The MINERAL INDUSTRY OF SOUTH DAKOTA in 1961

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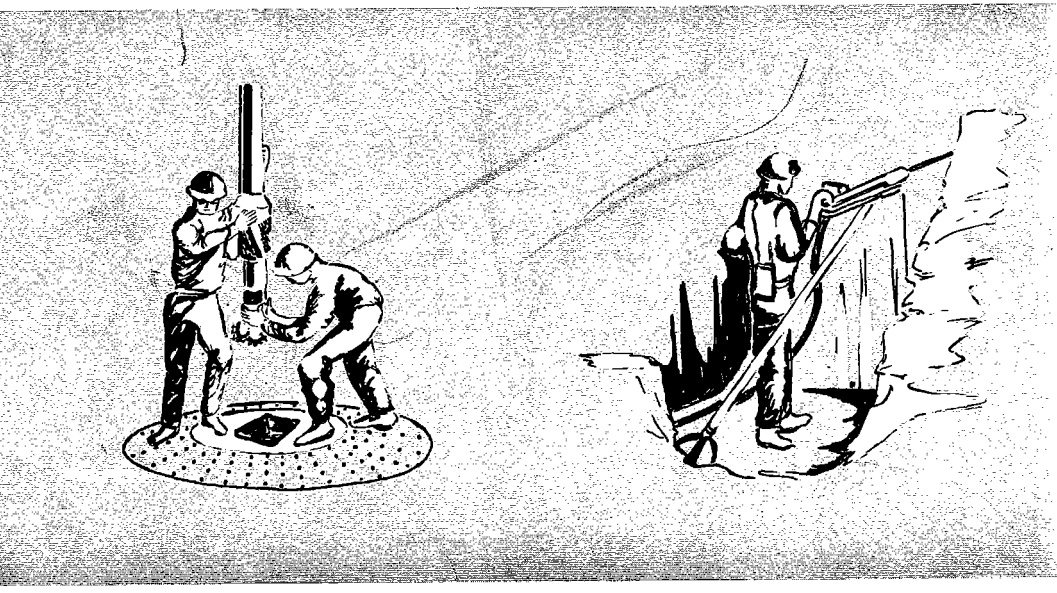

SOUTH DAKOTA Archie Gubbrud, Governor

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MINERALS REPORT 9

The Mineral Industry of South Dakota

This chapter has been prepared under a cooperative agreement for the collection of mineral data, except mineral fuels, between the Bureau of Mines, U.S. Department of the Interior, and the South Dakota State Geological Survey.

By Carl L. Bieniewski [1] and Allen F. Agnew [2]

THE DOWNWARD trend in the total value of mineral production in South Dakota that started in 1960 continued in 1961. The value of production, $43 million, was 8 percent below that of 1960. One commodity, gold, from the Homestake mine which again was the Nation's leading gold producer, accounted for nearly one-half of the State's mineral value. Sand and gravel, cement, and stone also were

TABLE 1.—Mineral production in South Dakota [1]

Mineral	1960		1961	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Beryllium concentrate---short tons, gross weight	167	$88	238	$130
Clays [2]---thousand short tons	202	202	249	249
Coal (lignite)---do	20	83	18	75
Copper (recoverable content of ores, etc.)---short tons	1	1		
Feldspar---long tons	45,588	292	29,354	186
Gem stones	(3)	20	(3)	18
Gold (recoverable content of ores, etc.)---troy ounces	554,771	19,417	557,855	19,525
Gypsum---thousand short tons	22	89	22	89
Iron ore (usable)---thousand long tons, gross weight	(4)	(4)	22	100
Lead (recoverable content of ores, etc.)---short tons			(5)	(6)
Mica: Scrap---do	205	10	1,054	32
Sheet---pounds	30,887	145	18,086	37
Petroleum (crude)---thousand 42-gallon barrels	281	(4)	7 234	(4)
Sand and gravel---thousand short tons	13,548	9,359	11,324	7,336
Silver (recoverable content of ores, etc.) thousand troy ounces	108	98	127	118
Stone---thousand short tons	3,149	7,909	2,806	6,642
Uranium ore---short tons	41,104	586	43,588	495
Value of items that cannot be disclosed: Cement, clays (bentonite), lime, lithium minerals (1960), vanadium, and values indicated by footnote 4		9,376		8,978
Total South Dakota [3]		46,780		42,980

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2] Excludes bentonite; included with "Value of items that cannot be disclosed."
[3] Weight not recorded.
[4] Figure withheld to avoid disclosing individual company confidential data.
[5] Less than one-half ton.
[6] Less than $500.
[7] Preliminary figure.
Total adjusted to eliminate duplicating value of raw materials used in manufacturing cement and lime.

