

**MINERALS  
IN THE  
ECONOMY  
OF  
SOUTH DAKOTA**

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in 1978

**BUREAU OF MINES ★ UNITED STATES DEPARTMENT OF THE INTERIOR**  
IN COOPERATION WITH  
**SOUTH DAKOTA STATE GEOLOGICAL SURVEY**

# MINERALS IN THE ECONOMY OF SOUTH DAKOTA

This current report has been prepared by the Bureau of Mines, U.S. Department of the Interior, to--

1. Provide the latest available data and information on the mineral industry of South Dakota.
2. Invite comment, revisions, or additional information on the subject.

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# MINERALS IN THE ECONOMY OF SOUTH DAKOTA

## INTRODUCTION

South Dakota, with a land area of 77,047 square miles, is the 16th largest State in the Nation. The population as of July 1, 1978, was 689,051, an increase of 3.4 percent above the 1970 census figure.

The value of nonfuel mineral production ranks fourth among the major sources of State income, following agriculture, tourism, and manufacturing. In 1978, the State nonfuel mineral output value was about 6 percent of agriculture revenues, which were estimated at \$1.8 billion.

Nationwide, the State ranks 38th in value of mineral production derived from metallic and nonmetallic ores and industrial minerals and rocks. State-wide, the annual nonfuel mineral production represented a value of \$1,526 per square mile in 1978.

Gold is the principal mineral commodity produced in terms of value, followed by cement, stone, sand and gravel, lime, and bentonite. South Dakota ranks first among the States in gold production and accounted for 40 percent of the total U.S. output in 1978.

## GENERAL MINERAL SITUATION

The value of South Dakota's nonfuel mineral production (table 1) reached an alltime high of \$117.6 million in 1978; the 13-percent increase over the previous high set by these commodities in 1977 was largely due to rising gold prices. Production of 14 nonfuel mineral commodities was recorded in 1978, and approximately 204 mineral producers contributed to the total State output. Although gold production quantities were down about 6 percent from 1977, the value of 1978 output increased 22 percent owing to higher gold prices, which averaged \$193.55 per troy ounce, \$45.24 per troy ounce higher than in 1977.

At the beginning of the fourth quarter of 1978, the mining industry of the State employed about 2,700 people, out of the total State nonagricultural work force of 231,400 persons. Those employed in mining during this period comprised the second highest earning level group in the State's total private nonagricultural work force. Average weekly earnings for those engaged in mining were \$282, compared with \$165 for the entire nonagricultural sector.

A recent study made by the Business Research Bureau, University of South Dakota, for the Bureau of Mines analyzed the economic impact of the mineral industry of South Dakota on the State's economy. Findings indicated that the mining and energy-producing industries that utilize mineral fuels account for approximately 10 percent of the gross State product (GSP). In 1978, the GSP for South Dakota was estimated to reach \$5.1 billion.

Minerals produced in the State play an important role in assisting the Nation to meet its mineral supply needs. Table 2 shows where South Dakota nonfuel mineral commodities fit into the Nation's total mineral production. Table 3 presents the ownership of the lands from which the State's nonfuel mineral production values were derived in 1978.

TABLE I. - Mineral production in South Dakota<sup>1</sup>

	1977		1978 <sup>p</sup>	
	Quantity	Value, thousand dollars	Quantity	Value, thousand dollars
Clays <sup>2</sup> .....thousand short tons..	197	233	192	239
Gem stones.....	NA	40	NA	41
Gold (recoverable content of ore, etc.)...troy ounces..	304,846	45,212	285,512	55,261
Mica.....thousand short tons..	56	5	44	4
Petroleum (crude).....thousand 42-gallon barrels..	632	7,584	( <sup>3</sup> )	( <sup>3</sup> )
Sand and gravel.....thousand short tons..	6,043	9,815	6,200	10,000
Silver (recoverable content of ore, etc.) thousand troy ounces..	69	317	54	294
Stone.....thousand short tons..	3,412	18,881	3,705	19,220
Combined value of beryllium concentrate (1977), cement (masonry and portland), clays (bentonite), feldspar, gypsum, iron ore, lime, and natural gas liquids (1977)	XX	30,010	XX	31,682
Total.....	XX	112,097	XX	<sup>4</sup> 117,607

<sup>p</sup>Preliminary. NA Not available. XX Not applicable.

