



2005 Minerals Yearbook

SOUTH DAKOTA

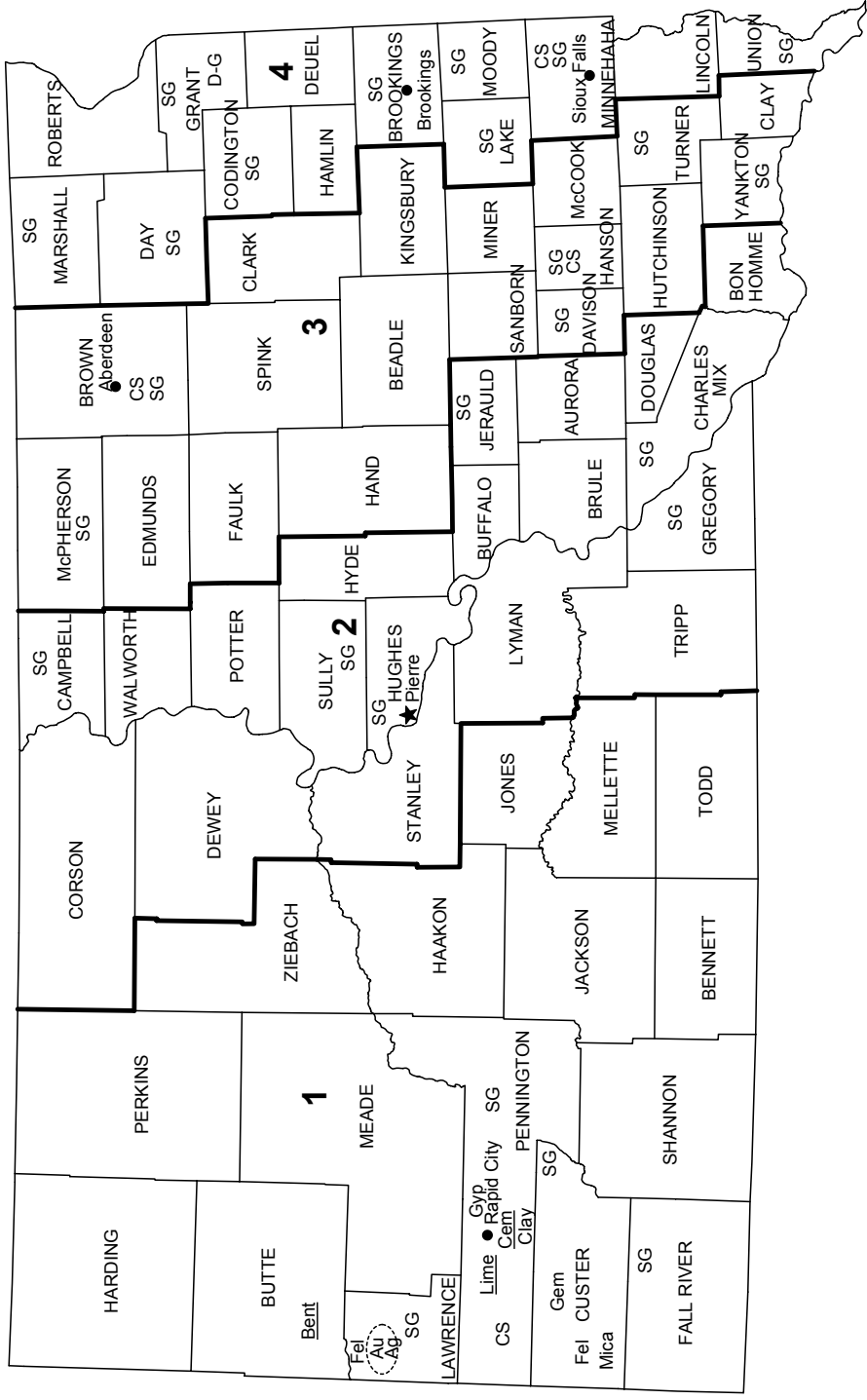
SOUTH DAKOTA

LEGEND

- County boundary
- ★ Capital
- City
- 1 — Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

- Ag Silver
- Au Gold
- Bent Bentonite mill
- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- D-G Dimension granite
- Fel Feldspar
- Gem Gemstones
- Gyp Gypsum
- Lime Lime plant
- Mica Mica
- SG Construction sand and gravel
- Concentration of mineral operations



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.

In 2005, South Dakota's nonfuel raw mineral production was valued¹ at \$215 million, based upon annual U.S. Geological Survey (USGS) data. This was a \$5 million, or 2.4%, increase from the State's total nonfuel mineral value for 2004, which had increased by \$11 million, or was up by 5.5% from 2003 to 2004. South Dakota ranked 39th among the States in total nonfuel mineral production, yet per capita the State ranked 13th in the Nation in the value of its mineral industry's nonfuel mineral production; with a population of nearly 200,000, the value of production was about \$277 per capita.