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large contributors; however, sand and gravel and stone production fell substantially below their 1960 output. Nonmetals accounted for $21.9 million, or 51 percent, of the total value, metals for $20.5 million, or 48 percent, and fuels for $0.6 million, or 1 percent, compared with the 1960 percentages of 55, 43, and 2 percent, respectively. Lawrence and Pennington Counties, in the western part of the State, produced about three-quarters of the value. Mineral production was reported from 62 of the State's 67 counties.

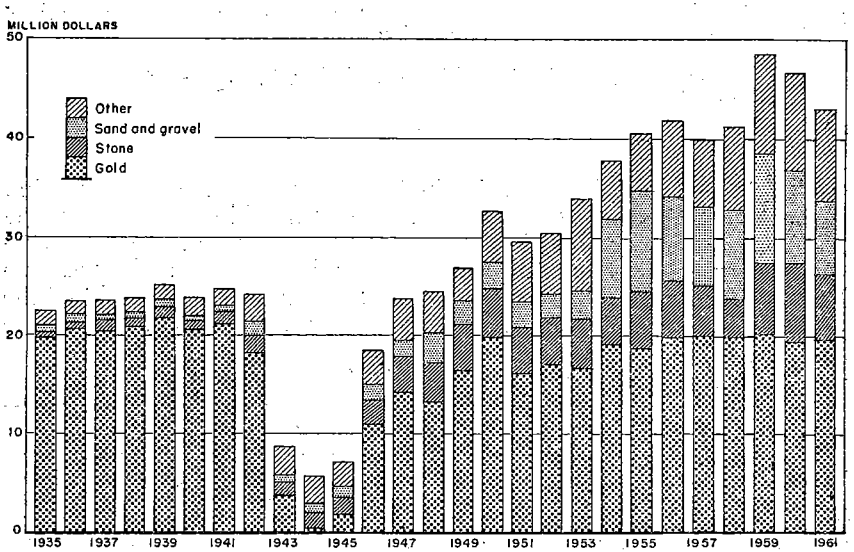

FIGURE 1.—Value of gold, dimension and crushed stone, sand and gravel, and total value of mineral production in South Dakota, 1935–61.

Employment and Injuries.—Final data for 1960 and preliminary data for 1961 compiled by the Bureau of Mines for employment and injuries in the South Dakota mineral industries, excluding the petroleum industry, are shown in table 2.

Government Programs.—The General Services Administration (GSA) continued to purchase domestic mica and beryl throughout the year at the Custer depot. The programs under which these commodities were purchased were scheduled to terminate June 30, 1962. No Office of Mineral Exploration (OME) contracts were issued during the year. The OME contract with the Lithium Corporation of America, signed in 1960, was terminated in June 1961 by mutual agreement. Metallurgical research on South Dakota minerals, conducted by the Federal Bureau of Mines at Rapid City, was transferred to the Bureau's Salt Lake City Metallurgy Research Center. The Office of Saline Waters (OSW) constructed a water desalination plant at Webster capable of converting 250,000 gallons per day of brackish water to fresh water. This was the second plant to be completed of five such plants that were to be built by OSW in the United States.

TABLE 2.—Employment and injuries in the mineral industries [1]

Industry	Number of operations [2]	Average number of men employed	Total man-hours worked	Injuries		Frequency rate (injuries per million man-hours)
				Fatal	Nonfatal	
1960:						
Metal mines and mills (excluding uranium)	55	1,788	4,299,522	2	68	16.3
Uranium mines and mills	44	123	151,964		5	32.9
Nonmetal mines and mills (other than sand and gravel and stone)	90	209	292,628	1	8	30.8
Stone quarries and plants	90	548	1,205,845	1	20	17.4
Sand and gravel plants	190	1,248	1,718,711	1	35	20.9
Coal mines	1	9	16,000			
Total	470	3,925	7,684,670	5	136	18.3
1961: [3]						
Metal mines and mills (excluding uranium)	55	1,831	4,403,145	1	57	13.2
Uranium mines and mills	23	104	204,216		10	49.0
Nonmetal mines and mills (other than sand and gravel and stone)	85	213	304,204	1	5	19.7
Stone quarries and plants	76	556	1,074,406		20	18.6
Sand and gravel plants	209	1,496	1,960,180		12	6.1
Coal mines	2	9	13,442			
Total	450	4,209	7,959,593	2	104	13.3

[1] Excludes petroleum.
[2] Each mine and mill counted.
[3] Preliminary figures.

Construction continued throughout the year at the Pathfinder atomic power plant, a cooperative project of the Atomic Energy Commission (AEC) and Northern States Power Co. The plant, near Sioux Falls, was expected to be completed early in 1962 and, according to AEC, initial criticality of the 62,000-kw reactor should be attained by September 1962.

