

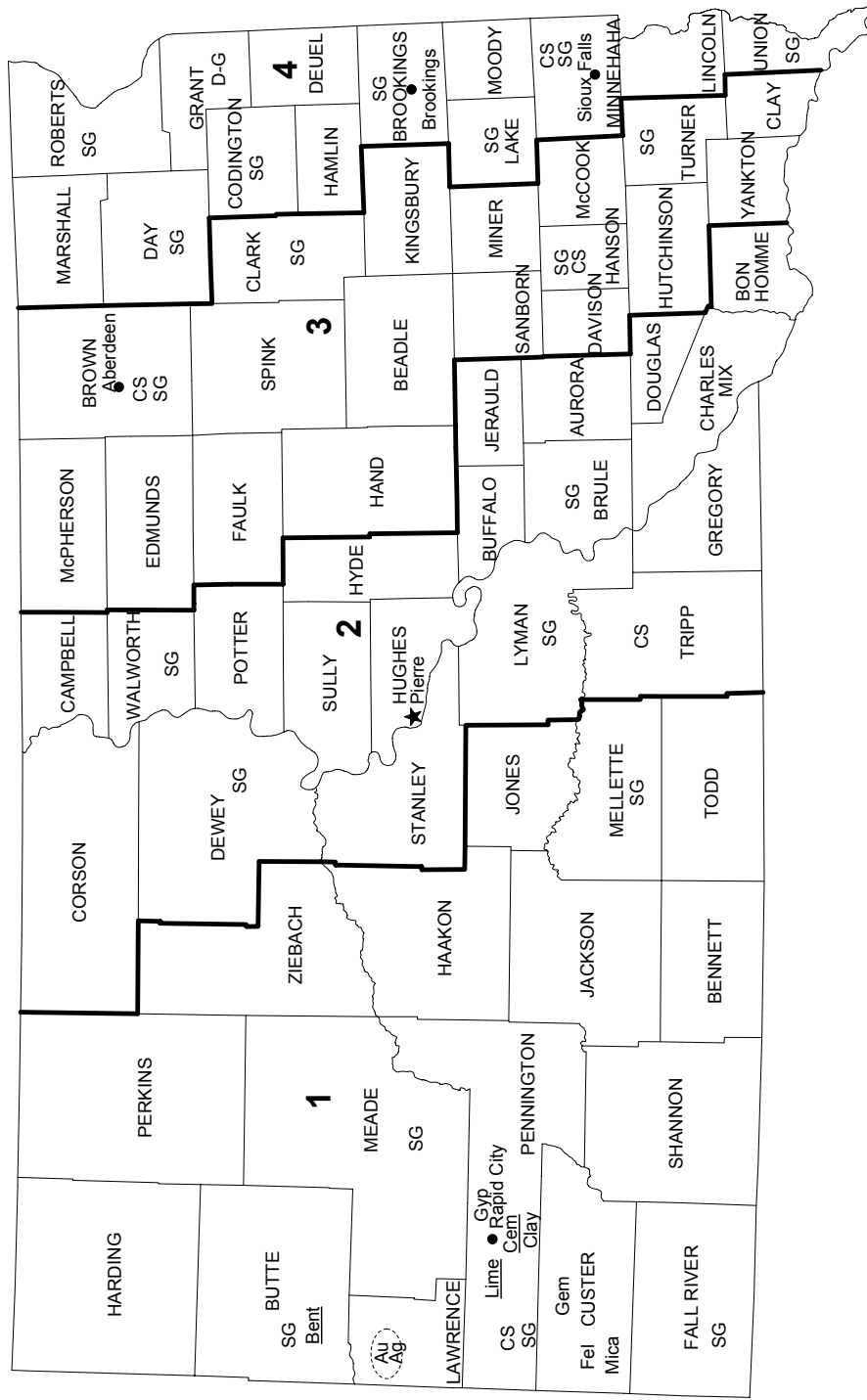
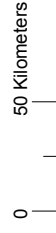
SOUTH DAKOTA

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 2001, the estimated value¹ of nonfuel raw mineral production for South Dakota was \$255 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 9% increase from that of 2000² and followed a 15.8% decrease from 1999 to 2000.

In 2001, gold remained South Dakota's leading nonfuel mineral by value. The State's production of metals, which also include iron ore and silver, accounted for more than one-third of the State's total nonfuel mineral production value. Cement, including both portland and masonry, was the second-leading nonfuel mineral commodity, followed by construction sand and gravel, crushed stone, and granite dimension stone. Increases in the values of gold, portland cement, and granite dimension stone (descending order of change in value) accounted for most of the State's rise in value. In 2000, a significant decrease in the value of gold plus significantly smaller decreases in lime, granite dimension stone, and portland cement led to the State's drop in value for the year. All increases were on the order of less than \$1 million, having little effect on the overall result (table 1).