Portland cement, by value, continued to be South Dakota's leading nonfuel mineral commodity in 2005, after having overtaken gold in 2002. (Prior to 2002, gold had been the State's leading mineral commodity for more than 4 decades.) Portland cement was followed by (in descending order of value) construction sand and gravel, crushed stone, gold, granite dimension stone, and lime. The State's production of construction materials, which mainly included (in descending order of value) portland cement, construction sand and gravel, crushed stone, granite dimension stone, common clays, and gypsum, accounted for more than 82% of the State's total nonfuel mineral production value.

Portland cement had the largest increase in value of production of all the State's mineral commodities. With a somewhat small increase in production and a significant increase in unit value, its value rose by about \$15 million. A nearly 4% increase in the production of crushed stone resulted in an 11%, or \$3 million rise in the mineral commodity's value. These increases were partly offset by decreases in most of the State's other nonfuel mineral production values, the largest of which were in construction sand and gravel, which was down about \$6 million, and smaller yet still significant decreases in the values of gold and granite dimension stone production (company proprietary data) (table 1).

In 2005, South Dakota continued to rank seventh in the quantity of gold produced of 11 producing States; it rose to third from fourth of 5 mica-producing States and remained a significant producer of construction sand and gravel and granite dimension stone.

The following narrative information was provided by the South Dakota Department of Environment and Natural Resources² (DENR). Production data in the text that follows

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the 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 2005 USGS mineral production data published in this chapter are those available as of December 2006. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²The DENR Minerals and Mining Program in cooperation with DENR Geological Survey Program provided information. E.H. Holm, T. Cline, Jr., and

are those reported by the DENR Minerals and Mining Program (MMP) and are based upon MMP surveys and estimates. Data may differ from some production figures reported to the USGS.

Exploration and Mine Permitting Activities

In 2005, the DENR issued only one nonfuel mineral mining exploration permit. The permit was granted to Dakota Stone Mining & Stone Supply Inc., which planned to explore for building-quality slate in the central Black Hills region. On August 9, Cold Spring Granite Co. submitted a small-scale-mine permit application to expand its existing granite quarry covered under Large Scale Mine Permit No. 8. The 2.75-hectare (ha) (6.8 acre) area was to be used to store granite blocks, and the reclamation plan for the area was that the land be used as cropland. The permit was likely to be granted sometime in 2006.

Gold exploration activities in South Dakota continued to be limited despite higher gold prices. None of the large-scale gold mines conducted exploration activities, and only one placer mining operation reported exploration activities. Wharf Resources (U.S.A.) Inc., which operated a large-scale gold mine located in the Black Hills, completed reclamation activities for 13 exploration permits in 2005, the permits having been issued between 1988 and 1995. A total of 9.7 ha and more than 2,070 drill holes were reclaimed. Close-out inspections were performed by the DENR in 2004 and 2005. In January 2006, based on the recommendation of the DENR, the board released Wharf Resources from liability at these exploration sites.

During 2005, 510 companies and individuals had active mine licenses in South Dakota. An operator was required to obtain a license to mine for sand, gravel, pegmatite minerals (feldspar, mica, rose quartz), materials to be used in the process of making cement or lime, and rock to be crushed and used in construction. Thirty-six mine permits for the mining of other minerals (such as bentonite, dimension stone, placer gold, and slate) were in force, and 11 precious metal mining permits, which included six large-scale gold mining operations, remained current in 2005. Wharf Resources, which operated the only active gold mine in South Dakota, held four of these permits. No new mine permits or mine permit amendments were issued to large-scale gold operations during the year.

Commodity Review

Industrial Minerals

Aggregate (Construction Sand and Gravel and Crushed Stone).—Sand and gravel was the major industrial mineral

M. Macy, Natural Resources Project Engineer, Environmental Project Scientist, and Natural Resources Project Engineer, respectively, with the Minerals and Mining Program, jointly authored the text of information provided by that program.

commodity produced during 2005. Based upon aggregate data gathered and compiled by the MMP, 14.7 million metric tons (Mt) (16.2 million short tons) of sand and gravel were produced in South Dakota in 2005. Sand and gravel were produced in nearly every county in the State and were mostly used for road construction projects.

During 2005, Sioux quartzite became the second most produced industrial mineral commodity by weight in the State, at about 3.11 Mt. It was quarried from four locations in the southeastern portion of the State; most of the quartzite was crushed and used in construction. Some larger blocks were used for riprap, railroad ballast, and occasionally for decorative purposes. Limestone was the third most produced commodity, at about 3.06 Mt. Limestone was produced in the Black Hills of western South Dakota and was used primarily in the production of cement and in construction projects.