REVIEW BY MINERAL COMMODITIES

NONMETALS

Cement.—Cement sales of the State-owned plant at Rapid City, which is the only cement plant in South Dakota, increased 12 percent in quantity and 4 percent in value over that of 1960. Under South Dakota law the money received from cement sales is earmarked for construction and maintenance of State, county, and municipal roads.

Portland cement shipments represented 98 percent and masonry cement shipments 2 percent of the total cement sales. Prices of portland cement averaged $2.91 a barrel (376 pounds), compared with $3.14 in 1960. Masonry cement sold for $3.89 a barrel (376 pounds), the same price as in 1960.

Shipments of portland cement outside of South Dakota were made to Colorado, Iowa, Minnesota, Montana, Nebraska, North Dakota, and Wyoming. Masonry cement was shipped to all these States except Colorado and Iowa. Seventeen new sales outlets were established in Minnesota, Nebraska, and Colorado for selling portland and masonry cements produced at the State-owned cement plant. The South Da-

kota Cement Commission signed a 1-year option on 160 acres of land outside Wolsey, at the intersection of the Milwaukee and Northwestern railroad lines, for possible development into a cement distribution center for the eastern part of the State.

Clays.—The quantity of miscellaneous clay used during the year increased 23 percent over 1960. About one-half of the clay was used for manufacturing cement at the South Dakota cement plant. Other main uses included lightweight aggregate and building brick. Bentonite production was far below the 1960 figure. Only a small quantity was mined from a State lease in Butte County. The main uses for bentonite were in rotary drilling mud and refractories.

Feldspar.—Quantity and value of crude feldspar output dropped 36 percent below that of 1960. Reduced demand for South Dakota ground feldspar by eastern manufacturers of glass, enamel, insulation, brick, and tile caused the decrease. Increases of ground feldspar used in making pottery and porcelain were not enough to offset the reduction.

Crude feldspar was mined at 56 mines, compared with 72 in 1960. Only potash feldspar was obtained from these operations. Mines producing over 1,000 long tons of crude feldspar were the Abingdon Feldspar mines, Albino No. 1, St. Louis, Shamrock, and Tip Top. Nearly all the mined feldspar was purchased by International Minerals & Chemical Corp. (IMC) for its grinding plant at Custer.

Gem Stones.—The value of gem stones produced decreased 10 percent below that of 1960. Gem stones were reportedly found in sizable quantities in Custer, Fall River, Lawrence, Pennington, and Shannon Counties. Agate, chalcedony, and rose quartz were the leading gem materials.

Gypsum.—Although output from the only gypsum producer, the South Dakota cement plant, was the same as in 1960, the quantity of gypsum consumed increased 30 percent. This resulted in a reduction of the stockpile at the cement plant in Rapid City. Gypsum was used as a portland cement retarder.

Lime.—Quicklime produced by Black Hills Lime Co., at a plant near Pringle, was sold for metallurgical use. Utah-Idaho Sugar Co. produced quicklime at its Belle Fourche sugar plant for use in making sugar.

Lithium.—The Etta mine, the State's principal source of lithium in 1960, was purchased in January 1961 by Corde Clifford from Maywood Chemical Works, Division of Stepan Chemical Co. The mine was inactive during 1961, for the first time in 50 years. A small quantity of lithium, obtained as a byproduct from some pegmatite mining operations, was stockpiled for future sale.

Mica.—Block mica recovered from hand-cobbed mica decreased 77 percent in quantity and 74 percent in value below that of 1960. The hand-cobbed mica was sold to GSA at the Custer purchasing depot. A private contractor processed the hand-cobbed mica and the resulting block mica was placed in Government inventories. Government purchases of domestic mica were scheduled to terminate June 30, 1962.

TABLE 3.—Production of hand-cobbed mica and yield of sheet mica

Year	Hand-cobbed mica	Total block mica recovered		Stained quality recovered		Good-stained and better quality recovered	
	Pounds	Pounds	Percent of hand-cobbed	Pounds	Percent of total block	Pounds	Percent of total block
1957	149,163	9,048	6.07	4,828	53.36	255	2.82
1958	257,198	16,681	6.49	9,552	57.26	471	2.82
1959	365,712	38,734	10.59	20,079	51.84	631	1.55
1960	286,043	30,887	10.80	18,662	60.42	461	1.49
1961	83,381	7,086	8.50	4,994	70.48	214	3.02

One operator sold punch and washer mica to an eastern fabricator of block mica. Scrap mica produced from two mines was sent to grinding plants in California and Illinois. Production of hand-cobbed mica declined sharply, and only 29 percent of the 1960 quantity was obtained in 1961. The number of mines operated continued to decline; only 20 mines were active, compared with 38 in 1960. Leading producers of crude mica were Homestead Mining Co., Michael Kennedy, and Carl Roseberry.