Based upon USGS estimates of the quantities produced in the 50 States during 2001, South Dakota remained the second leading State in the production of granite dimension stone and seventh in feldspar. While the State increased to fifth from sixth in gold, it decreased to fifth from fourth in mica. Additionally, South Dakota was a significant producer of construction sand and gravel.

The following narrative information was provided by the South Dakota Department of Environment and Natural Resources' (DENR) Minerals and Mining Program³ (MMP) in association with DENR's South Dakota Geological Survey. Production data in the text that follows are those reported by the

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon 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 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as 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. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

³E.H. Holm, D.K. Burtt, M.R. Nelson, and Erik Nelson of the DENR's Minerals and Mining Program jointly authored the text of South Dakota mineral industry information submitted by that agency.

MMP based upon the agency's own surveys and estimates. Data may differ from some production figures reported to the USGS.

Despite low gold prices, gold production and value increased in 2001 in South Dakota for the first time in 5 years. Homestake Mining Co. and Wharf Resources (USA), Inc. produced 9,000 kilograms (kg) of gold in 2001. This represented an 8.4% increase in the amount of gold produced compared with 2000. Gold remained the leading mineral commodity in South Dakota in terms of value. The average price of gold in 2001 was \$271.02 per troy ounce, yielding a gross value of \$78.4 million. This was 5.6% higher than the 2000 gross value of \$73.9 million. The mines are surface heap-leach operations, with the exception of Homestake's operations, which are underground (Holm and others, 2002).

Homestake and Wharf also produced silver as a byproduct in the gold recovery process. A total of 4,870 kg of silver was recovered in 2001. At an average price of \$4.37 per troy ounce, the value of silver was \$684,000, an increase from the 2,480 kg and \$395,000 value reported in 2000.

Homestake, which has been a part of South Dakota history for 125 years, mined its last ton of gold ore on December 14, 2001. The mine, which was once the largest gold mine in the Western Hemisphere, began closure activities that will include dismantling buildings and reclaiming areas associated with its 125-year mining history. In anticipation of the closure, Homestake completed several reclamation activities prior to and during 2001.

In addition to the mine closure, Homestake announced a merger with Barrick Gold Corp., making the new company the third largest gold mining company in the world. The merger was completed on December 14, 2001, the same day the last ton of gold ore was mined at the Homestake Mine. Homestake was also delisted on the New York Stock Exchange on that date. It was originally listed on the exchange on January 25, 1879. The parent company will operate under the Barrick Gold name. Barrick Gold also owns the Richmond Hill Mine [owned by LAC Minerals (USA), LLC until the acquisition of LAC Minerals by Barrick Gold in 1994] in South Dakota, which has been in reclamation for the past 8 years.

Gold exploration activities in South Dakota were limited due to continued low gold prices and other factors. Wharf completed 57 exploration drill holes in the vicinity of its existing operation in Lawrence County. These holes tested an extension of Wharf's Trojan deposit, which occurs in Deadwood Formation sedimentary units, and associated intrusions of monzonite porphyry.

Wharf announced that it would close the Golden Reward Mine and begin final reclamation in 2002. The mine is owned by Wharf and has been in temporary cessation for the past 5 years. Final reclamation will consist of backfilling pits in the western part of the mine, reconstructing the upper Fantail Creek drainage, and completing topsoil placement and revegetation. Most of the backfilling and regrading work will be completed

by October 2002. About 1.9 million cubic meters will be moved during reclamation.

There are currently 11 mine permits that cover 7 large-scale gold mining operations in South Dakota. No new mine permits or mine permit amendments were issued to large-scale gold operations in 2001. One permit was closed in 2001. The Board of Minerals and Environment released Dakota Placer's reclamation bond for its Red Placer Mine near Deadwood.

During 2001, 493 companies had active mine licenses in South Dakota. An operator must obtain a license to mine for pegmatite minerals, materials used in the process of making cement or lime, rock to be crushed and used in construction, and sand and gravel. There were also 35 mine permits that covered the mining of other minerals, such as bentonite, dimension stone, placer gold, and slate.

Sand and gravel was the major nonmetallic mineral commodity produced, with 15.4 million metric tons (Mt) reported. Sand and gravel was produced in nearly every county in South Dakota and was used mainly for road construction projects.

