

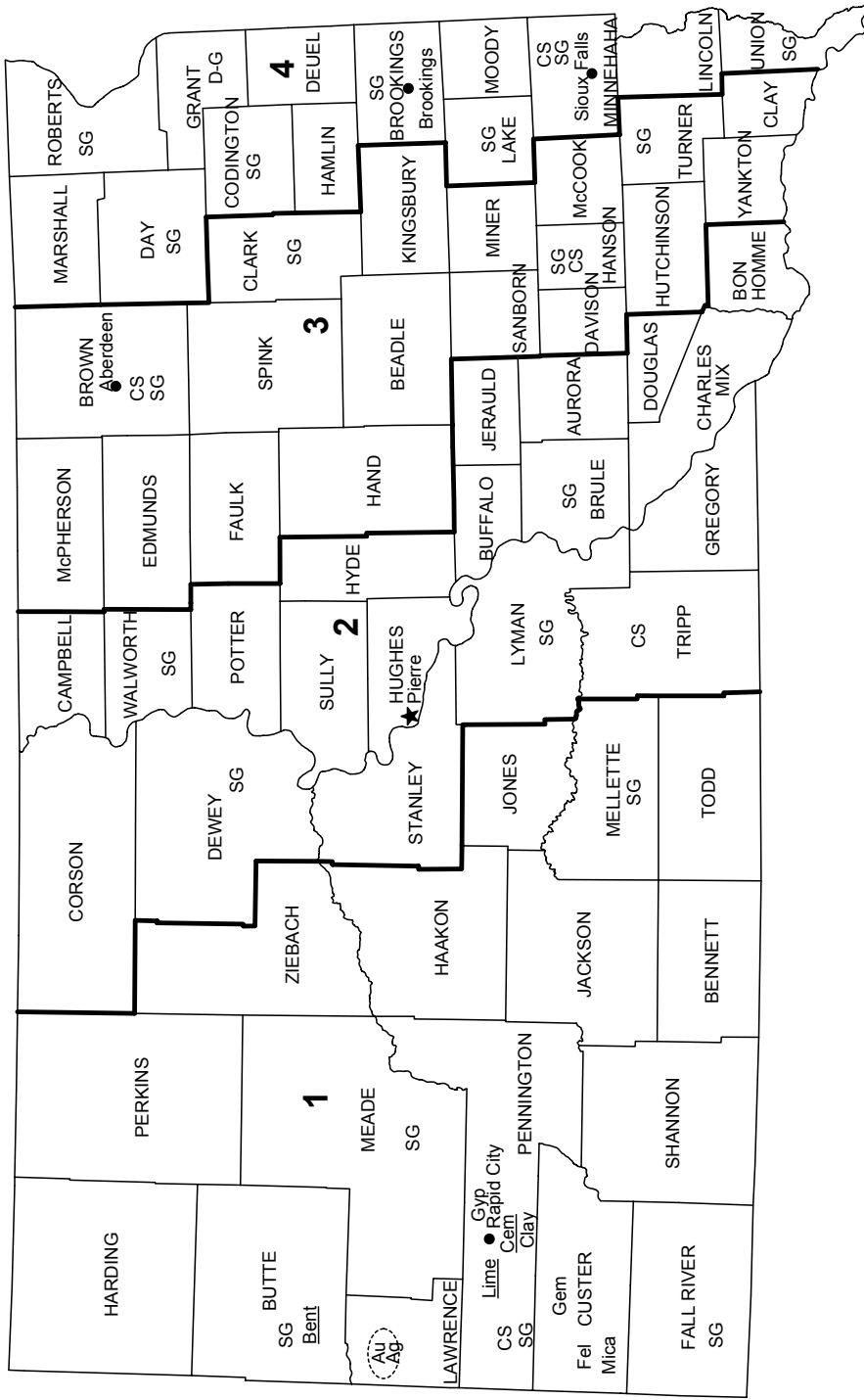
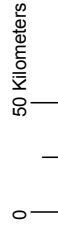
SOUTH DAKOTA

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 2002, the estimated value¹ of nonfuel mineral production for South Dakota was \$186 million, based upon preliminary U.S. Geological Survey (USGS) data. This was approximately a 30% decrease from that of 2001² and followed a 15% increase from 2000 to 2001.

