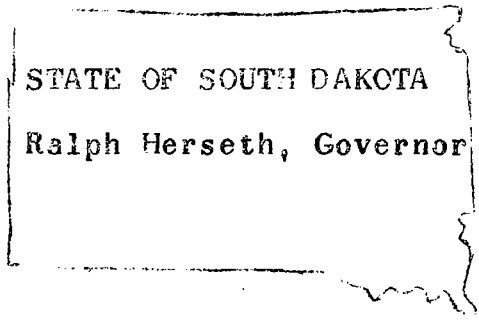


MINERALS REPORT 5

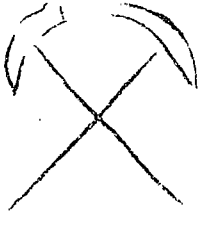
THE MINERAL INDUSTRY OF SOUTH DAKOTA IN 1958

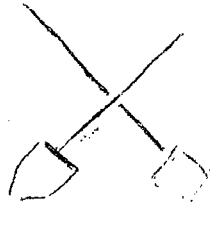
by

D.H. Mullen, U.S. Bureau of Mines
and
Allen F. Agnew, State Geologist

SOUTH DAKOTA GEOLOGICAL SURVEY
Vermillion, South Dakota

November 1, 1959





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 D. H. Mullen [1] and Allen F. Agnew [2]

MINERAL production from the mines, quarries, and wells of South Dakota in 1958 was valued at $41.5 million, a 4-percent rise above 1957, and approached the record total of 1956. Substantial gains were recorded in the value of production of columbium-tantalum concentrate and sheet mica and shipments of cement. The value of the output of silver, gem stones, sand and gravel, and petroleum advanced moderately, but the value of gold recovered was only slightly higher. Interest increased in petroleum, and one new field was discovered in Harding County.

Employment.—The mineral industries employed an average of 2,475 workers throughout the year, compared with 2,612 in 1957. Average weekly wage was $88.59 for an average workweek of 44.7 hours, compared with $85.70 for a workweek of 44.6 hours in 1957. The general and contract construction industry, which includes much of the output of sand and gravel and crushed stone used in road building and heavy construction, employed an average of 9,325 workers; average weekly wage was $109.61 and average workweek 42.3 hours. In 1957 the totals were 9,125, $95.21, and 42.7, respectively. The weekly wage included base pay, overtime, and night differentials but did not represent take-home pay or wage rates.

Legislation and Government Programs.—Sheet and hand-cobbed mica, beryllium concentrate (beryl), and columbium-tantalum concentrate were purchased by the Federal Government through the General Services Administration (GSA) buying station at Custer for the strategic stockpile. The hand-cobbed mica was processed at the station by a contractor operating for GSA. Beryllium and columbium-tantalum concentrates and the sheet mica recovered at the station were shipped to stockpiles.

The Office of Mineral Exploration (OME) was established within the Department of the Interior to replace the Defense Minerals Exploration Administration (DMEA). No contracts were approved during the year; DMEA contracts in force continued to be serviced.

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

Mineral	1957		1958	
	Short tons (unless otherwise stated)	Value (thousand)	Short tons (unless otherwise stated)	Value (thousand)
Beryllium concentrate—gross weight	268	$145	240	$129
Clays [2]—thousand short tons	176	176	155	155
Coal (lignite)—do.	21	79	20	78
Columbium-tantalum concentrate—pounds	2,311	6	4,294	10
Feldspar—long tons	41,316	267	23,229	145
Gem stones	(3)	15	(3)	16
Gold (recoverable content of ores, etc.)—troy ounces	568,130	19,885	570,830	19,979
Gypsum—thousand short tons	13	53	12	49
Mica:				
Scrap	1,626	43	1,003	24
Sheet—pounds	9,093	46	16,772	68
Sand and gravel—thousand short tons	14,758	8,001	14,705	9,179
Silver (recoverable content of ores, etc.) thousand troy ounces	135	122	153	138
Stone—thousand short tons	1,718	5,068	1,395	4,095
Uranium ore	69,800	760	35,489	530
Value of items that cannot be disclosed: Cement, clays (bentonite), iron ore (1957), lime, lithium minerals (1958), and petroleum		6,090		7,555
Total South Dakota [4]		[5] 39,997		41,534

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2] Excludes bentonite; value included with "Items that cannot be disclosed."
[3] Weight not recorded.
[4] Total has been adjusted to eliminate duplication in the value of raw materials used in manufacturing cement and lime.
[5] Revised figure.

