

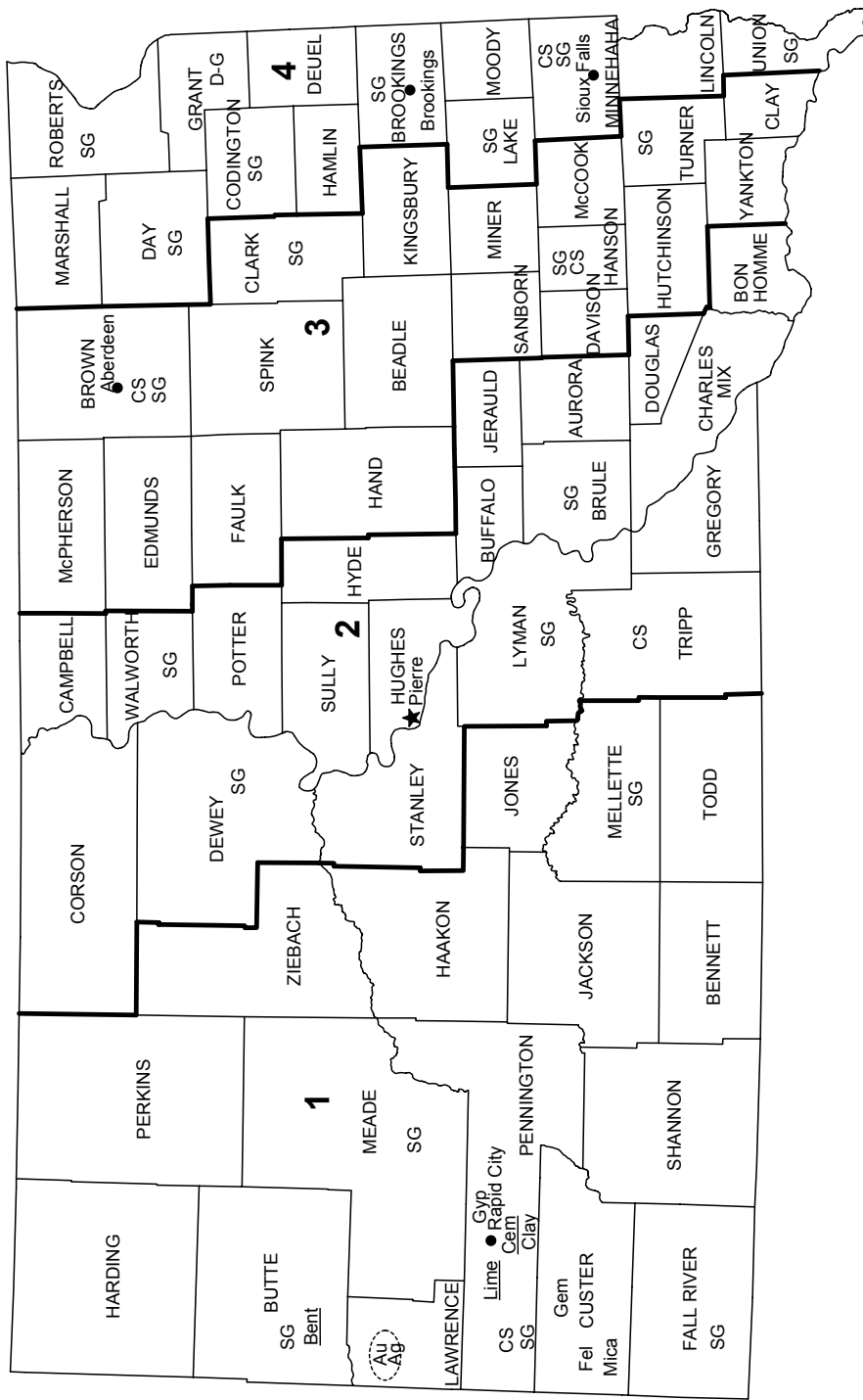
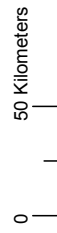
SOUTH DAKOTA

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 2004, South Dakota's nonfuel raw mineral production was valued¹ at \$210 million, based upon annual U.S. Geological Survey (USGS) data. This was an increase of 5.5% from State's total nonfuel mineral value for 2003², which was down nearly 8% from 2002.