In 2002, portland cement overtook gold as South Dakota's leading nonfuel mineral by value. The State's production of construction materials, which also include construction sand and gravel, crushed stone, granite dimension stone, gypsum, and common clays (descending order of value), accounted for about 80% of the State's total nonfuel mineral production value. A substantial decrease in the production and value of gold accounted for most of the State's decrease in value; smaller decreases also occurred in the values of dimension granite, construction sand and gravel, portland cement, and silver (descending order of change). Crushed stone production and value were up for the year and to a lesser extent so was that of gypsum (table 1).

In 2001, significant increases in gold, portland cement, and dimension granite led the way to the State's increase in value; crushed stone also had a small increase. The only sizable decrease was that of construction sand and gravel, down about \$5 million. All other changes in value were relatively small and had little effect on the overall result (table 1).

Based upon USGS estimates of the quantities produced in the 50 States during 2002, South Dakota remained the second leading State in the production of granite dimension stone (ninth in dimension stone overall), fifth in mica, and seventh in feldspar. The State decreased to seventh from fifth in the production of gold. Additionally, South Dakota was a significant producer of construction sand and gravel.

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 2002 USGS mineral production data published in this chapter are preliminary estimates as of July 2003 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 2001 may differ from the Minerals Yearbook, Area Reports: Domestic 2001, Volume II, owing to the revision of preliminary 2001 to final 2001 data. Data for 2002 are preliminary and are expected to change; related rankings may also change.

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. (The complete DENR report, Summary of the Mining Industry in South Dakota 2002, upon which this is based, may be found on the Internet⁴.) Production data in the text that follows are those reported by the MMP based upon the agency's own surveys and estimates. Data may differ from some production figures reported to the USGS.

Commodity Review

Industrial Minerals

Mica.—Two companies submitted mine permit applications in 2002. In October 2002, Pacer Corp. submitted a large-scale mine permit to construct a new mica milling facility at its Brite-X Mine north of Custer and to amend the mining and reclamation plan for the mine. The mine is currently operated under Large Scale Mine Permit No. 311. In April 2003, Pacer decided to withdraw the mine permit application and evaluate other locations for the mill.

Shale.—One company submitted a permit amendment in 2002. Dakota Block, a division of Pete Lien & Sons Inc., submitted a permit amendment application in December 2002 to modify the mine plan for its shale mine east of Rapid City. The amendment would allow Dakota Block to amend the mining sequence and revise the affected area boundary. The department will make its recommendation on the permit amendment application sometime in spring 2003.

Stone.—Cold Spring Granite Co. submitted a small-scale mine permit application for its granite quarry operation east of Milbank. Cold Spring is planning to construct a culvert to divert an intermittent stream around one of its quarries and a quarry operated by Dakota Granite Co. The diversion will allow both companies to expand their quarries. The department will make its recommendation on the permit application in April 2003.

Metals

Gold.—After an increase in gold production in 2001,

³E.H. Holm, D.K. Burtt, M.R. Nelson, and Erik Nelson of the South Dakota Department of Environmental Natural Resources' Minerals and Mining Program jointly authored the text of the State mineral industry information provided by that agency.

⁴A reference that includes a section mark (§) is found in the Internet Reference Cited section.

production decreased markedly in 2002. The main reason for the decrease was the closure of the historic Homestake Mine. Production from the Homestake Mine decreased from 5,760 kilograms (kg) in 2001 to 1,130 kg in 2002. All of the production came from the underground portion of the mine, as Homestake had already completed mining in the Open Cut in September 1998. Wharf Resources (USA), Inc. reported gold production of 2,550 kg in 2002, a decrease from the 3,240 kg reported in 2001. Golden Reward Mining Co. recovered less than 2 kg of gold during reclamation activities. There were no new mine permits or permit amendments issued to large-scale gold- and silver-mining operations in 2002.