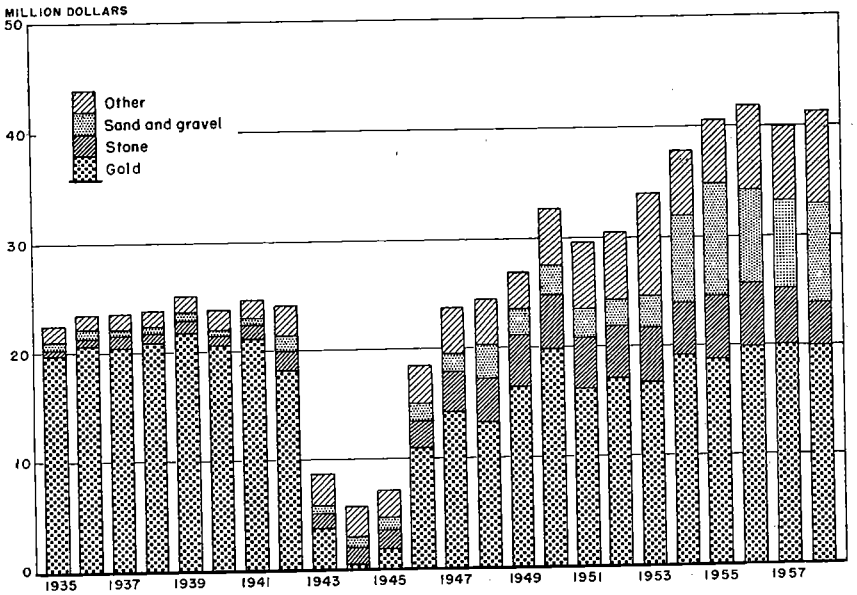

FIGURE 1.—Value of gold, dimension and crushed stone, sand and gravel, and total value of mineral production in South Dakota, 1935–58.

REVIEW BY COMMODITIES

METALS

Beryllium.—Beryllium concentrate (beryl) was produced hand-sorted in Custer and Pennington Counties as a coproduct of feldspar and mica mining. Output was 240 tons, 10 percent less than in 1957. The output was sold to the Government at the GSA purchase depot at Custer and to buyers who purchased small lots for resale to consumers.

Research on recovery of beryllium oxide from sintered products by leaching, fractional precipitation, and solvent extraction was continued at the Federal Bureau of Mines Experiment Station, Rapid City.

Columbium-Tantalum.—Columbium-tantalum concentrate was produced as a coproduct of mining feldspar and mica in Custer and Pennington Counties. The output was nearly double that of 1957. Except for a small quantity sold to a buyer for resale to consumers, the concentrate was sold to the Government (GSA) purchase depot at Custer.

Gold and Silver.—Gold and silver were produced at three mines in Lawrence County. Output of gold increased only slightly, whereas that of silver rose 13 percent over 1957. Homestake Mining Co. continued to be the Nation's leading gold producer.

Iron Ore.—The Colorado Fuel & Iron Corp. completed plans for extensive development of iron-ore deposits in the Black Hills, and planned a beneficiation plant.

TABLE 2.—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 (thousand)
	Lode	Placer		Troy ounces	Value (thousand)	Troy ounces (thousand)	Value (thousand)	
1949–53 (average)	4	1	1,318	501,654	$17,558	132	$120	[3] $17,684
1954	2		1,601	541,445	18,951	151	137	19,088
1955	2		1,665	529,865	18,545	154	140	18,685
1956	2		1,743	568,523	19,898	136	123	20,021
1957	2		1,779	568,130	19,885	135	122	20,007
1958	3		1,824	570,830	19,979	153	138	20,118
1876–1958			(4)	27,118,406	730,741	11,286	8,346	[5] 739,252

[1] Includes recoverable metal content of gravel washed (placer operations), ore milled, old tailings or slimes re-treated, and ore or old tailings shipped directly to smelters during the year indicated.
[2] Does not include gravel washed.
[3] Includes 15 short tons of lead valued at $4,286 and 6 tons of zinc valued at $1,543.
[4] Data not available.
[5] Includes 106 short tons of copper valued at $36,466, 497 tons of lead valued at $71,752, and 265 tons of zinc valued at $56,406 produced before 1954.