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

<sup>2</sup>Excludes bentonite; value included in "Combined value" figure.

<sup>3</sup>These data now collected by U.S. Department of Energy; not available at time this table was prepared.

<sup>4</sup>Incomplete total; excludes value of natural gas liquids and petroleum.

TABLE 2. - South Dakota's role in U.S. mineral supply in 1978<sup>P</sup>

	Share of U.S. output, percent	Rank in Nation	Reserves
Gold.....	30	1	Large.
Bentonite.....	W	6	Moderate.
Stone (dimension).....	2	11	Large.
Sand and gravel.....	1	41	Do.
Stone (crushed).....	<1	38	Do.
<u>Silver.....</u>	<1	12	Moderate.

<sup>P</sup>Preliminary.

TABLE 3. - South Dakota's land ownership and mineral production

	Ownership, percent	State production value in 1978, <sup>P</sup> percent
Federal <sup>1</sup> .....	10	0
State.....	11	24
Private.....	79	76
<u>Total.....</u>	<u>100</u>	<u>100</u>

<sup>P</sup>Preliminary.

<sup>1</sup>Land ownership as of January 1977.

A severe cement shortage started plaguing the region in 1978 and the South Dakota Cement Commission halted sales of cement from its cement plant in Rapid City to other States at midyear. Continued mechanical problems encountered during shakedown operations of a new kiln installed to double plant capacity, together with increased demand, intensified the situation, causing State officials to institute this policy. This action caused protest from customers in neighboring States, and ensuing court actions included a U.S. District Court restraining order suspending the policy against out-of-State sales and setting up an allocation system for all customers; a 6th Circuit Court of South Dakota order overriding the injunction issued by the U.S. District Court but allowing out-of-State shipments once in-State needs are met, and finally a U.S. Circuit Court of Appeals ruling that the State may restrict sales of cement to out-of-State customers. Cement plant officials are predicting another regional shortage for 1979, but indicated they will have adequate supplies for South Dakota customers.

Union Carbide Corp. announced plans late in 1978 to begin mining uranium in western South Dakota in 1980 if the necessary licenses can be obtained. The company plans to start its mining on properties located within the Black Hills National Forest, 23 miles northwest of Hot Springs. Initial operations will include mining from seven open pits and one underground site. The ore mined is to be heap-leached near the mines, and the uranium liquid concentrate will be shipped to a yellow cake processing plant at Gas Hills, Wyo.

One of the State's oldest mineral-processing facilities, the brick plant of Black Hills Clay Products Co. in Butte County (fig. 1), terminated its



FIGURE 1. - Black Hills Clay Product Co. brick plant, Butte County. (Courtesy, South Dakota Industrial Division)

operation near yearend. The plant, with a reported capacity of 7.2 million brick per year, went into operation in 1927 and has been the sole producer of clay brick in the State during the past two decades. Salvageable equipment will be utilized by an affiliate company plant in North Dakota where better processing-fuel efficiency can be obtained.

Stone producers in the State recorded another banner year in terms of value of material produced. Of all the various nonmetallic minerals produced during the year, stone ranked first. The different types of stone produced from major production areas in the State include granite from Grant County, limestone from Pennington and Meade Counties, and quartzite from McCook and Minnehaha Counties (fig. 2).

Exploration for uranium deposits continued during 1978, although at a slower pace than in the previous year. The emphasis was again on Harding and Fall River Counties where the most intensive drilling occurred. Union Carbide Corp. announced plans to begin uranium mining and heap-leach processing in the Edgemont district of Fall River County during 1980.