Environmental Issues and Mine Reclamation

Homestake Mining Co. continued closure activities at its historic gold mine in Lead during 2002. The mine was closed at the end of 2001 because of low gold prices, high production costs, and lower-than-expected ore grades. On January 18, 2002, the last ore was milled, and on February 13, 2002, the mill was shut down forever. The mill processed 152 million metric tons (Mt) of ore and produced 1,230 metric tons (t) of gold and 280 t of silver during its long history. In June 2002, demolition of the mill facilities began. Homestake hired Cleveland Wrecking Co. to demolish 25 structures in the mill complex, including the South Mill, refinery, and the East and West Sand Plants. Demolition debris from the mill was hauled to a demolition disposal facility constructed at the East Waste Rock Disposal Facility near the Open Cut. In November, mill demolition was completed. The company then began an extensive soils testing program of the mill site. These tests will help Homestake determine recontouring and mill foundation removal plans for the site, which will take place in 2003. Homestake continued decommissioning of the underground mine while discussions continued on whether to convert the mine to a national underground laboratory to study neutrinos (fundamental particles that make up the universe).

The Gilt Edge Mine, an open pit heap-leach gold mine operated by Brohm Mining Co., was abandoned after its parent, Dakota Mining Inc., declared bankruptcy in 1999. The site was placed on the Superfund National Priorities List in 2000, and the State and the U.S. Environmental Protection Agency (EPA) are currently in the process of reclaiming the site.

The focus of reclamation activity at the mine during 2002 was on capping the Ruby waste rock dump, the major source of acid mine drainage at the site. The majority of the capping system was completed by yearend. Delhur Industries Inc., the primary contractor at the site, placed a 30- to 60-centimeter liner bedding layer over the regraded dump. Comanco Environmental Corp., a subcontractor for Delhur, then installed 25 hectares (ha) of 80-mil linear low-density polyethylene (LLDPE) geomembrane liner and geotextile over the bedding layer. Staff from the Minerals and Mining Program and the Bureau of Reclamation performed construction quality assurance and quality control for the lining project.

As the liner was completed, Delhur placed drain layer material over the geotextile. About 115,000 cubic meters of crushed rock was used for the drain layer. Some of the drain layer material came from rock brought to the mine site from

the Highway 385 reconstruction project. By yearend, the drain layer was completed, and Delhur placed cover soil over the drain layer on the upper portion of the dump. Geomembrane liner and riprap were also placed in 1,200 meters of perimeter diversion ditches. Plans are to complete cover soil placement and seeding of the dump in spring 2003.

Water treatment continued at the mine site during the first part of 2002. In August, the water-treatment plant was shut down in order to convert it from a caustic system to a high-density sludge lime treatment system. The plant conversion, which will be completed in June 2003, will lower water treatment costs at the site. Acid water is currently being stored in the mine pits until the water-treatment plant is operating again.

Plans for completing reclamation of the rest of the site, including the mine pits and heap leach pad, are currently being prepared by EPA and the State.

Wharf Resources (USA), Inc. completed most of the required reclamation at its Golden Reward Mine during 2002. The company announced in 2001 that it would close the Golden Reward Mine and begin final reclamation. The mine, owned by Wharf Resources, has not produced for the past 5 years. Wharf began reclamation activities in April 2002 by backfilling the Harmony and Liberty Pits with spent ore and waste rock. The upper Fantail Creek drainage was reconstructed through the backfilled Liberty Pit. After the spent ore was removed from the leach pad, the asphalt liner was ripped and the area was recontoured. Golden Reward placed topsoil on the regraded areas and completed seeding in November 2002. A total of 2.5 million cubic meters of material was moved during the project. Demolition of the crusher building and truck shop was completed in August. About 79 ha were reclaimed in 2002. Only some minor reclamation remained to be completed.