Uranium.—Uranium ore was produced principally from mines in Fall River County, with a small output from Custer and Butte Counties. Production was 35,489 tons, a 49-percent decline from 1957. The average grade of ore increased from 0.17 percent uranium oxide per ton in 1957 to 0.20 percent in 1958. The capacity of the 300-ton-a-day processing plant at Edgemont, which operated the entire year,

was increased to 400 tons a day upon authorization of the Atomic Energy Commission (AEC), and process improvements also were completed. Most of the ore processed at the plant came from deposits in Wyoming.

A study begun by AEC to determine the adequacy of milling facilities in various producing areas was completed early in 1958. On the basis of this study a tentative allocation of 600 tons a day was assigned to the uraniferous lignite deposits in North and South Dakota. Proposals to construct a plant were under consideration, but none had been approved at yearend.

NONMETALS

Cement.—Shipments of masonry and portland cements increased 30 percent over 1957. The average price per barrel was the same as in 1957—$3.76 for masonry cement and $3 for portland cement.

Clays.—Miscellaneous clay was produced in Butte County for manufacturing building brick, sewer tile, and other heavy clay products and in Pennington County for making cement and lightweight aggregate. Production dropped 12 percent from 1957. Bentonite was produced and processed by one company in Butte County, and two companies processed bentonite from Wyoming deposits in mills at Belle Fourche.

Feldspar.—Production of feldspar in Custer and Pennington Counties declined 44 percent in quantity and 46 percent in value compared with 1957 because of lack of an outlet during the last half of the year. Of the total production, 96 percent came from 32 mines in Custer County. With the exception of a small quantity shipped to a mill in Illinois, the entire output was processed at the grinding plant at Custer. The ground product was marketed in Eastern and Midwestern States for use in manufacturing pottery, glass, enamel, soap and abrasives, and welding-rod coating. The grinding plant at Custer, destroyed by fire in July, was rebuilt, and operations were resumed late in the year although construction was not entirely complete.

Gem Stones.—Agate, petrified wood, gem varieties of beryl, tourmaline, garnet and apatite, rose quartz, and specimens of ore minerals were collected by individuals, gem shops, and gem societies for polishing, for sales to processors, and to meet an extensive tourist demand for gem and decorative stones and specimens. The total quantity of material of this type marketed each year ranges from 15 to 20 tons. Much was used to decorate novelty table lamps, vases, and similar objects. The bulk of the output came from Custer and Pennington Counties, although specimens of various types were found in most western counties.

Gypsum.—Gypsum from deposits in the Spearfish formation, Pennington County, was mined by the South Dakota State Cement Commission for making cement. Production declined 8 percent compared with 1957.

Lime.—High-calcium limestone mined in Custer County was used for producing quicklime at a plant near Pringle. The entire output of the plant was consumed within the State for metallurgical uses. Production was 4 percent below 1957.

Mica.—Mica (including hand-cobbed and scrap) was produced at 62 mines by 68 operators in Custer and Pennington Counties. Most hand-cobbed mica and trimmed mica came from Custer County and the bulk of the scrap mica from Pennington County. Production of scrap mica declined 38 percent in quantity and 44 percent in value, whereas production of hand-cobbed and sheet mica increased 72 and 84 percent in quantity and 49 percent in value compared with 1957. The proportion of block mica recovered from the hand-cobbed mica increased from 6.07 percent in 1957 to 6.49 percent in 1958. Recovery of Stained-quality mica rose from 53.36 to 57.26 percent, but recovery of Good-Stained and better quality mica remained the same—2.82 percent. The increase in the percentage recovery of Stained mica and the lack of a comparable percentage increase in the higher valued Good-Stained and better quality mica accounted for the lower overall value per pound of the block mica. The output of hand-cobbed mica was sold to the GSA buying station at Custer for processing.

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
1954	207,221	15,967	7.71	8,381	52.49	477	2.99
1955	64,673	4,633	7.16	1,856	40.06	259	5.59
1956	216,802	12,238	5.64	7,420	60.63	253	2.07
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