The second largest nonmetallic mineral commodity produced in 2001 was limestone with 3.95 Mt reported. GCC Dacotah (formed by the acquisition of Dacotah Cement by Grupo Cementos de Chihuahua in March 2001) alone produced 1.34 Mt of limestone for cement. It also produced 220,000 metric tons (t) of shale, 44,000 t of gypsum, and 46,000 t of sand.

Sioux quartzite was the third largest nonmetallic mineral commodity produced, with 3.06 Mt reported. 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 rip-rap, railroad ballast, and occasionally for decorative purposes.

A total of 350,000 t of granite was mined by Dakota Granite Co. and Cold Spring Granite Co. from quarries near Milbank, South Dakota. 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.

Other minerals produced in lesser amounts in 2001 included bentonite, iron ore, mica schist, pegmatite minerals (feldspar, mica, rose quartz), placer gold, and slate.

Mine Reclamation

Reclamation activities at the Gilt Edge Mine, which began in the fall of 2000, continued throughout 2001. The U.S. Environmental Protection Agency (EPA) took over management of the mine from the State on July 31, 2000, and the mine was placed on the Superfund National Priority List on December 1, 2000. Through an interagency agreement, the EPA retained the U.S. Department of the Interior's U.S. Bureau of Reclamation to manage the site and develop closure plans. Reclamation efforts have concentrated on getting the Ruby Gulch waste rock dump, the major source of acid mine drainage at the site, ready for capping. About 1.07 million cubic meters of material was moved on the dump in order to reduce slopes to a 3.5:1 slope. The Bureau also constructed ditches to divert water around the dump. At the end of 2001, earthmoving activities were nearing completion, with all earthmoving scheduled to be completed by February 2002. Plans were to place a geomembrane (plastic)

liner and rock drainage layer over the regraded waste dump in summer 2002.

Water-treatment continued at the mine site in 2001. More than 890 million liters (ML) of acid water has been treated and discharged since the State took over the mine in July 1999. Acid water stored in the pits had been reduced to 341 ML by yearend 2001 from 568 ML in July 1999.

The Richmond Hill Mine continues to show improvement since major reclamation activities were completed in the mid-1990s. The performance of the pit impoundment, backfilled with acid-generating rock and covered with a low-permeability capping system, continued to surpass expectations again in 2001. Monitoring data showed that only minimum amounts of oxygen and water were being detected in the impoundment, indicating the cap was effective in limiting oxygen and water infiltration and is preventing acid generation.

The capped leach pads also continued to perform well. Monitoring data showed the capping systems were effective in reducing water infiltration into the spent ore. Water draining from the leach pads was being treated in an innovative passive wetland-treatment system constructed in 2000. Passive treatment systems allow naturally occurring biological processes to treat mine drainage in a controlled environment. Results from 2001 show that the passive treatment system was effective in reducing nitrates, sulfates, and selenium. LAC planned to adjust the system in 2002 to improve removal rates.

Ground and surface water quality around the mine site is closely monitored. Ground water impacted by acid rock drainage prior to mine reclamation is steadily improving. Monitoring wells generally show decreasing trends in sulfate and metal concentrations and increasing pH. Biological assessments of Squaw Creek below the mine show that the stream remains healthy and supports a viable cold water fishery.

The DENR worked with the U.S. Forest Service and the EPA to reclaim the historic Minnesota Ridge Mine, which is south of Lead in Lawrence County, in summer 2001. In fall 2000, buildings at the site were demolished in preparation for reclamation activities. Reclamation activities in 2001 included removing acid-generating rock from a drainage, placing the rock in a capped facility on a nearby ridge, and reconstructing the drainage. The U.S. Forest Service plans to conduct other activities at the site in 2002 to complete reclamation.

The State is also involved in a partnership with the Western Governors Association and the U.S. Forest Service to obtain additional funding to reclaim the King of the West and the Yellow Bird Mines, which are southwest of Rochford in Pennington County, through the Abandoned Mined Land Initiative. The initiative is a partnership created in 1997 between the Western Governors Association and the National Mining Association to address obstacles to abandoned mine reclamation. Hazards at the sites include acid-generating tailings, open shafts, collapsed buildings, and other structures. The Forest Service was developing a plan to reclaim the site with reclamation scheduled to start in 2002 or 2003.

Reference Cited

Holm, E.H., Cline, T., Jr., and Nelson, M.R., 2002, South Dakota, *in* Annual review 2001: Mining Engineering, v. 54, no. 5, May, p. 78-80.