Exploration for oil and gas was again at a high level of activity. Approximately 56 test wells were drilled, or an estimated 275,000 feet of hole. Slightly more than half of these were drilled specifically as gas test wells. The increased gas testing probably resulted from the discovery by Texas operator Jerry McCutchin, Jr., of the West Short Pine Hills field late in 1977 in southwestern Harding County. The gas was recovered from a depth of about 1,600 feet in the late Cretaceous Shannon sandy shale member of the Pierre Shale. The discovery well showed a calculated absolute open flow of 980 Mcf per day. The gas had a tested heat value of 958 Btu. Ten potentially productive gas wells have been completed by this operator offsetting the discovery well. At yearend the wells were being connected to an existing 12-inch gas line about 3-1/2 miles distant from the new field. Three additional gas test wells, a few miles southeast of the West Short Pine Hills field, recovered gas from the Shannon zone, but had not yet been tested for gas flow by yearend. A second possible new gas discovery was made in extreme southwestern Fall River County in a reentry of an oil test well plugged and abandoned in 1969. The reentry recovered approximately 4 MMcf per day of low-Btu gas. No attempts have yet been made to develop a gasfield there.

Fourteen oilfield development wells were either placed on production or waiting to be completed at yearend. One oil discovery well resulted in the establishment of a new oilfield, bring the total number of oil and gas fields in the State to 15. Nineteen test wells were plugged and abandoned as dry holes.

Other gas testing took place in Stanley, Haakon, Tripp, Lyman, and Butte Counties. No promising showing was made of commercial gas in the Niobrara Chalk and the Greenhorn Limestone, the two formations holding the most potential for shallow gas reservoirs. Because these two formations produce significant amounts of natural gas in Colorado, Kansas, and Nebraska, it is believed that considerable potential exists for commercial gas accumulations in the formations in South Dakota.



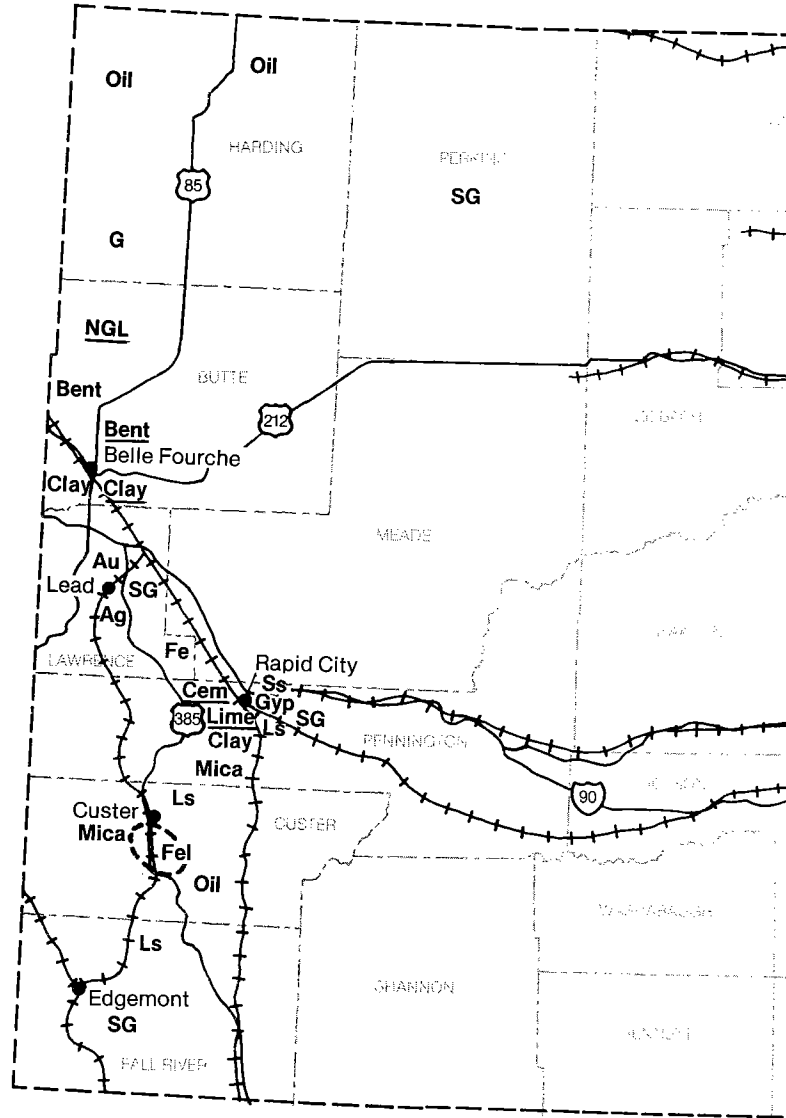
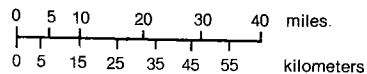
# SOUTH