TABLE 4.—Mica sold or used by producers

	1954	1955	1956	1957	1958
Hand-cobbed mica, total:[1] Pounds	207,221	64,673	216,802	149,163	257,198
Sheet mica:[1]					
Full trimmed:					
Pounds	332	221	256	45	94
Value	$3,056	$1,980	$2,010	$756	$1,393
Average per pound	$9.20	$8.96	$7.85	$16.80	$14.82
From hand-cobbed mica:					
Pounds	15,967	4,633	12,238	9,048	16,678
Value	$62,166	$19,403	$65,043	$44,751	$66,489
Average per pound	$3.89	$4.19	$5.31	$4.95	$3.99
Total:					
Pounds	16,299	4,854	12,494	9,093	16,772
Value	$65,222	$21,383	$67,053	$45,507	$67,882
Average per pound	$4.00	$4.41	$5.37	$5.00	$4.05
Scrap mica, total:					
Short tons	1,510	1,322	1,268	1,626	1,003
Value	$26,943	$26,853	$31,224	$43,142	$24,241
Average per ton	$17.84	$20.31	$24.62	$26.53	$24.17
Total sheet and scrap mica:					
Short tons	1,518	1,324	1,274	1,631	1,011
Value	$92,165	$48,236	$98,277	$88,649	$92,123

[1] Sold to the Government through GSA.

Sand and Gravel.—Production of sand and gravel was reported in 64 of the State's 67 counties at 209 operations, of which 79 were commercial and 130 Government-and-contractor. Commercial sand and gravel, which represented 18 percent of the total production, was used for building (22 percent), paving (67 percent), molding and filter sand, railroad ballast, fill material, and roofing gravel. Sixty percent of the commercial sand and gravel was washed, screened, or otherwise prepared.

Although production of sand and gravel decreased less than 1 percent compared with 1957, value gained 15 percent.

Most Government-and-contractor operations were undertaken by contractors for the State department of highways. Contracts were awarded in 63 counties. Production for repairs and maintenance by county and municipal crews was reported in 35 counties. Contracts by counties and municipalities were awarded in 22 counties. Government-and-contractor production represented 82 percent of the total output of sand and gravel. Of this quantity, 83 percent was washed, screened, or otherwise prepared.

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

Class of operation and use	1957		1958	
	Thousand short tons	Value (thousand)	Thousand short tons	Value (thousand)
COMMERCIAL OPERATIONS				
Sand:				
Building	328	$343	346	$366
Filter	(1)	(1)	88	88
Molding			(2)	2
Paving	133	101	266	237
Railroad ballast	(1)	(1)		
Other	42	24	15	8
Total	503	468	715	701
Gravel:				
Building	78	97	234	291
Paving	1,363	836	1,517	921
Railroad ballast	(1)	(1)	181	151
Other	74	44	29	16
Total	1,515	977	1,961	1,379
Total sand and gravel	2,018	1,445	2,676	2,080
GOVERNMENT-AND-CONTRACTOR OPERATIONS				
Sand:				
Building			49	49
Paving	375	254	475	310
Total	375	254	524	359
Gravel:				
Building	10	5		
Paving	12,355	6,297	11,505	6,740
Total	12,365	6,302	11,505	6,740
Total sand and gravel	12,740	6,556	12,029	7,099
ALL OPERATIONS				
Sand	878	722	1,239	1,060
Gravel	13,880	7,279	13,466	8,119
Grand total	14,758	8,001	14,705	9,179

[1] Figures withheld to avoid disclosing individual company confidential data; included with "Other."
[2] Less than 1,000 tons.

According to a report [3] by the Bureau of Public Roads, U.S. Department of Commerce, 7.2 miles of the National System of Interstate and Defense Highways was completed during the year. At yearend 52.2 miles of highway was under construction compared with 27.5 miles at the close of 1957.

Counties producing more than 500,000 tons were: Lincoln (882,900), Pennington (699,700), Minnehaha (687,200), Brown (587,700), Codington (563,700), and Gregory (550,100). The bulk of the output in these counties was produced by contractors for the State department of highways and used in road construction.

Stone.—Production of dimension granite in Grant County declined 5 percent compared with 1957. The mahogany- and russet-colored stone was used for monuments and building facings. Crushed and broken stone comprising limestone, sandstone, and miscellaneous stone was produced in 27 counties. Crushed limestone produced in Custer, Fall River, Lawrence, Pennington, and Todd Counties was used for road construction, concrete aggregate, and railroad ballast; for manufacturing cement and lime; and in sugar factories. Crushed sandstone, produced in Hanson and Minnehaha Counties, was used for road construction and as a refractory stone in foundries and steel plants. Miscellaneous stone, all of which was produced by contractors for the State department of highways for road construction, was mined in 22 counties. Total output of stone declined 19 percent in quantity and value compared with 1957.

MINERAL FUELS

Coal (Lignite).—Production from a strip mine in Dewey County was 7 percent below 1957. The entire output was sold in Dewey and adjoining counties. Other mines producing less than 1,000 tons a year, all for local consumption, were operated in Dewey, Corson, and Perkins Counties.