TABLE 4.—Mica sold or used by producers

	1957	1958	1959	1960	1961
Hand-cobbed mica, total:[1] pounds	149,163	257,198	365,712	286,043	83,381
Sheet mica:					
Full-trimmed:					
Pounds	45	94	41		
Value	$756	$1,393	$593		
Average per pound	$16.80	$14.82	$14.46		
Punch and washer:[2]					
Pounds					11,000
Value					$300
Average per pound					$.03
From hand-cobbed mica:[1]					
Pounds	9,048	16,678	38,734	30,887	7,086
Value	$44,751	$66,489	$157,234	$145,154	$37,040
Average per pound	$4.95	$3.99	$4.06	$4.70	$5.23
Total:					
Pounds	9,093	16,772	38,775	30,887	18,086
Value	$45,507	$67,882	$157,827	$145,154	$37,340
Average per pound	$5.00	$4.05	$4.07	$4.70	$2.06
Scrap mica:					
Short tons	1,626	1,003	158	205	1,054
Value	$43,142	$24,241	$4,916	$9,748	$32,122
Average per ton	$26.53	$24.17	$31.11	$47.55	$30.48
Total sheet and scrap mica:					
Short tons	1,631	1,011	177	220	1,063
Value	$88,649	$92,123	$162,743	$154,902	$69,462

[1] Sold to the Government through GSA.
[2] Sold to industry.

Sand and Gravel.—No sand and gravel production was reported for 6 of the 67 counties. Sand and gravel output continued the decline started in 1960. Production was 2.2 million tons, or 16 percent below that of 1960. Road construction in 1961, the largest use for sand and gravel, was considerably less than that of 1960. The U.S. Bureau of Public Roads [3] reported that of the 679 miles of the Interstate high-

[3] Bureau of Public Roads, Quarterly Report on the Federal-Aid Highway Program, Dec. 31, 1961. Press release BPR 62–4, Feb. 7, 1962.

way designated for South Dakota, 168 miles was open to traffic, 254 miles was underway (either in the construction, engineering, or right-of-way phase), and 256 miles was to be started. A total of 52 miles of new road of the Interstate System was opened to traffic in 1961. A comparable figure for 1960 was not available because the Bureau of Public Roads changed its method of reporting progress for the Interstate System in 1960. Under the Federal-Aid Primary and Secondary (ABC) highway system, 669 miles was completed in 1961, and 276 miles was under construction at the end of the year; in 1960 these figures were 1,138 and 445, respectively.

TABLE 5.—Sand and gravel sold or used by producers, by classes of operations and uses

(Thousand short tons and thousand dollars)

Class of operation and use	1960		1961	
	Quantity	Value	Quantity	Value
Commercial operations:				
Sand:				
Building	572	$689	502	$583
Paving	212	195	255	220
Railroad ballast	(1)	(1)	(1)	(1)
Fill	9	12	13	7
Molding	4	16	(1)	(1)
Blast			(1)	(1)
Oil (hydrafrac)	3	21	(1)	(1)
Other	71	78	17	53
Total sand	871	1,011	787	863
Construction gravel:				
Building	96	120	109	160
Paving	1,581	947	2,961	1,813
Railroad ballast	176	126	62	59
Fill	34	12	97	49
Other	123	94	20	22
Miscellaneous gravel	418	217	89	74
Total gravel	2,428	1,516	3,338	2,177
Total sand and gravel	3,299	2,527	4,125	3,040
Government-and-contractor operations:				
Sand:				
Building	2	1	125	88
Paving	520	343	594	494
Total sand	522	344	719	582
Gravel:				
Building	132	138		
Paving	9,595	6,350	6,480	3,714
Total gravel	9,727	6,488	6,480	3,714
Total sand and gravel	10,249	6,832	7,199	4,296
All operations:				
Sand	1,393	1,355	1,506	1,445
Gravel	12,155	8,004	9,818	5,891
Grand total	13,548	9,359	11,324	7,336

[1] Figure withheld to avoid disclosing individual company confidential data; included with "Other."

Other substantial consumers of sand and gravel were the Oahe, Fort Randall, and Big Bend dam construction projects and the Intercontinental Ballistics Missile installations (Titan and Minuteman) in the western part of the State. Silica sand, produced by Black Hills Silica Sand Co. from its operation near Hill City, was used in the hydrafrac process for recovering oil and gas, for foundry moldings, and for sand blasting. Twelve sand and gravel operators produced more than 100,000 tons, each, but none exceeded 500,000 tons. The six leading producers were Western Contracting Corp., Dave Gustafson & Co., Inc., G. H. Lindekugel & Sons, Inc., Highway Construction Co., Concrete Materials Co., and Rounds Construction Co.