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1999		2000 r/		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clay, common	183	W	191	W	191	W
Gemstones	NA	5	NA	W	NA	W
Gold 3/ kilograms	10,300	113,000	8,230	74,200	W	W
Sand and gravel, construction	12,400	45,600	12,800	46,500	11,500	42,500
Silver 3/ metric tons	W	W	1	227	W	W
Stone, crushed	6,020	26,500	5,460	25,500	5,400	26,000
Combined values of cement, feldspar, gypsum (crude), iron ore (usable), lime, mica (crude), stone (dimension granite), and values indicated by symbol W	XX	93,100	XX	87,400	XX	187,000
Total	XX	278,000	XX	234,000	XX	255,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

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

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

3/ Recoverable content of ores, etc.

TABLE 2
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	4	W	W	W	4	W	W	W
Granite	2	W	W	W	2	W	W	W
Quartzite	5	W	W	W	9	W	W	W
Total or average	XX	6,020	\$26,500	\$4.40	XX	5,460	\$25,500	\$4.67

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

1/ Data 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 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	W	W	\$5.20
Filter stone	W	W	6.32
Other coarse aggregate	200	\$1,180	5.92
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	6.27
Bituminous aggregate, coarse	W	W	6.45
Bituminous surface-treatment aggregate	W	W	6.49
Railroad ballast	W	W	6.56
Other graded coarse aggregate	1,050	7,250	6.88
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	W	W	5.91
Other fine aggregate	372	2,340	6.28
Coarse and fine aggregates:			
Graded road base or subbase	W	W	4.89
Crusher run or fill or waste	W	W	6.11
Other coarse and fine aggregates	383	1,690	4.40
Other construction materials	(3/)	(3/)	5.95
Chemical and metallurgical:			
Cement manufacture	(3/)	(3/)	1.68
Lime manufacture	(3/)	(3/)	16.54
Other miscellaneous uses and specified uses not listed	(3/)	(3/)	6.00
Unspecified: 4/			
Reported	1,280	5,300	4.13
Estimated	850	3,500	4.13
Total or average	5,460	25,500	4.67

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

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

2/ Includes granite, limestone, and quartzite.

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

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

TABLE 4
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000,
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 (+1 1/2 inch) 3/	W	W	--	--	W	W
Coarse aggregate, graded 4/	W	W	--	--	W	W
Fine aggregate (-3/8 inch) 5/	W	W	--	--	W	W
Coarse and fine aggregate 6/	W	W	--	--	W	W
Other construction materials	--	--	--	--	W	W
Chemical and metallurgical 7/	W	W	--	--	--	--
Other miscellaneous uses and specified uses not listed	W	W	--	--	--	--
Unspecified: 8/						
Reported	--	--	624	2,580	658	2,720
Estimated	720	3,000	--	--	130	530
Total	2,980	12,600	624	2,580	1,860	10,300

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

1/ No production reported in District 2.

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

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

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

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

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

7/ Includes cement manufacture and lime manufacture.

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

TABLE 5
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000,
BY MAJOR USE CATEGORY 1/

Use	Quantity	Value (thousands)	Unit value
	(thousand metric tons)		
Concrete aggregate (including concrete sand)	1,120	\$5,940	\$5.30
Plaster and gunit sands	62	488	7.87
Concrete products (blocks, bricks, pipe, decorative, etc.)	39	592	15.18
Asphaltic concrete aggregates and other bituminous mixtures	649	2,690	4.14
Road base and coverings 2/	4,130	12,800	3.09
Fill	639	1,640	2.57
Snow and ice control	52	153	2.94
Other miscellaneous uses 3/	137	548	4.00
Unspecified: 4/			
Reported	1,630	5,340	3.27
Estimated	4,300	16,000	3.81
Total or average	12,800	46,500	3.64

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

2/ Includes road and other stabilization (lime).

2/ Includes filtration, railroad ballast, and roofing granules.

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

TABLE 6
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000,
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/	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	W	W	11	62
Road base materials	514	1,170	752	2,530
Fill	3	4	10	22
Other miscellaneous uses 3/	477	2,810	120	6.29
Unspecified: 4/				
Reported	591	1,530	218	414
Estimated	840	3,100	1,100	3,600
Total	2,430	8,620	2,210	7,290
	District 3		District 4	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	W	W	705	3,890
Asphaltic concrete aggregates and other bituminous mixtures	W	W	583	2,380
Road base materials	680	1,800	2,190	7,260
Fill	130	219	496	1,400
Other miscellaneous uses 3/	90	276	74	357
Unspecified: 4/				
Reported	110	222	712	3,170
Estimated	1,600	5,400	780	4,200
Total	2,580	7,890	5,540	22,700

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

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

2/ Includes plaster and gunite sands.

3/ Includes filtration, railroad ballast, roofing granules, and snow and ice control.

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