When Wharf Resources announced that it would be closing the Golden Reward Mine, the Terry Peak Ski Area became interested in using Golden Reward's process building and associated ponds to increase its snowmaking capabilities. In March, Wharf Resources requested State approval to leave two process area buildings and the process ponds for snowmaking purposes. The ski area will use the process building to store snowmaking equipment, and Wharf Resources will use the office building to store records. The Board of Minerals and Environment approved Wharf Resources' request in April. In the event the buildings and ponds are not used, Wharf Resources is required to reclaim the facilities in accordance with its reclamation plan. About 30 million liters from the process ponds were used for snowmaking in November and December 2002.

The Richmond Hill Mine, an open pit heap-leach gold mine that developed an acid mine drainage problem during operations, continued to show improvement. The bulk of reclamation was completed by the mine operator, LAC Minerals (USA), LLC, 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 perform as designed. Monitoring data showed that only minimal amounts of oxygen and water were being detected in the impoundment. This indicated that the cap was effective in limiting oxygen and that water infiltration was preventing acid generation. No signs of settling or slumping were detected

during routine surveys of the pit impoundment. A dense, self-sustaining vegetative cover has become established on the pit impoundment and most of the waste depository area.

The capped leach pads also continued to perform well. Monitoring data showed that the capping systems were effective in reducing water infiltration into the spent ore. No signs of settlement or cracking were found during routine surveys of the leach pads. A dense, self-sustaining cover had become established on the leach pads.

LAC resumed water treatment in October 2002 after treating no water in 2001. Effluent from the leach pads was collected and stored in the former process ponds and then treated prior to discharge. About 18 million liters were treated with a reverse osmosis unit and discharged by yearend. LAC planned to continue water treatment in 2003.

Ground and surface water quality around the mine site was closely monitored. Ground water impacted by acid rock drainage prior to mine reclamation was improving steadily. Monitoring wells generally showed decreasing trends in

sulfate and metal concentrations and increasing pH. Biological assessments of Squaw Creek below the mine showed that the stream remains healthy and supports a viable cold water fishery.

No Notices of Violation were issued to large-scale gold and silver mines in 2002. However, the department did issue Wharf an amended order concerning the repair of liners for the pregnant and contingency ponds. Wharf failed to comply with the requirements of the August 7, 2001, Notice of Violation when it did not submit mitigation or repair plans for the pregnant and contingency pond liners when leakage through the primary liner of the ponds exceeded the required reporting thresholds. Wharf agreed to complete liner repairs to these ponds and to comply with the response action plan.

Internet Reference Cited

South Dakota Department of Environment and Natural Resources, Minerals and Mining Program, 2003 (May), Summary of the Mining Industry in South Dakota 2002, accessed July 25, 2003, at URL <http://www.state.sd.us/denr/DES/mining/Goldrpt2003.pdf>.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH DAKOTA^{1,2}
(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2000		2001		2002 ^P	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	191	W	200	W	200 ^e	775 ^e
Gold ³ kilograms	8,230	74,200	W	W	2,450	24,000
Sand and gravel, construction	12,800	46,500	11,200	41,500	10,400	39,200
Silver ³ metric tons	3	403	W	W	W	W
Stone, crushed	5,460	25,500	5,850	27,200	6,100	28,900
Combined values of cement [masonry (2000), portland], feldspar, gemstones, gypsum (crude), iron ore (usable), lime, mica (crude), stone (dimension granite), and values indicated by symbol W	XX	86,400	XX	200,000	XX	93,400
Total	XX	232,900	XX	268,000	XX	186,000

^eEstimated. ^PPreliminary. W Withheld to avoid disclosing company proprietary data; value included with "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.

³Recoverable content of ores, etc.