Stone.—Overall stone production was 11 percent in quantity and 16 percent in value below that of 1960, mainly because of a decrease of about 200,000 tons of crushed limestone for use in road construction. The principal uses for limestone were road construction and cement manufacture, which accounted for 55 percent and 42 percent of the total limestone production, respectively. Limestone also was used for riprap, railroad ballast, and lime manufacture.

Granite was prepared and marketed as dimension and crushed stone. Dimension granite in rough and dressed blocks was used for architectural and monumental purposes; crushed granite was used for riprap and aggregate. All of the miscellaneous stone produced was used for the Oahe dam project as riprap, spalls, and filter blanket. Crushed sandstone was used as refractory stone, riprap, railroad ballast, filler, roofing and decorative gravel, and base material in road construction. Producers with outputs of crushed stone exceeding 100,000 tons were L. G. Everist, Inc., South Dakota Cement Commission, Concrete Materials Co., Hills Material Co., Spencer Quarries, Inc., Missouri Basin Construction Co., and Pete Lien & Sons.

METALS

Beryllium.—South Dakota was the Nation's leading producer of hand-cobbed beryl. Although only 65 mines operated in 1961, compared with 71 in 1960, the quantity of beryl sold was 43 percent greater. The quantity sold from individual properties, all in Custer or Pennington Counties, ranged from 11 pounds to over 130,000 pounds. The beryllium oxide (BeO) content of the beryl marketed averaged 11.0 percent.

Output of beryl from each of two properties, operated by Hough & Judson, exceeded 100,000 pounds. Before 1961, no single South Dakota property had produced 100,000 pounds in 1 year. Operators who produced and sold more than 10,000 pounds of beryl were Peerless Minerals, Inc., Bland Mining & Milling Co., Walter Clifford, Double R Mines, Fred Tubbs, and Leonard E. Wood. Gladys Wells purchased some beryl for resale to consumers; however, the main outlet was GSA, which bought beryl for the national (strategic) stockpile under the Government purchase program for domestically produced beryl ores. This program was scheduled to terminate June 30, 1962. Research and development for concentrating low-grade beryl ores was conducted throughout the year at the Northwest Defense Minerals, Inc., mill at Keystone.

Gold and Silver.—Gold alone accounted for 45 percent of South Dakota's mineral production value. All recovered gold and virtually all the recovered silver came from the Homestake Mining Co. operation at Lead. The value of the bullion recovered by Homestake was $126,-

000 more than in 1960. According to the company annual report, 1.78 million tons of ore with an average grade of $11.31 per ton was mined and delivered to the mill. This tonnage surpassed the 1960 production of nearly 1.77 million tons, which had been the highest production in the operation's history. The Homestake mine again was the Nation's leading gold producer. The only other production of silver during 1961 was from the Silver Queen mine near Deadwood, operated by Hage Bros., Inc.

TABLE 6.—Mine production of gold, silver, copper, lead, and zinc, in terms of recoverable metals[1]

Year	Mines producing		Material sold or treated[2] (thousand short tons)	Gold (lode and placer)		Silver (lode and placer)		Total value (thousands)
	Lode	Placer		Troy ounces	Value (thousands)	Troy ounces (thousands)	Value (thousands)	
1952–56 (average)	4	--	1,563	531,471	$18,601	142	$129	[3] $18,731
1957	2	--	1,779	568,130	19,885	135	122	20,007
1958	3	--	1,824	570,830	19,979	153	138	20,117
1959	2	--	1,778	577,730	20,221	124	113	20,334
1960	2	--	1,767	554,771	19,417	108	98	[4] 19,515
1961	2	--	1,781	557,855	19,525	127	118	[5] 19,643
1876–1961	--	--	(6)	28,808,762	789,904	11,645	8,675	[7] 798,744

[1] Includes recoverable metal content of gravel washed (placer operations), ore milled, old tailings or slimes retreated, and ore or old tailings shipped directly to smelters during the calendar year indicated.
[2] Does not include gravel washed.
[3] Includes 12 short tons of lead valued at $3,264.
[4] Includes 1 ton of copper valued at $642.
[5] Includes less than one-half ton of lead valued at $52.
[6] Data not available.
[7] Includes 107 short tons of copper valued at $37,108, 497 tons of lead valued at $71,804, and 265 tons of zinc valued at $56,406.

Iron Ore.—Iron ore, mined by Pete Lien & Sons near Rochford in Pennington County, was purchased by the South Dakota Cement Commission under its stockpiling program, for use in manufacturing cement at Rapid City.

