	2.96
Total or average	8,750	27,700	3.16

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

2/ Includes plaster and gunite sands.

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

TABLE 5
SOUTH DAKOTA: 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	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	354	1,760	W	W
Asphaltic concrete aggregates and road base materials 3/	882	1,840	W	W
Other miscellaneous uses	--	--	1,000	3,000
Unspecified: 4/				
Actual	43	175	47	79
Estimated	527	1,640	695	1,920
Total	1,810	5,410	1,750	5,000
	District 3		District 4	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	316	1,490
Asphaltic concrete aggregates and road base materials 3/	W	W	1,330	4,080
Other miscellaneous uses	948	3,130	--	--
Unspecified: 4/				
Actual	132	294	611	2,700
Estimated	481	1,360	1,390	4,220
Total	1,560	4,790	3,640	12,500

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 fill and snow and ice control.

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