Petroleum.—Petroleum production from the Buffalo field, Harding County, and the Barker field, Custer County, increased 7 percent over 1957. Exploratory drilling, although not as extensive as in 1957, was more rewarding. One discovery was made 4 miles west of the Buffalo field in Harding County. A successful development well also was completed in the Buffalo field. Other wells in Butte, Custer, Fall River, Jackson, Lincoln, and Meade Counties were dry and were abandoned. Data collected by the State geologist show that 14 wells were completed and that drilling totaled 40,875 feet.

REVIEW BY COUNTIES

Butte.—American Colloid Co. produced bentonite, all of which was processed at its mill at Belle Fourche. Eastern Clay Products Department, International Minerals & Chemical Corp., processed bentonite from deposits in Wyoming at its mill at Belle Fourche. Black Hills Clay Products Co. produced miscellaneous clay for manufacturing building brick, draintile, and other heavy clay products. Uranium ore was produced at the Kling No. 1 mine by Rogers & Osborne and at

[3] Bureau of Public Roads, Status of Federal-Aid Highway Programs, Dec. 31, 1958: BPR 59–2.

the Kling No. 2 mine by H. W. McDonald. The ore was processed at the Mines Development, Inc., plant at Edgemont. Contractors produced miscellaneous stone for the State highway department; paving sand and gravel was produced for the State and county highway departments.

TABLE 6.—Value of mineral production in South Dakota, by counties

County	1957	1958	Minerals produced in 1958 in order of value
Aurora	(1)	$84,300	Sand and gravel.
Beadle	$87,800	339,200	Sand and gravel, stone.
Bennett	4,800	29,900	Sand and gravel.
Bon Homme	175,600	142,800	Sand and gravel, stone.
Brookings	329,000	217,000	Sand and gravel.
Brown	325,800	345,800	Sand and gravel, stone.
Brule	41,100	42,800	Do.
Buffalo	16,400	65,900	Do.
Butte	(1)	1,572,189	Clays, sand and gravel, uranium ore, stone.
Campbell	70,000	11,500	Sand and gravel.
Charles Mix	172,600	230,800	Sand and gravel, stone.
Clark	123,700	135,600	Sand and gravel.
Clay	116,900	53,900	Do.
Codington	291,100	531,800	Sand and gravel, stone.
Corson	101,800	65,800	Sand and gravel.
Custer	610,874	488,653	Feldspar, uranium ore, lime, mica (sheet), beryllium concentrate, stone, sand and gravel, gem stones, columbium-tantalum concentrate, petroleum, mica (scrap).
Davison	243,000	118,000	Sand and gravel.
Day	171,100	157,100	Sand and gravel, stone.
Deuel	12,000	64,500	Do.
Dewey	109,318	130,484	Coal, sand and gravel.
Douglas	58,800	118,700	Sand and gravel.
Edmunds	22,800	119,600	Do.
Fall River	872,048	617,021	Uranium ore, sand and gravel, gem stones, stone.
Faulk	52,900	115,900	Sand and gravel.
Grant	2,779,095	2,303,762	Stone, sand and gravel.
Gregory	69,100	284,000	Sand and gravel.
Haakon		184,600	Do.
Hamlin	98,900	98,700	Do.
Hand	53,400	93,200	Do.
Hanson	349,200	392,300	Stone, sand and gravel.
Harding	(1)	(1)	Petroleum, sand and gravel.
Hughes	56,600	173,100	Sand and gravel.
Hutchinson	154,300	143,000	Do.
Hyde	38,300	90,400	Do.
Jackson	205,100	195,600	Sand and gravel, stone.
Jerauld	28,700	114,400	Do.
Jones	180,900	2,300	Stone.
Kingsbury	78,600	111,300	Sand and gravel.
Lake	138,100	170,300	Do.
Lawrence	20,129,244	20,238,118	Gold, silver, sand and gravel, stone.
Lincoln	116,500	525,400	Sand and gravel.
Lyman	341,100	86,300	Sand and gravel, stone.
Marshall	158,300	158,800	Sand and gravel.
McCook	83,400	32,100	Do.
McPherson	73,700	157,000	Do.
Meade	623,700	225,200	Sand and gravel, stone.
Mellette	131,500	15,300	Sand and gravel.
Miner	12,600	32,100	Do.
Minnehaha	778,200	854,900	Sand and gravel, stone.
Moody	132,300	130,300	Sand and gravel.
Pennington	6,823,401	7,933,023	Cement, stone, sand and gravel, clays, beryllium concentrate, gypsum, mica (scrap), mica (sheet), feldspar, columbium-tantalum concentrate, gem stones.
Perkins	6,928	137,000	Sand and gravel.
Potter	61,600	96,000	Do.
Roberts	108,900	197,500	Sand and gravel, stone.
Sanborn	29,400	11,500	Do.
Shannon	75,900		
Spink	180,400	266,400	Sand and gravel.
Stanley	98,400	95,300	Do.
Sully	87,700	55,300	Do.
Todd	10,400	18,600	Stone.
Tripp	55,800	94,900	Sand and gravel, stone.
Turner	46,100	57,300	Sand and gravel.