## LEGEND

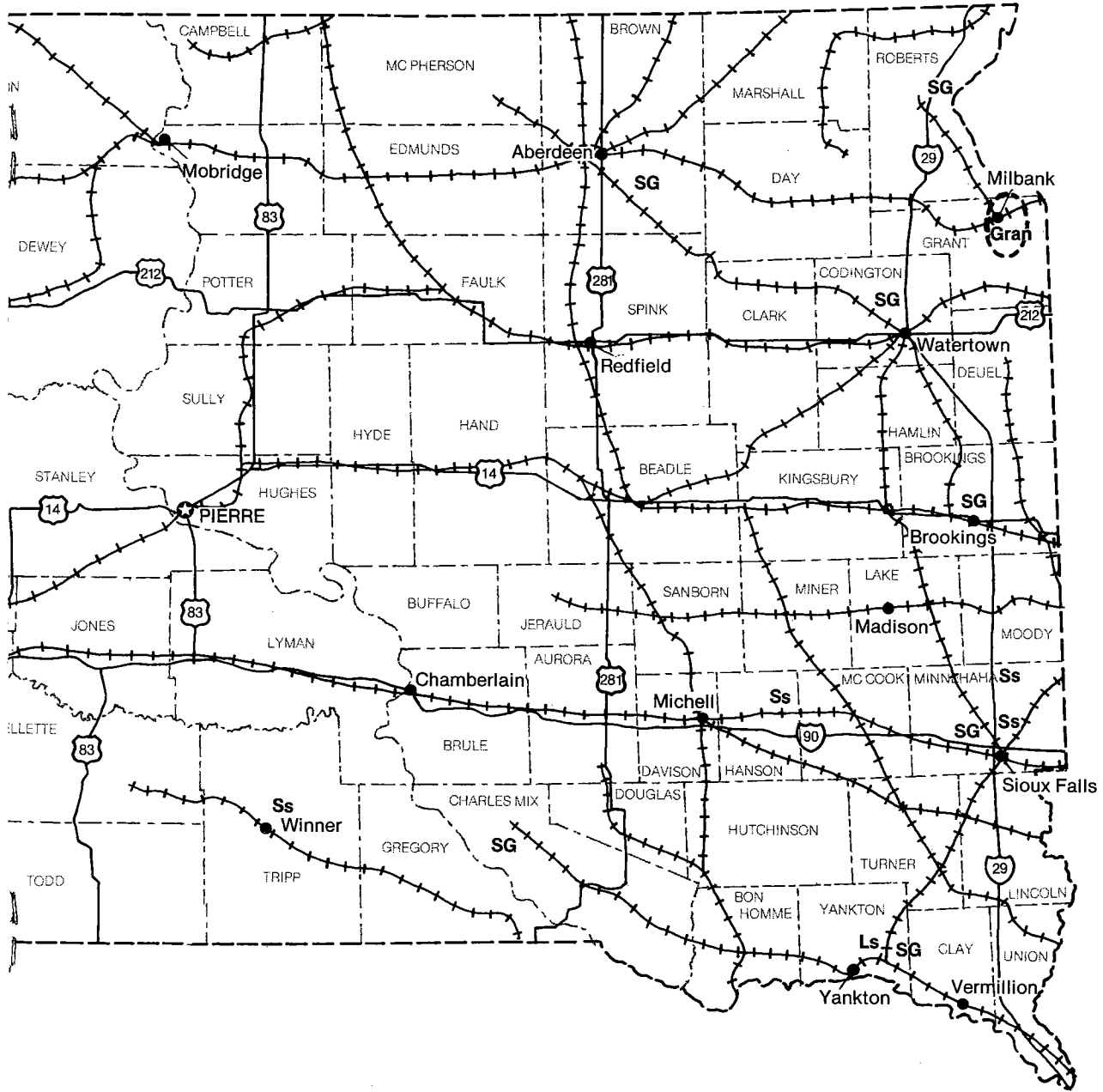
- State boundary
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- Road
- Interstate highway
- U.S. highway