Stone, Dimension.—About 302,000 metric tons (t) of dimension stone was mined by Dakota Granite Co. and Cold Spring Granite Co. from quarries near Milbank in northeastern South Dakota. Because of its beauty and distinctive red color, the “mahogany” granite is used primarily for monuments and building construction; much of it went to international markets.

Other Industrial Minerals.—Minerals produced in smaller amounts during 2005 included iron ore, mica schist, pegmatite minerals (feldspar, mica, rose quartz), placer gold, shale, and slate.

Metals

Gold and Silver.—Gold production and value in South Dakota decreased in 2005. Wharf Resources produced in excess of 1,900 kilograms (kg) of gold in 2005 and was the only company reporting gold production. This represented about a 20% decrease in the amount of gold produced compared with that of 2004. During 2004, nearly all gold production in the State was produced by Wharf Resources; only minor amounts were produced by Homestake Mining Company and by LAC Minerals (USA), LLC. The average price of gold in 2005 was about \$445 per troy ounce, yielding a gross value of more than \$27 million, lower than the 2004 gross value of about \$31 million. During the past several years, all mines had been surface heap leach operations, with the exception of the Homestake Mine.

Wharf Resources also was the only company to report silver production, which was a byproduct of its gold recovery process. Based upon MMP data, about 5,200 kg (167,000 troy ounces) of silver was recovered in 2005. At an average price of about \$7.30 per troy ounce, the value of the silver was slightly more than \$1.2 million. This is an increase from the 2,800 kg (89,000 troy ounces) and \$596,000 value in 2004.

In early 2005, Wharf Resources' parent company, Goldcorp Inc., merged with Wheaten River Minerals Ltd. The new company was the lowest-cost (per ounce) million-ounce gold producer in the world. Goldcorp was also among the top six gold producers in North America (South Dakota Department of Environment and Natural Resources Minerals and Mining Program, 2006³).

³References that include a section mark (§) are found in the Internet References Cited section.

Mine Reclamation

Homestake completed several reclamation projects at its historic gold mine, the Homestake Mine, in Lead during 2005. The new park in the former mill area was dedicated and opened to the public on June 3. The park included displays of vintage mining equipment, a ¼-mile hiking trail, and a picnic area. The company also completed reclamation of its Yates Waste Rock Facility in August. Slopes were reduced and revegetated to improve the long-term stability and appearance of the facility. Additionally, Homestake sealed and closed several mine tunnels near Lead.

The company also continued work on converting underground portions of the Homestake Mine into a national underground science laboratory. In July, the National Science Foundation selected the Homestake Mine and the Henderson Mine in Colorado as the two finalists for the deep underground science and engineering laboratory, dubbed DUSEL. A decision on which mine would be the preferred site for the DUSEL was to be made at a later date. In September, the State signed an agreement with Barrick Gold Corp. Inc., Homestake's parent company, to turn the underground mine over to the State's Science and Technology Authority. The South Dakota Legislature approved \$19.9 million in additional funding during a special session in October to fund the development of an interim lab at the 1,480-meter level of the mine (South Dakota Science and Technology Authority, 2005§).

Government Programs and Activities

Environmental Issues

Gilt Edge Mine Superfund site.—The U.S. Environmental Protection Agency (EPA) continued acid water treatment at the Gilt Edge Mine Superfund Site. Water treatment resumed on September 29 after some adjustments were made earlier in the year to improve the efficiency of the water treatment plant. The plant treated 72.3 million liters (L) (19.1 million gallons) in 2005, and water treatment was to continue in 2006.

Over the past few years, the EPA has been conducting a large-scale test to treat water in the Gilt Edge's Anchor Hill Pit using biological processes. pH adjustments were made to the water by adding lime and caustic, ethanol, molasses, and phosphoric acid to enhance the growth of bacteria. The bacteria created conditions for metals precipitation. The goal of the test was to reduce the acidity and heavy metal concentrations of the water so it could meet water quality standards and be discharged directly without further treatment. The test entered its operational phase in 2004 and the EPA discharged 380,000 L (100,000 gallons) of water from the pit. During 2005, the EPA discharged 45 million L (12 million gallons) from the pit. Additional discharges were planned for 2006. The process needed additional work before it could be considered an alternative treatment method to the current water treatment plant.

Near yearend, the leachate collection pond at the toe of the reclaimed (Gilt Edge) Ruby Waste Rock Depository was replaced with an underground vault. Leachate from

the toe was to be collected in the new vault and pumped to the water treatment plant. A new pumphouse was under construction at the toe of the depository; completion was planned for early 2006. The EPA and the State continued to prepare plans for reclaiming the remainder of the site, including the mine pits and heap leach pad. A feasibility study on reclamation options was scheduled for completion during 2006.