See footnotes at end of table.

TABLE 6.—Value of mineral production in South Dakota, by countries—Con.

County	1957	1958	Minerals produced in 1958 in order of value
Union	$102,300	$41,300	Sand and gravel, stone.
Walworth	46,400	118,300	Sand and gravel.
Washabaugh	9,500	25,000	Do.
Yankton	1,450	45,300	Sand and gravel, stone.
Ziebach	200	22,400	Sand and gravel.
Undistributed [2]	2,191,800	323,000	Lithium minerals, gem stones, sand and gravel.
Total [3]	[4] 39,997,000	41,534,000	

[1] Figure withheld to avoid disclosing individual company confidential data; included with "Undistributed."
[2] Includes value of mineral production that cannot be assigned to specific counties and values indicated by footnote 1.
[3] Total has been adjusted to eliminate duplication in the value of raw materials used in manufacturing cement and lime.
[4] Revised figure.

Custer.—Beryllium concentrate (beryl), produced from pegmatite deposits at 82 mines, represented 38 percent of the total value of Custer County mineral production. Major producers were: George Bland who operated at 15 locations (principal production was from the Bull Moose and Tin Mountain mines); Walter Clifford at the Red Bird lode; Leonard E. Wood at the Lucky Strike; Henry Kautzsch at the Townsite; and Maywood Chemical Works at the Tin Mountain mine. Large producers sold their product directly to GSA at Custer. Other producers of smaller quantities sold to Gladys Wells at Custer for resale to GSA. Output of Columbium-tantalum concentrate, recovered from pegmatite deposits, increased more than threefold over 1957. The major producer was George Bland at the Helen Beryl mine. Three other operators also reported production. The entire output was sold to GSA at Custer. Feldspar, the major product of the pegmatite deposits in quantity, was produced at 32 mines. Abingdon Potteries, Inc., operated the Townsite mine and shipped the crude material to its grinding plant in Illinois. Consolidated Feldspar Department, International Minerals & Chemical Corp., operated the Ballard Dyke and other deposits and purchased the output of other producers for grinding at its plant at Custer. The plant was completely destroyed by a fire, caused by lightning, on July 30. It was replaced by a modern fireproof mill that resumed operation in December. The new mill was equipped with the latest machinery for crushing, grinding, and air classification. Five different grades were produced, primarily for use in making pottery, enamelware, and glass. Adequate storage silos for crude and finished material were provided at the new plant.

Full-trimmed, hand-cobbed, and scrap mica, important coproducts in the recovery of feldspar from pegmatite deposits, were produced at 52 mines. One operator produced only full-trimmed sheet mica. Hand-cobbed mica was produced at 21 mines, 2 of which also yielded full-trimmed sheet mica and scrap mica. Scrap mica was produced at 33 mines. The full-trimmed sheet mica and hand-cobbed mica were sold to GSA at Custer for processing. Scrap mica was sold to grinding plants in Colorado and Eastern and Midwestern States. A small quantity was stockpiled by one producer for processing at its plant in Vermont. Principal producers of hand-cobbed mica were York Min-

erals, at the Red Deer mine, and Glenn Ventling, at the New York mine. Carl Roseberry, operating the Elkhorn mine, and Mont Heumphreus, operating the Heumphreus mine, were the largest producers of scrap mica.

High-calcium limestone was produced for manufacturing quicklime at a plant near Pringle. The entire output was used within the State for metallurgical purposes. Crushed limestone and miscellaneous stone was used in highway construction. Uranium ore, produced from three mines by Triangle Enterprises and Giant Cycle Corp., was shipped to the mill at Edgemont. A small quantity of petroleum was produced from the Barker field. Gem stones and mineral specimens, such as agate, beryl, rose quartz, tourmaline, and similar materials, were recovered from various pegmatite deposits by Scott's Rose Quartz Co. and numerous individuals for polishing and sale as specimens and curios. Sand and gravel for road construction was produced for the State department of highways.