Lead.—Hage Bros., Inc., shipped a small quantity of lead-bearing silver ore from the Silver Queen mine near Deadwood to the American Smelting and Refining Co. lead smelter at East Helena, Mont. This was the first year since 1953 that lead was recovered from a South Dakota ore. Activity at the mine consisted of driving exploratory and development drifts.

Uranium ore.—Uranium ore production was 6 percent higher than that of 1960; however, the value was 16 percent lower because the mined ore averaged 0.17 percent U_3O_8 ($11.56 per ton), compared with 0.19 percent U_3O_8 ($14.44) in 1960. Shippers of uranium ore during the year were Black Hills Uranium Co., Walter L. McKenna, Susquehanna-Western, Inc., Chase Mining Co., Bettenhausen & Wheeler, Chord Uranium Co., F. J. & F. Albright, Emmett Isaacs, Giant Cycle Corp., and Rosenland & Cleghorn.

Mines Development, Inc., a subsidiary of Susquehanna-Western, Inc., completed its 5th year of uranium milling at Edgemont. The company and AEC agreed on terms for a new milling contract extending through 1966. Mill capacity was increased as of September 1, 1961, under authorization by AEC pending approval of the new contract, which was still unsigned at yearend.

Vanadium.—The vanadium circuit installed at the Mines Development, Inc., uranium mill in 1960 was operated throughout the year to recover vanadium contained in uranium ores from South Dakota and Wyoming. The South Dakota uranium ores which contained vanadium averaged 0.153 percent V_2O_5 (3.1 pounds vanadium oxide per ton).

MINERAL FUELS

Coal (Lignite).—Output of coal (lignite) declined for the second consecutive year, as production was 10 percent below that of 1960. All production attributed to the State came from a strip mine operated by Dewey County Coal Co. Small quantities (less than 1,000 tons) not included in the State total were mined from properties in Corson, Harding, and Perkins Counties.

Petroleum.—Petroleum (crude) production decreased 47,000 barrels, or 17 percent, below that of 1960, thereby reversing the past upward trend. Except for a small quantity produced by 1 well in the Barker Dome field, the production was obtained from 19 wells in the Buffalo field.

According to State reports, the four exploratory wells drilled and completed during the year were dry. One exploratory well started in December 1961 was down 4,492 feet and was still not drilled out at yearend. One old well was deepened 30 feet for development.

REVIEW BY COUNTIES

Table 7 shows the value of mineral production by counties. Only those counties with significant production are discussed in this review.

Butte.—Value of mineral production was one-half that of 1960. This decline of over $500,000 dropped the county from fifth to sixth place. Fire clay, mined in the county and processed by Black Hills Clay Products Co. at its Belle Fourche plant, was used for brick and tile. A small quantity of bentonite was mined by American Colloid Co. from a State lease within the county, but the bulk of bentonite processed at the company Belle Fourche plant came from Crook County, Wyo. IMC processed only bentonite from its operations in Crook County, Wyo., at its Belle Fourche plant. Processed bentonite from the two plants was mainly used in refractories, rotary drilling mud, and in pelletizing other materials. Utah-Idaho Sugar Co. made quicklime from purchased limestone at its Belle Fourche sugar plant. Stone and sand and gravel was produced for the State and county highway departments for road construction and maintenance.

Custer.—Value of mineral production was 1 percent less than in 1960. The county ranked fifth in value of mineral production.

TABLE 7.—Value of mineral production in South Dakota, by counties[1]