Portland cement continued to be South Dakota's leading, by value, nonfuel mineral commodity in 2004, after having overtaken gold in 2002. Prior to 2002, gold had been the State's leading mineral commodity for more than four decades. The State's production of construction materials, which included (in descending order of value) portland cement, construction sand and gravel, crushed stone, granite dimension stone, common clays, and gypsum, accounted for about 79% of the State's total nonfuel mineral production value. In 2004, a nearly 19% increase in the production of construction sand and gravel resulted in a nearly \$7 million rise in the commodity's value (table 1). The value of crushed stone increased \$2.3 million. Smaller yet significant increases also took place in the values of gold and portland cement (descending order of change); the only decreases in value were those of dimension granite and common clays (company proprietary data).

In 2003, lime production rose, generating a significant increase in the commodity's total value, but this and other smaller increases were more than offset by a nearly \$9 million drop in the value of crushed stone, smaller yet significant decreases in the values of gold and portland cement, and a \$2.7 million decrease in the value of construction sand and gravel (table 1).

In 2004, South Dakota continued to be fifth (of 5 producing States) in the quantity of mica produced, seventh of 9 gold-producing States, and 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 Resources' (DENR) Minerals and Mining Program³ (MMP) in cooperation with DENR's South Dakota Geological Survey. Production data in the text that follows are those reported by the MMP and based upon the agency's own surveys and estimates. Data may differ from some production figures reported to the USGS.

Exploration

Gold exploration activities in South Dakota continued to be limited despite higher gold prices. No exploration permits were issued in 2004, and only one of the large scale gold mines conducted exploration activities during the year. Wharf Resources (USA), Inc. completed seven exploration drill holes in the vicinity of its existing operation in Lawrence County.

In November and December 2003, Western Mining Corporation conducted nickel and copper exploration activities in southeastern South Dakota to test target areas of potential mineralization identified during an earlier airborne geophysical survey. But evaluation of the samples from the exploration program performed in the early months of 2004 indicated little potential for nickel and copper in the area; the company performed no further exploration in southeastern South Dakota in 2004.

Commodity Review

Industrial Minerals

During the 2004 reporting period, 500 companies and individuals had active mine licenses 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 were also 36 mine permits that cover mining other minerals such as bentonite, dimension stone, placer gold, and slate.

Crushed Stone.—Limestone regained the number two spot, measured in metric tons, among nonmetallic mineral commodities produced during 2004. Limestone production, according to the South Dakota DENR, was reported at 3.3 million metric tons (Mt), while Sioux quartzite production followed closely at 2.92 Mt. Limestone was produced in the Black Hills of western South Dakota and was used primarily in the production of cement and for construction projects. Sioux quartzite was quarried from four locations in southeastern South Dakota. Most of the quartzite was crushed and used in construction. Some larger blocks are used for rip-rap, railroad ballast, and occasionally for decorative purposes.

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 2004 USGS mineral production data published in this chapter are those available as of December 2005. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—also can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2003 may differ from the Minerals Yearbook, Area Reports: Domestic 2003, Volume II, owing to the revision of preliminary 2003 to final 2003 data. Data and rankings for 2004 are considered to be final and are not likely to change significantly.

³E.H. Holm, T. Cline, Jr., and M. Macy, Natural Resources Project Engineer, Environmental Project Scientist, and Natural Resources Project Engineer, respectively, with the South Dakota Department of Environment and Natural Resources' Minerals and Mining Program, jointly authored the text of the State mineral industry information provided by that agency.

Dimension Stone.—A total of 327,000 metric tons (t) of dimension stone was mined by Dakota Granite Company and Cold Spring Granite Company from quarries near Milbank in northeastern South Dakota. Because of its beauty and distinctive red color, the “mahogany” granite was used primarily for monuments and building construction. Much of it went to international markets.

Sand and Gravel.—During 2004, sand and gravel was again the major nonmetallic mineral commodity produced with 14.3 Mt reported to the South Dakota DENR. Sand and gravel is produced in nearly every county in South Dakota and is used mainly for road construction projects.