Fall River.—Sand and gravel and uranium ore comprised principal mineral output of the county, which ranked sixth in the State in value of mineral production. Sand and gravel for building and highway construction was produced by four operators and by contractors for the State department of highways. The Fall River Sand & Gravel Co. was the major producer. Uranium ore, produced at 23 operations, was shipped to the mill at Edgemont. Major producers were Giant Cycle Corp. producing at five operations, and Pictograph Mining & Uranium Co., Inc., operating the Dexter No. 4 mine. Mines Development, Inc., operated its processing plant at Edgemont the entire year. Capacity of the plant was increased from 300 to 400 tons of crude ore a day. The resin-in-pulp process for recovering uranium oxide from the leach liquors was changed to a solvent-extraction system. Since the mill began operations in mid-1956, 300,000 tons of ore from deposits in South Dakota and Wyoming has been processed. AEC required that the stockpile at Edgemont, purchased by the Government before construction of the mill, be absorbed by 1962 within the daily ore-processing capacity.

Grant.—Output of dimension granite, from 10 quarries near Milbank and Big Stone City, declined slightly compared with 1957. The deep-red and brown-mahogany granites in the Big Stone City-Milbank area, were used extensively for building facings, interior decoration, and monuments. The rough quarry blocks from five operations were finished at plants in Minnesota. Sand and gravel for road construction was produced by contractors for the State department of highways and the Grant County Highway Commission. The county ranked third in the State in value of mineral production.

Harding.—Petroleum production, from two fields, increased slightly over 1957. One new field was discovered 4 miles west and slightly south of the Buffalo field when the No. 1 Government well was completed at a depth of 8,645 feet. Initial production was 12 barrels an hour on pump from the Red River formation at a depth of 8,434 to 8,484 feet. One development well, a southwest extension of the Buffalo field, was completed at a depth of 8,657 feet. Production was 173 barrels of oil a day on pump from the Red River formation at a

depth of 8,522 to 8,574 feet. Output of sand and gravel for the State Department of highways was more than double that of 1957.

Lawrence.—The county contributed nearly half the value of South Dakota's mineral production. Output of gold increased only slightly, whereas that of silver increased 13 percent over 1957. The Homestake Mining Co. in the Lead-Deadwood area continued to be the leading producer of gold in the United States. The value of sand and gravel produced by contractors for the State department of highways increased 30 percent although the quantity declined 12 percent compared with 1957, reflecting the more rigid specifications required for material used in highway construction. Crushed limestone used for road construction and sugar refining, produced by Cole Construction Co., declined 44 percent in quantity and 20 percent in value from 1957.

TABLE 7.—Ore milled, receipts, and dividends, Homestake mine [1]

Year	Ore milled (thousand short tons)	Receipts for bullion product		Dividends (thousand)
		Total (thousand)	Per ton	
1954	1,485	$18,410	$12.40	$4,019
1955	1,550	18,055	11.65	4,019
1956	1,628	19,354	11.89	4,019
1957	1,660	19,479	11.74	4,019
1958	1,725	19,611	11.37	4,019

[1] From 1876 to 1958, inclusive, this mine yielded bullion and concentrates that brought a net return of $658.4 million and paid $202.9 million in dividends.

Homestake Mining Co. operated its Homestake mine and amalgamation-cyanidation mill at Lead the entire year. Ore milled totaled 1.7 million tons. Percentage recovery declined slightly from 97.18 to 97.13. Mining and milling costs per ton declined because of the greater quantity of material handled. A diamond-drilling program on the 5300 and 5600 levels was completed in May. The results were disappointing. Some ore of good grade was found, but there was less continuity of the ore bodies between levels than anticipated. No new ore blocks were added to the reserve, which was 13.2 million tons on December 31, 1958—a decline of 950,000 tons from the preceding yearend. The difference of 775,000 tons between ore mined in 1958 (1.725 million tons) and the decline in reserve estimates (950,000 tons) represents the excess recovered over conservative engineering and geological estimates. When the diamond-drilling program was completed, work was resumed at the No. 4 winze below the 5000 level, and at yearend the winze was at a depth of 6170 feet. Development of two deeper levels, the 5900 and 6200 from the winze, will proceed as planned. Rock temperature at the 6170 level of the winze was 111° F. and confirmed the need for completing the deep ventilation shaft that was begun in 1957. The program continued as planned and was expected to be completed in 1960.