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

Kind	2000				2001			
	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	\$4.23	4	W	W	\$4.17
Granite	2	W	W	4.18	1	W	W	4.41
Quartzite	9	W	W	5.26	4	W	W	5.26
Total or average	XX	5,460	\$25,500	4.67	XX	5,850	\$27,200	4.65

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

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

TABLE 3
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	W	W	\$4.96
Filter stone	W	W	9.92
Other coarse aggregates	W	W	5.09
Coarse aggregate, graded:			
Concrete aggregate, coarse	W	W	7.17
Bituminous aggregate, coarse	W	W	7.17
Bituminous surface-treatment aggregate	W	W	7.72
Railroad ballast	W	W	6.61
Other graded coarse aggregates	W	W	7.29
Fine aggregate (-3/8 inch):			
Stone sand, bituminous mix or seal	W	W	4.96
Other fine aggregates	W	W	6.70
Coarse and fine aggregates:			
Crusher run or fill or waste	W	W	5.18
Other coarse and fine aggregates	W	W	3.98
Other construction materials	58	\$350	6.03
Chemical and metallurgical, cement manufacture	W	W	3.58
Other miscellaneous uses and specified uses not listed	W	W	5.00
Unspecified: ²			
Reported	2,340	10,300	4.41
Estimated	2,100	5,000	4.63
Total or average	5,850	27,200	4.65

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

¹Data are rounded to no more than three significant digits, except unit value; 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 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ²	--	--	--	--	W	W
Coarse aggregate, graded ³	--	--	--	--	W	W
Fine aggregate (-3/8 inch) ⁴	--	--	--	--	W	W
Coarse and fine aggregate ⁵	--	--	--	--	W	W
Other construction materials	--	--	--	--	58	350
Chemical and metallurgical ⁶	W	W	--	--	--	--
Other miscellaneous uses ⁷	W	W	--	--	--	--
Unspecified: ⁸						
Reported	866	3820	708	3123	766	3,380
Estimated	1,100	5,000	--	--	--	--
Total	3,160	13,200	708	3,123	1,980	10,900

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.

²Includes filter stone, riprap and jetty stone, and other coarse aggregates.

³Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregates.

⁴Includes stone sand (bituminous mix or seal) and other fine aggregates.

⁵Includes crusher run (select material or fill) and other coarse and fine aggregates.

⁶Includes cement manufacture.

⁷Includes specified uses not listed.

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

TABLE 5
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY MAJOR USE CATEGORY¹

Use	Quantity	Value	Unit
	(thousand metric tons)	(thousands)	value
Concrete aggregates (including concrete sand)	1,250	\$6,660	\$5.35
Plaster and gunite sands	59	450	7.63
Concrete products (blocks, bricks, pipe, decorative, etc.)	53	735	13.87
Asphaltic concrete aggregates and other bituminous mixtures	569	2,330	4.10
Road base and coverings	3,880	11,400	2.94
Fill	993	2,560	2.58
Snow and ice control	65	200	3.08
Other miscellaneous uses ²	71	410	5.77
Unspecified: ³			
Reported	802	3,000	3.74
Estimated	3,500	14,000	3.95
Total or average	11,200	41,500	3.70

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

²Includes filtration, railroad ballast, and roofing granules.

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

TABLE 6
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates (including concrete sand)	W	W	W	W	2	10	637	2930
Concrete products (blocks, bricks, pipe, decorative, etc.) ²	--	--	W	W	W	W	110	1,160
Asphaltic concrete aggregates and road base materials	449	1020	393	1220	769	2,080	2,830	9,430
Fill	--	--	9	13	45	134	939	2,410
Snow and ice control	--	--	W	W	W	W	53	152
Other miscellaneous uses ³	420	2,720	239	1,210	11	64	22	211
Unspecified: ⁴								
Reported	268	918	220	473	56	145	258	1,470
Estimated	990	3,500	800	3,000	1,000	3,600	670	3,600
Total	2,130	8,120	1,660	5,950	1,910	6,060	5,520	21,400

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

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 filtration, railroad ballast, and roofing granules.

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