Other Industrial Minerals.—Other nonfuel minerals and mineral materials produced in smaller amounts during 2004 include iron ore, mica, pegmatite minerals (feldspar, mica, and rose quartz), placer gold, shale, and slate. Pacer Corporation was issued a large-scale mine permit to expand its existing mica schist mine covered under Large Scale Mine Permit No. 311 on November 24, 2004. The operation will be expanded in a northwesterly direction and will include an additional 1.1 hectares. The reclamation plan for the mine is based on a post mine land use of grazing. Mining in the expansion area will begin in spring 2005 contingent on Pacer obtaining an operating plan from the U.S. Forest Service.

Metals

Gold.—Gold production decreased slightly in 2004, but the value increased slightly owing to the increase in gold prices. Based upon South Dakota DENR surveys and estimates, Homestake Mining Company, LAC Minerals, and Wharf Resources Inc. produced about 2,370 kilograms (kg) of gold in 2004. This represents a 3% decrease in the amount of gold produced compared with 2003. Wharf, the only major gold mine still operating, reported a 162-kg increase in gold production in 2004. Homestake recovered 2.8 kg of gold during the completion of mill demolition activities. LAC Minerals recovered 2.5 kg of gold during removal of sediments from its process ponds. Although production has lessened somewhat in recent years, gold continued to be one of the State’s leading nonfuel mineral commodities, ranking third value after portland cement and construction sand and gravel (table 1). The average price of gold in 2004 was \$409.72 per troy ounce, yielding an estimated gross value of about \$31 million. This was 8.4% higher than the 2003 gross value of \$28.6 million. The mines are surface heap-leach operations, with the exception of Homestake.

Silver.—Wharf was again the only company to report silver production, which is a byproduct of its gold recovery process. A total of 2,626 kg of silver was recovered in 2004 valued at \$596,418. This is an increase from the 2,382 kg and \$372,930 value reported in 2003.

In late August, Homestake shut down its wastewater treatment plant which has been in operation for the past 20 years. The plant, which was considered “state of the art” when it opened in 1984, will eventually be replaced by a new plant that will be constructed next to Homestake’s Grizzly Gulch tailings impoundment. The impoundment will store water for treatment while the new plant is being constructed. The old plant will be mothballed and possibly used if the mine is chosen as the site for the national underground laboratory.

There are currently 11 mine permits that cover six large-scale gold mining operations in South Dakota. Wharf, the only gold mine still actively mining in South Dakota, holds four of these permits. No new mine permits or mine permit amendments were issued to large-scale gold operations in 2004.

Environmental Issues and Mine Reclamation

The U.S. Environmental Protection Agency (EPA) continued acid water treatment at the Gilt Edge Superfund Site in 2004. Adjustments were made throughout the year to improve the efficiency of the water treatment plant. The new plant, which was dedicated on September 19, 2003, treated 8.5 million liters of water per week after the adjustments were made. However, because of drought conditions and the lack of water to treat, the plant was shut down for the year on August 23, 2004.

The Golden Reward Mining Company completed reclamation activities required under its last five exploration permits in 2004. A closeout inspection was performed by the department staff in September 2004. In October 2004, the South Dakota Board of Minerals and Environment released Golden Reward from liability at these exploration sites.

Homestake made significant progress on reclamation projects at its historic gold mine in Lead during 2004. The company continued work on the new park in the former mill area. Homestake plans to open the park to the public in the spring of 2005. The company also began reclaiming the Yates Waste Rock Facility in July. Regrading and revegetation of the waste rock facility will be completed in 2005.

Work continued in 2004 on the conversion of the Homestake underground mine into an underground science laboratory to study neutrinos. A proposal to convert the lower portion of the underground mine into a laboratory was developed in 2004. The proposal was one of eight that was submitted to the National Science Foundation in February 2005. The Foundation will select two or three of the proposals later in 2005 for further development and funding.

Government Programs

During the past few years, EPA has been conducting a large-scale test to treat water in the Anchor Hill Pit using biological processes. After pH adjustments were made using lime and caustic, ethanol, molasses, and phosphoric acid were added to the water 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. During 2004, the test entered its operational phase and EPA began planning to directly discharge water from the pit. After adding a filtration process, EPA’s contractor discharged 379,000 liters of water from the pit. The process still needs additional work

before it can be considered an alternative treatment method to the current water treatment plant. Additional discharges are planned for 2005.