Bald Mountain Mining Co. operated the Clinton, Portland, Decorah, Dakota, Folger, and Gold Bug group of mines and its 350-ton all-slime cyanide plant at Trojan. The tonnage of milled ore was 16 percent below 1957. Recovery of gold declined 10 percent; however, recovery of silver more than doubled. The average value of the ore

increased 14 percent. Ray Coppo produced a little gold ore at the Summit mine.

Minnehaha.—Production of crushed sandstone for use as refractory stone (ganister), riprap, concrete aggregate, and road construction declined 28 percent compared with 1957. Concrete Materials Co. was the leading producer. Output of sand and gravel for building and paving and for railroad ballast and fill more than doubled over 1957. Concrete Materials Co. and L. G. Everist, Inc., were the leading producers.

Pennington.—Various minerals and mineral products were produced from the mines, quarries, and mills in Pennington County, which continued to rank second in the State in value of mineral production. The value of beryllium concentrate (beryl), columbium-tantalum concentrate, feldspar, and mica, all products of pegmatite deposits, declined 29 percent compared with 1957. The destruction by fire of the feldspar grinding plant at Keystone in January 1957 made the production of feldspar (the principal product of pegmatite deposits) more difficult because of greater shipping distance to the grinding plant at Custer. The destruction of the plant at Custer by fire in July 1958 completely eliminated the local market for feldspar, and production declined sharply. At most pegmatite deposits the feldspar must be mined to expose smaller quantities of the more valuable minerals. Activities were confined to deposits where beryl, columbite-tantalite, and mica could be recovered without extensive mining of feldspar. Beryl was produced at 26 mines. The major operators were Consolidated Feldspar Department, International Minerals & Chemical Corp., at the Hugo mine; McCarty-Pullen Mines, at the Whitecap; Keystone Feldspar & Chemical Co., at the Peerless; Pete Lien & Sons, at the High Climb; and Myler & Sackett, at the Sackett Fraction lode. Columbium-tantalum concentrate was produced at three mines. Major producers were George Bland, at the High Climb and Whitecap mines and Black Hills Keystone Corp., at the Bob Ingersoll.

Output of scrap mica declined 30 percent, whereas that of hand-cobbed mica increased 47 percent. Increased activity was directed toward producing hand-cobbed mica to replace, partly, the loss of the local outlet for feldspar. The county continued to be the principal source of scrap mica, accounting for 90 percent of the State's production. Major producers were Keystone Feldspar & Chemical Co. at the Peerless mine; Consolidated Feldspar Department, International Minerals & Chemical Corp., at the Hugo; McCarty-Pullen Mines, at the Whitecap; and Montana Chemical & Milling Co., at the Cracker Jack. Hand-cobbed mica was produced at three mines. Principal producers were McCarty-Pullen Mines and Hardesty & Simpson, both at the Whitecap mine.

Shipments of portland and masonry cements by the South Dakota State Cement Commission at Rapid City increased 30 percent over 1957. The State-owned plant produced the limestone, shale, sand, and gypsum used from deposits near Rapid City. Iron ore used in the process came from a stockpile accumulated in previous years. A new 375-foot kiln was installed, together with necessary auxiliary equipment. Operation of the new kiln, which was begun in November, increased the annual capacity of the plant to 3 million barrels. Cement clinker was used as a base for manufacturing masonry cement. Shipments were made to consumers throughout South Dakota, to adjoining States, and to Colorado and Illinois.

Miscellaneous clay was mined from the Pierre formation near Rapid City for making lightweight aggregate. The county ranked second in the State in output of sand and gravel. Five operators produced building and paving sand and gravel and railroad ballast. Carlson Lien Co. and Birdsall Sand & Gravel Co. were the major producers. The Black Hills Silica Sand Corp. produced molding sand. Limestone for riprap, road construction, concrete aggregate, and railroad ballast was crushed by four operators. Principal producers were Hills Materials Co. and Pete Lien & Sons. Miscellaneous stone was crushed by contractors for the State department of highways.

Gem stones and mineral specimens were collected by gem societies and individuals from pegmatite deposits and mine dumps for polishing and sale to tourists. Agate and petrified-wood specimens were collected in the Badlands in the eastern part of the county.

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