## Mineral Symbols

- Ag** Silver ore
- Au** Gold ore
- Bent** Bentonite
- Bent** Bentonite processing plant
- Cem** Cement plant
- Clay** Clay
- Clay** Clay products
- Fe** Iron ore
- Fel** Feldspar
- Fel** Feldspar grinding mill
- G** Natural gas
- Gran** Granite
- Gyp** Gypsum
- Ls** Limestone
- Lime** Lime plant
- Mica** Mica
- NGL** Natural gas liquids plant
- Oil** Petroleum, crude
- SG** Sand and Gravel
- Ss** Sandstone
- Concentration of mineral operations



# DAKOTA



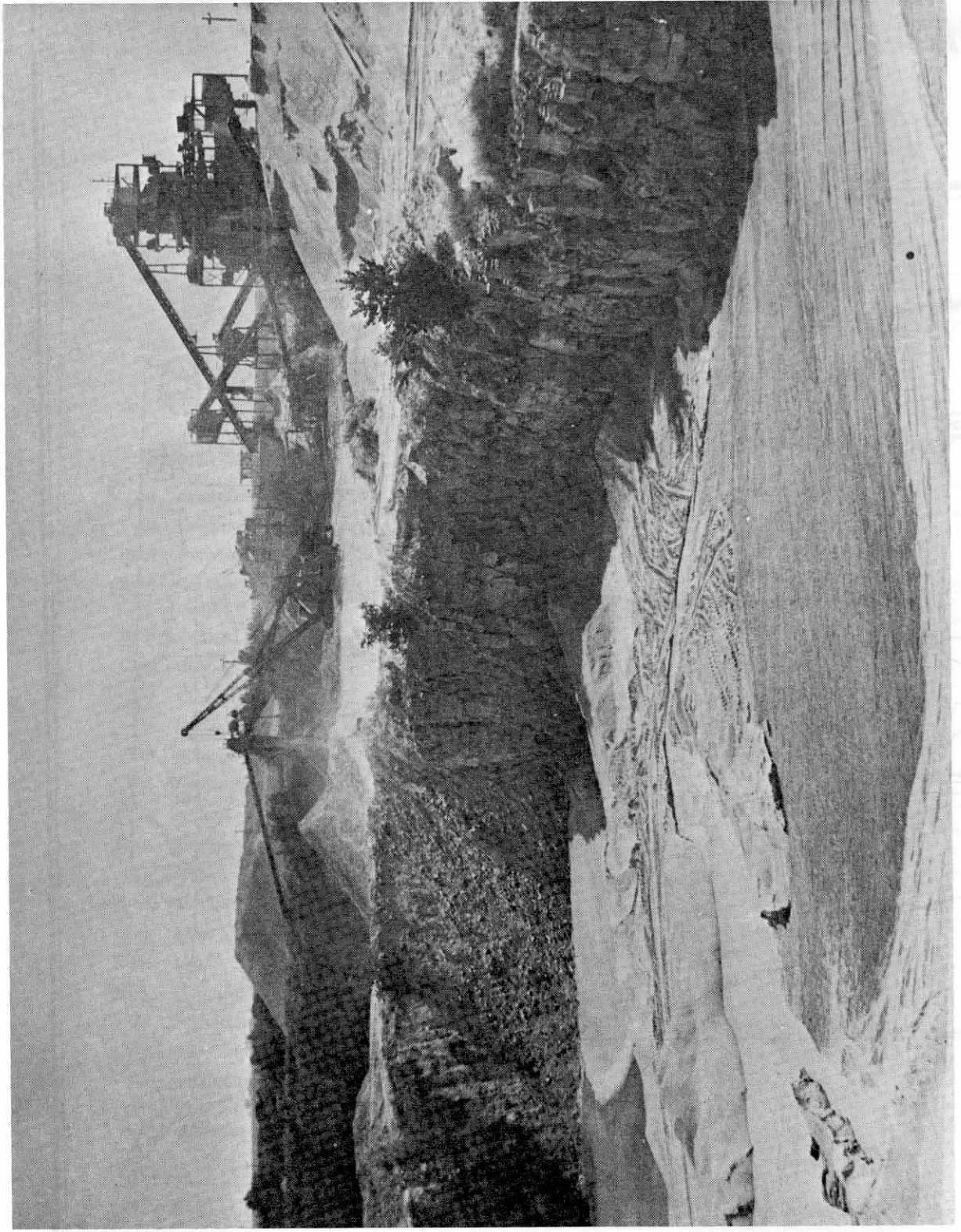


FIGURE 2. - Quartzite quarry, crusher and screening plant, Minnehaha County. (Courtesy, Sioux Falls Argus-Leader)

Oil production for 1978 is estimated by the South Dakota Geological Survey to be about 880,000 barrels valued at \$11.2 million from approximately 75 wells in 14 oilfields. This compares with 632,000 barrels from 69 wells in 13 fields in 1977. Natural gas, all produced as wellhead gas associated with oil, will amount to about 83 Mcf. All associated gas is used on location or is flared.

Approximately 95 percent of the oil and all of the gas produced in South Dakota is obtained from Harding County, where wells tap the Red River Dolomite of Ordovician age at depths ranging from 8,400 to 9,200 feet. The remaining oil is pumped from the Red River Formation in the Lantry field, Dewey County, at a depth of about 5,200 feet, and from the Minnelusa Formation of Pennsylvanian and Permian ages in the Barker Dome field, Custer County, at a depth of about 1,450 feet.

South Dakota's mineral industry is responsible for significant amounts of revenue accruing to the State. Table 4 shows income derived from mineral bonuses, royalties, rentals, and mineral taxes on fuels, metallic and non-metallic ores, and industrial minerals and rocks.

TABLE 4. - South Dakota's income from mineral bonuses, royalties, rentals, and taxes

	Fiscal year <sup>1</sup>		
	1976	1977	1978