Internet References Cited

South Dakota Department of Environment and Natural Resources Minerals and Mining Program, 2006, Summary of the mining industry in South Dakota 2005, accessed on April 8, 2008, at URL <http://www.state.sd.us/denr/DES/Mining/2005Goldrpt.pdf>.

South Dakota Science and Technology Authority, 2005, Sanford Lab, a brief timeline—2005, accessed on April 21, 2008, at URL http://sanfordlaboratoryathomestake.org/?page_id=9.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH DAKOTA^{1,2}

(Thousand metric tons and thousand dollars)

Mineral	2003		2004		2005	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	213	W	188	W	183	W
Sand and gravel, construction	11,800	44,800	14,000	51,700	12,800	45,500
Stone, crushed	6,880	24,700	6,410 ^r	27,600 ^r	6,650	30,600
Combined values of cement (portland), feldspar, gemstones, gold, gypsum (crude), lime, mica (crude), stone (dimension granite), and values indicated by symbol W	XX	130,000	XX	131,000 ^r	XX	139,000
Total	XX	199,000	XX	210,000 ^r	XX	215,000

^rRevised. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED, BY KIND¹

Kind	2004			2005		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	6 ^r	2,990 ^r	\$9,730 ^r	6	3,200	\$14,800
Granite	1	W	W	1	W	W
Quartzite	9	3,170	17,000	4	3,210	14,800
Slate	1	W	W	1	W	W
Total	XX	6,410 ^r	27,600 ^r	XX	6,650	30,600

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, BY USE¹

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch), other	W	W
Coarse aggregate, graded, other	W	W
Fine aggregate (-¾ inch), other	W	W
Coarse and fine aggregates, other	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Unspecified:²		
Reported	4,070	\$18,700
Estimated	241	1,100
Total	4,310	19,800
Grand total	6,650	30,600

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

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Reported and estimated production without a breakdown by end use.

TABLE 4
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, BY USE AND DISTRICT^{1,2}

(Thousand metric tons and thousand dollars)

Use	District 1		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ³	W	W	--	--	--	--
Coarse aggregate, graded ⁴	W	W	--	--	--	--
Fine aggregate (-¾ inch) ⁵	W	W	--	--	--	--
Coarse and fine aggregate ⁶	W	W	--	--	--	--
Chemical and metallurgical⁷						
	W	W	--	--	--	--
Unspecified:⁸						
Reported	855	3,980	493	2,270	2,720	12,500
Estimated	--	--	--	--	241	1,100
Total	3,200	14,800	493	2,270	2,960	13,600

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

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²No crushed stone produced in District 2.

³Includes other coarse aggregate.

⁴Includes other graded coarse aggregate.

⁵Includes other fine aggregate.

⁶Includes other coarse and fine aggregate.

⁷Includes cement and lime manufacture.

⁸Reported and estimated production without a breakdown by end use.

TABLE 5
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) ²	515	\$2,720	\$5.29
Asphaltic concrete aggregates and other bituminous mixtures	653	2,400	3.67
Road base and coverings ³	5,090	15,500	3.04
Fill	291	790	2.71
Snow and ice control	26	80	3.08
Other miscellaneous uses	29	228	7.86
Unspecified: ⁴			
Reported	2,440	10,300	4.20
Estimated	3,800	13,500	3.59
Total or average	12,800	45,500	3.55

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes plaster and gunite sands.

³Includes road and other stabilization (lime).

⁴Reported and estimated production without a breakdown by end use.

TABLE 6
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005,
BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates (including concrete sand) ²	W	W	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	--	--	W	W	W	W
Road base and coverings ³	W	W	W	W	270	767
Fill	--	--	8	8	52	142
Other miscellaneous uses ⁴	219	776	205	1,270	90	418
Unspecified: ⁵						
Reported	247	938	112	246	310	1,510
Estimated	1,200	4,200	1,500	5,500	600	2,200
Total	1,640	5,910	2,020	7,370	1,350	5,070
	District 4		Unspecified districts			
	Quantity	Value	Quantity	Value		
Concrete aggregates (including concrete sand) ²	280	1,300	--	--		
Asphaltic concrete aggregates and other bituminous mixtures	607	2,200	--	--		
Road base and coverings ³	4,210	13,000	236	649		
Fill	232	641	--	--		
Other miscellaneous uses ⁴	28	164	--	--		
Unspecified: ⁵						
Reported	1,770	7,570	--	--		
Estimated	500	1,600	--	--		
Total	7,590	26,500	236	649		

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes plaster and gunite sands.

³Includes road and other stabilization (lime).

⁴Includes snow and ice control.

⁵Reported and estimated production without a breakdown by end use.