County	1960	1961[2]	Minerals produced in 1961 in order of value
Aurora	$208,190	$32,345	Sand and gravel, stone.
Beadle	146,552	76,380	Do.
Bennett	(3)		
Bon Homme	217,400	110,200	Sand and gravel.
Brookings	391,483	377,463	Sand and gravel, stone.
Brown	658,902	207,300	Sand and gravel.
Brule	99,196	62,709	Sand and gravel, stone.
Buffalo	73,210	28,700	Sand and gravel.
Butte	1,297,862	648,557	Clays, sand and gravel, lime, stone.
Campbell	(3)	31,700	Sand and gravel.
Charles Mix	348,800	139,038	Sand and gravel, stone.
Clark	454,200	77,877	Do.
Clay	34,900	38,800	Sand and gravel.
Codington	471,061	276,402	Sand and gravel, stone.
Corson	39,534	(3)	Sand and gravel.
Custer[4]	685,214	677,232	Uranium ore, feldspar, sand and gravel, beryllium concentrate, lime, mica (sheet), stone, gem stones, petroleum.
Davison	127,942	176,298	Sand and gravel, stone.
Day	378,900	71,861	Do.
Deuel	91,100	11,066	Do.
Dewey	167,584	95,047	Coal, sand and gravel, stone.
Douglas	289,000	141,683	Sand and gravel, stone.
Edmunds	42,000	76,776	Do.
Fall River[4]	642,825	317,340	Uranium ore, sand and gravel, stone, gem stones.
Faulk	121,100	103,000	Sand and gravel.
Grant	3,004,488	2,865,574	Stone, sand and gravel.
Gregory	242,322	100,853	Sand and gravel, stone.
Haakon	169,777	71,100	Sand and gravel.
Hamlin	7,959	14,028	Sand and gravel, stone.
Hand	22,277	56,900	Sand and gravel.
Hanson	500,152	(3)	Stone.
Harding	4 800,346	577,884	Petroleum, sand and gravel.
Hughes	420,990	256,793	Stone, sand and gravel.
Hutchinson	148,800	73,291	Sand and gravel, stone.
Hyde	2,549	25,200	Sand and gravel.
Jackson	46,625		
Jerauld	51,900	65,580	Sand and gravel, stone.
Jones	5,390	14,500	Sand and gravel.
Kingsbury	110,202	74,876	Sand and gravel, stone.
Lake	285,120	117,800	Sand and gravel.
Lawrence	19,609,878	19,747,169	Gold, silver, stone, sand and gravel, gem stones, lead.
Lincoln	355,940	634,190	Sand and gravel, stone.
Lyman	66,573	22,709	Do.
Marshall	258,115	39,562	Do.
McCook	39,285	84,715	Do.
McPherson	163,000	32,400	Sand and gravel.
Meade	156,151	165,665	Stone, sand and gravel.
Mellette	78,343	4,500	Sand and gravel.
Miner	54,181	41,100	Do.
Minnehaha	1,842,250	1,922,908	Stone, sand and gravel.
Moody	180,064	158,732	Sand and gravel, stone.
Pennington	10,555,075	11,014,262	Cement, stone, sand and gravel, clays, iron ore, gypsum, beryllium concentrate, mica (scrap), feldspar, mica (sheet), gem stones.
Perkins	21,818	35,964	Sand and gravel, stone.
Potter	7,939		
Roberts	242,063	80,200	Sand and gravel.
Sanborn		1,900	Do.
Shannon	10,144	14,850	Sand and gravel, gem stones.
Spink	144,370	79,015	Sand and gravel, stone.
Stanley	131,345	34,900	Sand and gravel.
Sully	22,400	47,600	Do.
Todd	4,544		
Tripp	31,118	86,509	Sand and gravel, stone.
Turner	228,115	188,400	Sand and gravel.
Union	236,653	418,200	Do.
Walworth	134,424	69,300	Do.
Yankton	164,800	56,800	Do.
Ziebach	12,375	30,401	Sand and gravel, stone.
Undistributed[5]	118,454	905,352	
Total[6]	46,780,000	42,980,000	

[1] Washabaugh is not listed because no production was reported.
[2] Value of petroleum is preliminary.
[3] Figure withheld to avoid disclosing individual company confidential data; included with "Undistributed."
[4] Excludes vanadium.
[5] Includes production of lithium minerals (1960), vanadium, some sand and gravel and gem stones that cannot be assigned to specific counties, and values indicated by footnote 3.
[6] Total adjusted to eliminate duplicating value of raw materials used in manufacturing cement and lime.

Of the 56 active feldspar mines in the State, 50 were in Custer County, and these accounted for 95 percent of the State feldspar production and value. Except for production from one operator, the feldspar went to the IMC grinding plant at Custer. Of the 20 operating mica mines in the State, 16 were in Custer County and accounted for 88 percent of the total value of sheet mica. All the hand-cobbed mica was purchased by GSA at the Custer purchasing depot, where the mica was processed by a private contractor. The resultant sheet mica was placed in the national stockpile. An eastern fabricator of block mica purchased some punch and washer grade mica from one producer. Limestone mined by Black Hills Lime Co. near Pringle was made into quicklime in two shaft kilns located at the mine site. The quicklime was sold for metallurgical use. Gem material, acquired by Allen's Minerals and Mining, W. L. Roberts, Scott Rose Quartz Co., and various individuals, accounted for 33 percent of the State's gem value. Production of sand and gravel increased 89 percent over that of 1960 because sand and gravel was used in building construction in addition to road construction.

Beryl output increased about 55 percent in both quantity and value over that of 1960. Although 44 of the 65 active mines in South Dakota were in Custer County, production from these mines accounted for only about one-third of the State's quantity and value of beryl. Uranium ore production was nearly triple that of 1960. Output from the county's four operations accounted for two-thirds of the State uranium ore production. Some vanadium contained in the uranium ore was recovered at the uranium mill at Edgemont.