The EPA and the State continued to prepare plans to reclaim the rest of the site, including the mine pits and heap-leach pad.

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

(Thousand metric tons and thousand dollars)

Mineral	2002		2003		2004	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	208	W	213	W	188	W
Sand and gravel, construction	11,900	47,500	11,800	44,800	14,000	51,700
Stone, crushed	6,780	33,600	6,880	24,700	5,370	27,000
Combined values of cement (portland), feldspar, gemstones, gold, gypsum (crude), iron ore [usable (2002)], lime, mica (crude), silver (2002), stone (dimension granite), and values indicated by symbol W	XX	135,000	XX	130,000	XX	131,000
Total	XX	216,000	XX	199,000	XX	210,000

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	2002				2003				2004			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	4	3,060	\$12,800	\$4.19	4	3,050	\$10,900	\$3.58	4	1,950	\$9,150	\$4.68
Granite	1	W	W	5.51	1	W	W	3.58	1	W	W	3.58
Quartzite	9	3,450	19,300	5.60	9	3,540	12,700	3.58	9	3,170	17,000	5.35
Slate	5	W	W	4.96	1	W	W	4.95	1	W	W	4.95
Total or average	XX	6,780	33,600	4.96	XX	6,880	24,700	3.58	XX	5,370	27,000	5.03

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

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

TABLE 3a

SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2003, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Chemical and metallurgical, cement manufacture	W	W	\$3.58
Unspecified: ²			
Reported	5,410	\$19,400	3.58
Estimated	1,500	5,300	3.58
Total or average	6,880	24,700	3.58

W Withheld to avoid disclosing company proprietary data; included in "Unspecified: Reported."

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 3b

SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2004, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1½ inch):			
Riprap and jetty stone	W	W	\$10.59
Filter stone	W	W	8.94
Total or average	48	\$496	10.33
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	7.71
Bituminous aggregate, coarse	W	W	8.30
Railroad ballast	W	W	9.51
Other graded coarse aggregate	527	4,090	7.76
Total or average	868	6,800	7.83
Fine aggregate (-¾ inch):			
Stone sand, bituminous mix or seal	(2)	(2)	10.21
Other fine aggregate	456	1,930	4.22
Coarse and fine aggregates:			
Graded road base or subbase	W	W	8.43
Crusher run or fill or waste	W	W	7.16
Other coarse and fine aggregates	20	115	5.75
Total or average	25	157	6.28
Agricultural, other agricultural uses	8	15	1.88
Chemical and metallurgical, cement manufacture	(2)	(2)	2.59
Special, other fillers or extenders	(2)	(2)	4.53
Unspecified:³			
Reported	2,180	7,800	3.58
Estimated	510	5,100	10.02
Total or average	2,680	12,900	4.79
Grand total or average	5,370	27,000	5.03

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

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

²Withheld to avoid disclosing company proprietary data; included in "Grand total or average."

³Reported and estimated production without a breakdown by end use.

TABLE 4a
 SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2003, 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
Chemical and metallurgical ³	W	W	--	--	--	--
Unspecified: ⁴						
Reported	1,870	6,700	603	2,160	2,940	10,500
Estimated	1,200	4,200	--	--	290	1,100
Total	3,050	10,900	603	2,160	3,230	11,600

W Withheld to avoid disclosing company proprietary data; included in "Unspecified: Reported." -- 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 cement manufacture.

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

TABLE 4b
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2004, 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	--	--	(4)	(4)	(4)	(4)
Coarse aggregate, graded ⁵	--	--	(4)	(4)	(4)	(4)
Fine aggregate (-¾ inch) ⁶	--	--	(4)	(4)	(4)	(4)
Coarse and fine aggregate ⁷	--	--	(4)	(4)	(4)	(4)
Agricultural ⁸	--	--	(4)	(4)	--	--
Chemical and metallurgical ⁹	W	W	(4)	(4)	--	--
Special ¹⁰	--	--	(4)	(4)	--	--
Unspecified: ¹¹						
Reported	1,700	4,990	--	--	1,420	5,080
Estimated	250	4,200	--	--	250	900
Total	1,950	9,160	731	5,630	2,690	12,200

W Withheld to avoid disclosing company proprietary data; included in "Unspecified: Reported." -- 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 filter stone and riprap and jetty stone.

