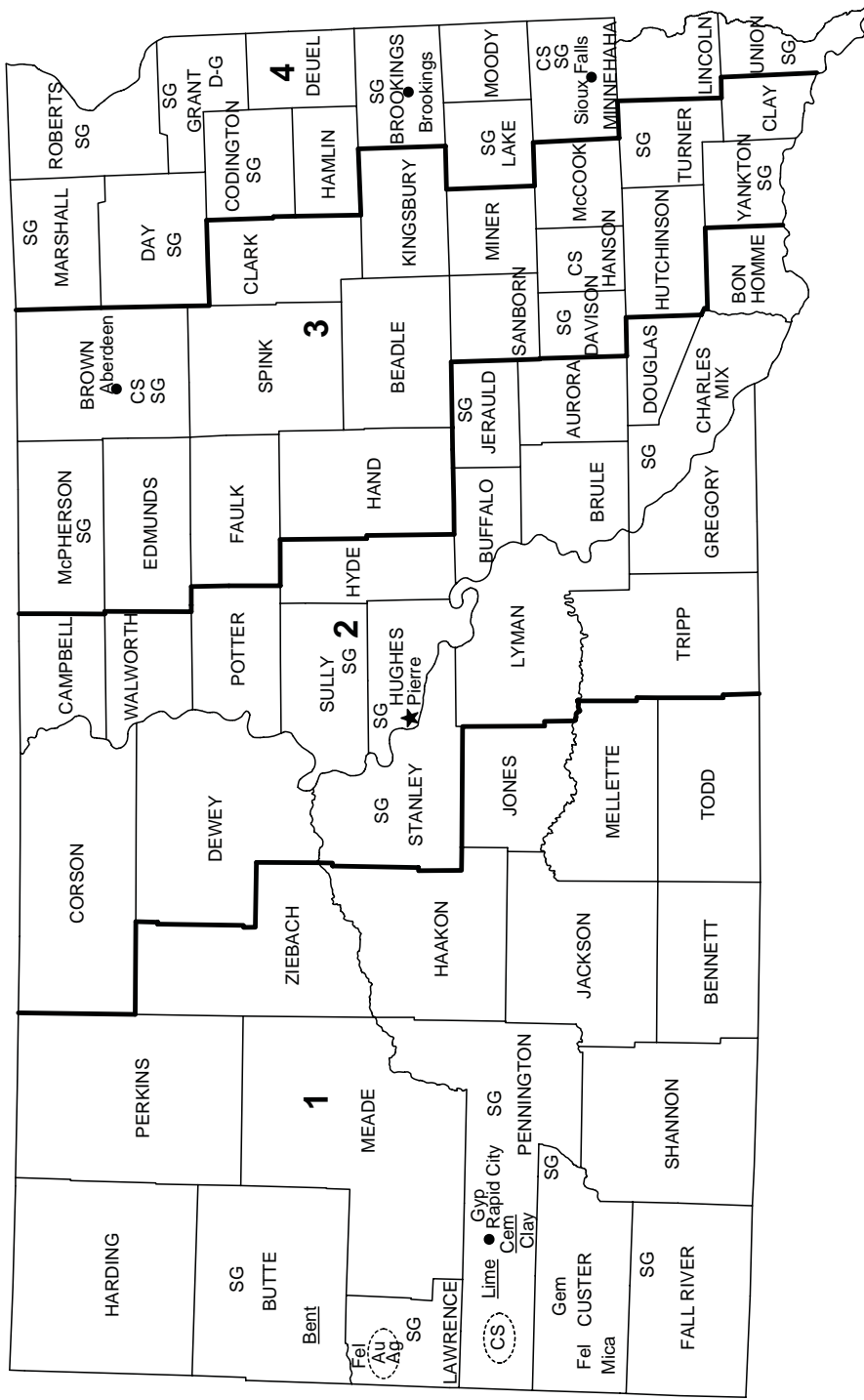




2006 Minerals Yearbook

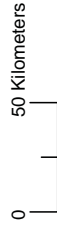
SOUTH DAKOTA

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 2006, South Dakota's nonfuel raw mineral production¹ was valued at \$223 million, based upon annual U.S. Geological Survey (USGS) data. This was a \$6 million, or 2.8%, increase from the State's total nonfuel mineral value for 2005, which also had increased by \$6 million from 2004 to 2005. South Dakota ranked 41st among the States in total nonfuel mineral production, yet per capita, the State ranked 14th in the Nation in the value of its mineral industry's nonfuel mineral production; with a population of slightly more than 782,000, the value of production was about \$286 per capita.

Portland cement, by value, continued to be South Dakota's leading nonfuel mineral commodity in 2006, 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 (in descending order of value) by construction sand and gravel, crushed stone, granite dimension stone, gold, 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 nearly 90% of the State's total nonfuel mineral production value.