For 6 months during 1961, oil was pumped from the county's only active oil well, in the Barker Dome field.

Fall River.—A sharp reduction in uranium ore production caused the county to drop out of the top ten producing counties; in 1960 it was rated ninth. Uranium ore production and the number of producing mines were both only about one-half those of 1960. Sand and gravel and stone production also were below the 1960 levels. About two-thirds of the sand and gravel output went into building; the remainder of the sand and gravel and all of the stone was used for road paving. Agate and uranium specimens were gathered by rock dealers and collectors.

Grant.—Grant County maintained its third position even though the value of mineral production was about $140,000 below that of 1960. Virtually all the county mineral value came from the sale of dimension granite blocks which were used as building and monumental stone. Granite was quarried for rough and dressed blocks at eight operations, compared with nine operations in 1960.

Harding.—Harding County dropped from fifth to eighth in mineral production value. A large part of the county value was due to oil production, which decreased 18 percent in value below that of 1960. The 19 wells which were producing in the Buffalo field at the end of 1960 pumped oil throughout 1961. There were no new producing wells. Four of the five exploratory wells started in 1961 were dry; the fifth was still not completed at yearend. The value of sand and gravel was only 12 percent of the 1960 value because of the small amount of road construction done during the year.

Lawrence.—The value of recovered gold, which accounted for 99 percent of the county's mineral production value, was more than enough to make the county number one in the State. All commodities produced in 1961 increased in both quantity and value, except gem stones, which decreased about 50 percent in value. Lead was a newcomer to the list of commodities produced in the county. The lead came from the Silver Queen mine near Deadwood, operated by Hage Bros., Inc.

TABLE 8.—Homestake mine ore milled, receipts, and dividends [1]

Year	Ore milled (thousand short tons)	Receipts for bullion product		Dividends (thousands)
		Total (thousands)	Per ton	
1957	1,660	$19,479	$11.74	$4,019
1958	1,725	19,611	11.37	4,019
1959	1,746	20,120	11.52	4,019
1960	1,767	19,465	11.02	4,021
1961	1,781	19,590	11.00	4,030

[1] From 1876 to 1961, inclusive, this mine yielded bullion and concentrates that brought a net return of $717.6 million and paid $214.9 million in dividends.

Homestake Mining Co. completed its 84th year of operating the Homestake mine at Lead. The Yates shaft marked its 20th year of hoisting gold ore in October 1961. Mill recovery of the gold contained in the ore was 97.28 percent, compared with 97.21 percent in 1960. The long-range ventilation program to provide cool air to all working levels was completed in 1961. Work was done throughout the year on the $1.5 million expansion program that was started in the late summer of 1960. This program consisted of developing the deeper levels for mining at 800 tons per day and enlarging the mill to handle the additional tonnage.

Lincoln.—Just over 1 million tons of sand and gravel and a few thousand tons of crushed stone were used for road construction. The sand and gravel production was about twice the 1960 quantity. The increase in sand and gravel production was due mainly to construction of a section of Interstate Highway 29 within the county. The value of the stone and sand and gravel output was enough to rank Lincoln County seventh in value of mineral production.

Minnehaha.—Minnehaha County ranked fourth in value of mineral production, the same position as in 1960. Sand and gravel production increased about one-third over 1960 whereas stone production decreased 4 percent. However, the changes in value almost offset each other. Most of the stone and sand and gravel went into road construction, which included parts of Interstate Highways 90 and 29 near Sioux Falls. Some stone was shipped by rail to the Oahe dam for use as riprap, filter blanket, and spalls.

Pennington.—The value of mineral production was one-quarter of the State total, and Pennington County was again second. The leading mineral product was cement. Stone production was 1.3 million tons, and sand and gravel production was 1.2 million tons. The

county was the leading producer of these two commodities. Road construction, especially for Interstate Highway 90, consumed the larger part of these two commodities. However, slightly more than 500,000 tons of limestone was used for manufacturing cement at the South Dakota cement plant at Rapid City. The South Dakota Cement Commission purchased 195 acres of limestone-bearing property adjacent to the cement plant for $600,000.

One-third of the 65 active beryl mines were in Pennington County and accounted for 67 percent of the State beryl production. Iron ore was mined by Pete Lien & Sons near Rochford. The South Dakota Cement Commission purchased the iron ore and stockpiled it at the cement plant for use as a raw material in cement manufacturing.

Williams Bros., a Tulsa, Okla., engineering firm, began a survey to determine the feasibility of an oil refinery in the Black Hawk area.

Union.—Because sand and gravel production was twice the 1960 quantity, the county ranked ninth. The increase in sand and gravel was due to paving a section of Interstate Highway 29 in the western end of the county.

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