Federal <sup>2</sup> .....	\$333,384	\$332,325	\$358,287
State.....	786,763	881,155	1,155,254
Ore tax.....	310,090	<sup>3</sup> 536,401	346,735
Energy mineral severance tax <sup>4</sup> .....	-	-	176,937
<b>Total.....</b>	<b>1,430,237</b>	<b>1,749,881</b>	<b>2,037,213</b>

<sup>1</sup>Based on July 1-June 30 fiscal year except for Federal fiscal years 1977 and 1978 of Oct. 1-Sept. 30.

<sup>2</sup>Mineral bonuses, royalties, and rentals paid to South Dakota under section 25 of the Mineral Leasing Act of February 25, 1920.

<sup>3</sup>South Dakota ore tax became effective July 1, 1976. Tax computed at 4 percent of the net profit on mineral operations extracting \$100,000 or more of minerals annually. Includes oil and gas tax prior to Jan. 1, 1978.

<sup>4</sup>Tax of 4-1/2 percent of gross value, effective January 1978.

#### TRENDS AND ISSUES

##### Federal Legislation and Hearings

During the 95th Congress, which adjourned its second session on October 15, 1978, a number of measures of particular interest to the mining industry of South Dakota were taken. The following is a partial summary of some of the actions taken in various subject areas and the Public Law (P.L.) that applies:

##### Coal Leasing

P.L. 95-544, Mineral Leasing Act Amendments, signed October 30, 1978--

Clarifies Interior Secretary's authority under Bureau of Land Management Organic Act to exchange Federal minerals for private minerals, and authority to sell Federal minerals under private land.

Authorizes boundary adjustments for tracts cornering or contiguous to existing leases without imposing production and royalty requirements of 1975 Coal Leasing Amendments Act.

Authorizes Interior Secretary to sell coal without issuance of competitive coal lease when removal is necessary and incident to right-of-way across Federal lands.

Repeals prohibition against employment of women in underground mines on Federal lands.