Construction sand and gravel and portland cement had the largest increases in production value of all the State's nonfuel mineral commodities. A 28% increase in construction sand and gravel production led to a more than \$14 million, or 31%, increase in its value. With a somewhat small decrease in production, the value of portland cement also had a significant increase in value. A relatively small decrease in crushed stone production resulted in a \$2 million increase in its value. The largest decrease in value took place in gold, which the production also was down significantly (table 1).

In 2006, South Dakota rose in rank to sixth from seventh in the quantity of gold produced of 10 producing States, and it rose to second from third of five mica-producing States while remaining a significant producer of construction sand and gravel and granite dimension stone (10th in rank).

The following narrative information was provided by the South Dakota Department of Environment and Natural Resources (DENR)² in cooperation with DENR Geological

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 2006 USGS mineral production data published in this chapter are those available as of March 2008. 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 Roberta Fivecoate, 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.

Survey Program. Production data in the text that follows 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 Permitting Activities

In 2006, the DENR issued an exploration permit to GCC Dacotah, Inc., a cement production company based in Rapid City. GCC Dacotah planned to explore for limestone reserves within Pennington County in the central Black Hills.

Permit applications were also received by the DENR from two additional companies planning to explore other locations in the Black Hills. Powertech (USA) Inc., Hot Springs, submitted an application in July to explore for uranium resources in an area northwest of Edgemont in the southern Black Hills. Pending issuance of a permit, the company hoped to begin exploration operations in the spring 2007. Capella Resources Ltd., Dartmouth, Nova Scotia, Canada, submitted an application to the DENR for gold exploration in the northern Black Hills. A permit for this activity had not been issued by yearend. Eleven mine permits, covering six large-scale gold mining operations, remained in effect during 2006.

Some gold exploration activity was reported in 2006 following a year in which essentially no exploration was carried out despite rising gold prices. Wharf Resources (USA) Inc., a holder of four gold mining permits, and operator of a large-scale gold mine in the Black Hills, drilled nearly 70 new exploration holes during the year. Two placer gold operations also reported exploration activities.

Commodity Review

Industrial Minerals

Sand and Gravel, Construction and Stone, Crushed.—

Sand and gravel remained the major industrial mineral commodity produced during 2006. Based upon data compiled by the MMP, 14.2 million metric tons (Mt) (15.6 million short tons) of sand and gravel was produced in 2006. Sand and gravel was produced throughout the State and was used mainly for road construction.

Limestone became the second leading industrial mineral produced in 2006, reaching 3.6 Mt, and surpassing quartzite production by about 0.56 Mt. Limestone was recovered from the Black Hills of western South Dakota and was used primarily in the production of cement and for construction. Quartzite was quarried from four areas in southeastern South Dakota. Most of the quartzite was crushed and used in construction. Some larger blocks were used for rip-rap, railroad ballast, and occasionally for decorative purposes.

A total of about 258,000 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. The “mahogany” granite mined by these companies exhibits a beauty and distinctive red color that continues to find important applications, primarily in international markets, in the construction of monuments, and various types of building designs.

Other industrial minerals produced in smaller amounts during 2006 included bentonite, gypsum, mica schist, pegmatite minerals (feldspar, mica, rose quartz), shale, and slate. Production of these minerals totaled about 298,000 t, of which 76% was shale.

During the year, 533 companies and individuals held active industrial mining licenses in the State. About 93% of these was involved in the recovery of construction stone, pegmatite minerals, sand and gravel, and materials used in the process for making cement or lime.

Metals

Gold and Silver.—Wharf Resources Inc. reported production of 1,960 kilograms (kg), (63,000 troy ounces) of gold in 2006, a slight increase compared with that of 2005. Wharf Resources’ surface heap-leach mine remained as the only large-scale gold mine continuing to operate in the State. In 2005, Homestake Mining Company and LAC Minerals (USA), LLC had reported production of minor quantities of gold, but did not produce any gold in 2006. The average price of gold in 2006 rose to \$603.46 per troy ounce, increasing the gross value of the gold produced to about \$38 million, an increase of nearly 37% compared with that of 2005.

Wharf Resources’ gold recovery process also produced silver as a byproduct. A total of about 5,740 kg (184,545 troy ounces) of silver was recovered in 2006. At an average price of \$11.55 per troy ounce, the value of the silver recovered was about \$2.13 million, an increase of 74% compared with that of 2005.

Mine Reclamation

In April, the Board of Minerals and Environment granted Homestake Mining’s request for partial release of reclamation liability at its Open Cut surface mine in Lead. The 208 hectares

(ha) (514 acres) of affected land was the single largest block of acreage the board had ever released from reclamation liability. Under its mining permits, Homestake still had 43.7 ha (108 acres) that needed further reclamation work prior to release of the company’s remaining reclamation liability. The board also accepted Homestake’s post closure plan and set a 100-year period for post closure care and maintenance. The 100-year period is necessary for long-term water treatment of mine runoff for selenium and total dissolved solids.