⁴Withheld to avoid disclosing company proprietary data; included in "Total."

⁵Includes bituminous aggregate (coarse), concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

⁶Includes stone sand (bituminous mix or seal) and other fine aggregate.

⁷Includes crusher run or fill or waste, graded road base or subbase, and other coarse and fine aggregates.

⁸Includes other agricultural uses.

⁹Includes cement manufacture.

¹⁰Includes other fillers or extenders.

¹¹Reported and estimated production without a breakdown by end use.

TABLE 5a
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2003,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	440	\$2,260	\$5.13
Plaster and gunitite sands	6	34	5.67
Concrete products (blocks, bricks, pipe, decorative, etc.)	9	94	10.44
Asphaltic concrete aggregates and road base materials ²	4,830	15,100	3.13
Fill	359	976	2.72
Other miscellaneous uses ³	84	384	4.57
Unspecified: ⁴			
Reported	2,110	9,900	4.70
Estimated	3,900	16,000	4.13
Total or average	11,800	44,800	3.81

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

²Includes road and other stabilization (cement and lime).

³Includes roofing granules and snow and ice control.

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

TABLE 5b
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2004,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) ²	522	\$2,430	\$4.64
Asphaltic concrete aggregates and other bituminous mixtures	571	1,530	2.68
Road base and coverings ³	5,790	18,600	3.22
Fill	438	1,190	2.72
Snow and ice control	21	55	2.55
Other miscellaneous uses	19	150	7.73
Unspecified: ⁴			
Reported	2,190	9,460	4.32
Estimated	4,500	18,000	4.10
Total or average	14,000	51,700	3.69

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 (cement).

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

TABLE 6a
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2003,
BY USE AND DISTRICT¹

(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	W	W	W	W	5	42
Asphaltic concrete aggregates and road base materials ³	245	778	1,040	3,270	1,140	2,250
Fill	W	W	W	W	36	89
Other miscellaneous uses ⁴	92	421	146	851	7	28
Unspecified: ⁵						
Reported	651	2,980	192	685	216	1,110
Estimated	800	3,500	900	3,400	1,200	4,600
Total	1,770	7,690	2,260	8,160	2,570	8,150
	District 4		Unspecified districts			
	Quantity	Value	Quantity	Value		
Concrete aggregate and concrete products ²	306	1,450	--	--		
Asphaltic concrete aggregates and road base materials ³	2,410	8,810	--	--		
Fill	282	744	--	--		
Other miscellaneous uses ⁴	25	122	--	--		
Unspecified: ⁵						
Reported	1,030	5,080	20	55		
Estimated	1,100	4,600	--	--		
Total	5,150	20,800	20	55		

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 (cement and lime).

⁴Includes roofing granules and snow and ice control.

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

TABLE 6b
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2004,
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	458	1,150
Road base and coverings ³	328	833	424	980	479	1,290
Fill	17	76	19	21	75	232
Other miscellaneous uses ⁴	6	40	149	737	75	420
Unspecified: ⁵						
Reported	346	1,320	122	390	9	32
Estimated	1,700	7,400	1,100	4,200	1,100	4,300
Total	2,370	9,690	1,780	6,340	2,230	7,450
	District 4		Unspecified districts			
	Quantity	Value	Quantity	Value		
Concrete aggregates (including concrete sand) ²	324	1,400	--	--		
Asphaltic concrete aggregates and other bituminous mixtures	105	331	--	--		
Road base and coverings ³	4,240	14,500	320	1,060		
Fill	326	863	--	--		
Other miscellaneous uses ⁴	17	83	--	--		
Unspecified: ⁵						
Reported	1,710	7,730	--	--		
Estimated	560	2,200	20	60		
Total	7,280	27,100	340	1,110		

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 (cement).

⁴Includes snow and ice control.

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