### Energy

P.L. 95-607, Uranium Mill Tailings Radiation Control Act of 1978, signed November 1978--

Establishes remedial action program for processing sites where all or substantially all uranium produced was sold to a Federal agency.

Directs the Environmental Protection Agency (EPA) Administrator to report on location and potential health, safety, and environmental hazards of uranium mine waste and make recommendations for program to eliminate such hazards.

Directs the Nuclear Regulatory Commission to require transfer of title to land used for disposal of mill tailings to the United States or the States upon termination of license.

Requires EPA to promulgate standards of general application for protection of public health and safety and environment from radiological and nonradiological hazards associated with residual radioactive material within 1 year.

P.L. 95-620, Powerplant and Industrial Fuel Use Act, signed November 9, 1978--

Enacted as part of National Energy Act, with purpose of increasing coal use in powerplant and major fuel-burning installations.

Provides that natural gas or oil may not be used as primary energy sources in new electric powerplants or in new major fuel-burning installations. Exceptions are provided based on economics, environmental limitations, etc.

For existing facilities, prevents powerplants from using natural gas after January 1, 1990, and major fuel-burning installations could be barred from using oil or natural gas if capability already exists to use coal.

Authorizes financial assistance to areas impacted by increased coal or uranium production. Aid is generally limited to areas with employment increase of more than 8 percent in calendar year.

Provides loans to assist powerplants in acquisition of pollution control equipment.

Directs President to conduct national coal policy study, including reserves, productive capacity, and research into production and utilization.

Authorizes additional funds to be used for rehabilitation and improvement of coal-hauling railroads.

#### Public Lands

P.L. 95-237, Endangered American Wilderness Act, signed January 31, 1978--

Adds 17 areas in 10 Western States totaling 1.3 million acres to National Wilderness Preservation System.

#### Safety and Health

P.L. 96-227, Excise Tax on Coal, signed February 10, 1978--

Establishes ad valorem taxes of 50 cents per ton on underground coal and 25 cents per ton on surface coal; tax does not apply to lignite. Revenues will finance Black Lung Trust Fund established pursuant to Black Lung Benefit Reform Act of 1977.

#### Wilderness and Wild and Scenic Rivers

P.L. 95-625, National Parks and Recreation Act of 1978, signed November 10, 1978--

Makes additions to Wild and Scenic Rivers System and National Preservation System. Increases development and acquisition ceiling for national monuments, seashores, historic sites, and national lakeshores. Part of the Missouri River in South Dakota was added into the wild and scenic rivers system.

During 1978, the U.S. Forest Service held a series of hearings and open houses in South Dakota to give the public opportunity to discuss with Forest Service officials the RARE II (Roadless Area Review and Evaluation II) program involving potential wilderness designation for areas in the Black Hills and national grasslands, and to review draft environmental impact statements outlining some of the alternatives being considered. Five areas totaling approximately 59,000 acres were inventoried in 1977 for possible inclusion into the system. Two of these areas are now receiving prime consideration for wilderness in the Black Hills of South Dakota. They consist of Norbeck with 9,400 acres in the Harney Peak area and Beaver Park with 5,000 acres near Sturgis. The impact statement recognizes that critical minerals would be impacted in the Norbeck area but indicates that the alternative that appears to be most desirable to the public in the State is designating Norbeck as wilderness and all other areas as nonwilderness.

#### Federal Programs

Agencies of the Federal Government (including the Bureau of Mines, Geological Survey, Bureau of Land Management, Mine Safety and Health Administration,

Forest Service, Environmental Protection Agency, and others) conducted a wide range of programs affiliated with mining and mineral resource matters in the State.

The Bureau of Mines, through its State Liaison Offices in Rapid City and in Bismarck, N. Dak., continued to provide technical assistance and mineral research and resource information. Mining and metallurgical research and mineral-resource-related projects were conducted for the Bureau of Mines at the South Dakota School of Mines and Technology under funding grants made available by the Bureau.