Work continued in 2006 on the conversion of the Homestake underground mine into a national underground science laboratory. In May, ownership of the underground mine was transferred from Barrick Gold Corporation, Toronto, Ontario, Canada, to the South Dakota Science and Technology Authority. In June, conceptual designs for a deep underground lab were submitted to the National Science Foundation. The Authority planned to begin rehabilitating the mine shafts and tunnels in 2007 and also to pump water out of the mine in preparation for construction of an interim laboratory.

Environmental Issues

The U.S. Environmental Protection Agency (EPA) continued acid water treatment at the Gilt Edge Superfund Site in 2006. A total of 377 million liters (99.7 million gallons) was treated and discharged in 2006, with plans to continue this water treatment in 2007. The EPA and the State continued to prepare plans to reclaim the rest of the site, including the mine pits and heap-leach pad. A feasibility study outlining reclamation options was scheduled to be completed in October 2007.

The 2006 State Legislature passed a bill authorizing the Board of Minerals and Environment to promulgate rules for the construction, operation, monitoring, and closure of uranium and other in situ leach mines. Passage of this bill was prompted by the growing interest in uranium mining within the State, and the associated possibility that uranium in situ leach mining operations would be carried out. In response to this legislation, a draft set of rules was prepared by the DENR. Following a public hearing, and consideration of comments from the public and the DENR, the Board of Minerals and Environment adopted the newly prepared rules regarding in situ leach mining.

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

(Thousand metric tons and thousand dollars)

Mineral	2004		2005		2006	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	188	W	183	W	176	W
Sand and gravel, construction	14,000	51,700	12,800	45,500	16,400	59,800
Stone, crushed	6,410	27,600	6,740 ^r	32,400 ^r	6,320	34,600
Combined values of cement (portland), feldspar, gemstones (natural), gold, gypsum (crude), iron ore [usable shipped (2005-06)], lime, mica (crude), stone (dimension granite), and values indicated by symbol W	XX	131,000	XX	139,000	XX	129,000
Total	XX	211,000 ^r	XX	217,000 ^r	XX	223,000

¹Revised. 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	2005			2006		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	6	3,200	\$14,800	4	3,240	\$14,400
Granite	1	W	W	1	W	W
Quartzite	4	3,300 ^r	16,500 ^r	3	2,870	19,000
Slate	1	W	W	1	W	W
Total	XX	6,740 ^r	32,400 ^r	XX	6,320	34,600

¹Revised. 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 2006, 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	(2)	(2)
Unspecified: ³		
Reported	3,750	18,200
Estimated	1,400	7,900
Total	5,190	26,100
Grand total	6,320	34,600

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.

²Withheld to avoid disclosing company proprietary data; included with "Unspecified: Reported."

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

TABLE 4
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2006, 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 metallurgical ⁷	(8)	(8)	--	--	--	--
Unspecified: ⁹						
Reported	2,020	7,700	658	4,580	1,080	5,920
Estimated	1,200	6,700	--	--	220	1,200
Total	3,240	14,400	658	4,580	2,420	15,600

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 production for District 2.

³Includes other coarse aggregate.

⁴Includes other graded coarse aggregate.

⁵Includes other fine aggregate.

⁶Includes other coarse and fine aggregates.

⁷Includes cement manufacture.

⁸Withheld to avoid disclosing company proprietary data; included with "Unspecified: Reported."

⁹Reported and estimated production without a breakdown by end use.

TABLE 5
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006,
BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand) ²	413	\$2,090	\$5.05
Asphaltic concrete aggregates and other bituminous mixtures	927	3,250	3.50
Road base and coverings ³	4,230	14,100	3.34
Fill	458	1,300	2.84
Snow and ice control	16	40	2.50
Other miscellaneous uses	56	591	10.58
Unspecified: ⁴			
Reported	1,050	4,430	4.24
Estimated	9,270	34,000	3.67
Total or average	16,400	59,800	3.64

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

²Includes plaster and gunite sands.

³Includes road and other stabilization (cement and lime).

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

TABLE 6
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006,
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	11	102
Asphaltic concrete aggregates and other bituminous mixtures	--	--	W	W	174	383
Road base and coverings ³	W	W	226	741	W	W
Fill	(4)	2	18	68	88	228
Other miscellaneous uses ⁵	316	1,100	83	403	239	634
Unspecified: ⁶						
Reported	184	790	74	164	65	281
Estimated	4,250	15,200	1,540	5,520	970	3,890
Total	4,750	17,100	1,940	6,900	1,550	5,520
	District 4		Unspecified districts			
	Quantity	Value	Quantity	Value		
Concrete aggregates (including concrete sand) ²	319	1,680	--	--		
Asphaltic concrete aggregates and other bituminous mixtures	W	W	--	--		
Road base and coverings ³	3,120	10,600	359	1,190		
Fill	352	1,010	--	--		
Other miscellaneous uses ⁵	800	3,320	--	--		
Unspecified: ⁶						
Reported	723	3,200	--	--		
Estimated	2,510	9,330	--	--		
Total	7,820	29,100	359	1,190		

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).

⁴Less than ½ unit.

⁵Includes snow and ice control.

⁶Reported and estimated production without a breakdown by end use.