The Water Resources Division of the Geological Survey was engaged in over a dozen water resource investigation projects in South Dakota during the year. Two of the projects involve studies of the major aquifers within the High Plains and the Northern Great Plains part of the State. New withdrawals of water from these aquifers for existing and proposed mining and industrial facilities are expected to exceed 100,000 acre-feet per year within 5 years. Some concerned persons, including public officials, fear that the aquifers are incapable of supporting a sustained yield of that magnitude and that severe damage may result to other water users in the region. The studies are therefore designed to delineate the magnitude and distribution (both in space and time) of the water resources in the aquifers and to determine the response to proposed water withdrawals.

In late 1978, the Geological Survey, in cooperation with the South Dakota Department of Natural Resources, began a project to inventory water use throughout the State.

#### State Legislation and Hearings

The 1978 session of the South Dakota Legislature convened on January 3 and adjourned on February 25, following a scheduled 10-day recess to allow the Governor to act on measures and to provide the legislature an opportunity to consider vetoed bills.

Of the 372 measures enacted into law, the following affect the mineral industry:

H.B. 1007, Severance Tax and Distribution: Increases severance tax on energy minerals from 3 percent to 4.5 percent of gross value with two-thirds of revenue going to counties of origin with a limit of \$300,000 to each county, and one-third to the State until January 1980; and one-half to each thereafter. Law effective immediately.

S.B. 96, Surface Mining Mineral Exploration and Capping: Provides additional standards for surface mining and exploration. Includes seismic holes in the definition of exploration drilling and requires a performance bond on all holes for exploration purposes. Transfers the administration and enforcement responsibility for mineral exploration, except oil and gas, from the Department of Natural Resource Development to the Department of Agriculture, Division of Conservation.

The State Conservation Commission hearings held in late 1978 considered the amending or adoption of certain rules concerning mining and mineral exploration reclamation. The purpose of the amendments and the new rules is to implement Senate Bill 96, which became effective July 1, 1978, and to improve the existing surface mined land reclamation standards.

S.B. 160, an act to Regulate Prospecting on State Lands: Sets up new rules for mineral exploration on State lands, including lands in which the State has a mineral interest.

During the year public hearings were held on a variety of subjects of interest to the mineral industry of the State. Topics covered included mineral land leasing, exploration and reclamation permits, air and water quality standards, oil and gas field designation and spacing, water appropriations, and others.

#### State Programs

The South Dakota Geological Survey is continuing basic research projects involving mineral and water resources of the State.

County ground water and mineral resource studies are being carried out on a continuing basis. These studies are done in cooperation with the U.S. Geological Survey, the County Commissioners, and the Conservancy Subdistricts. Typically, a county study presents the details of sand and gravel deposits in the area, as well as the thickness, distribution, and character of the deposits.

Collection of basic data on geothermal and oil and gas resources takes place on a continuing basis, although no specific projects were underway at yearend.

State Survey geologists took part in a project to evaluate the uranium resources of the Lemmon 1° x 2° quadrangle, being carried out during the year. The project is sponsored by the U.S. Department of Energy and is part of its National Uranium Resource Evaluation (NURE) program. State participation in this program may increase in the future. A side benefit of the project is the collection of basic data on ground water in the area being studied.

Information on mineral and water resources is available upon request by letter or telephone or on a walk-in basis from the offices of the State Geological Survey in both Vermillion and Rapid City. A large part of the Survey's work is answering requests for information from the general public and from State and Federal agencies.



## NEW PUBLICATIONS

1. Aase, J. H., and P. A. LaTour. The Mineral Industry of South Dakota. Preprint of chapter from the 1976 Bureau of Mines Minerals Yearbook, 1978, 9 pp. (Free).
2. Poth, L. A., and E. Hoskins. The Economic Impact of the Mineral Industry of South Dakota. Business Research Bureau, Univ. S. Dak., Bull. 126, 1978, 135 pp. (Free).
3. Steece, F. V. Deadwood Formation in the Williston Basin, South Dakota. Mont. Geol. Soc. Williston Basin Symp., 1978, pp. 63-69 (Free).

## SOURCES

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Publication Distribution Branch  
Bureau of Mines  
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### Reference 2

Business Research Bureau  
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### Reference 3

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