

SOUTH DAKOTA

STATE GEOLOGICAL SURVEY

E. P. Rothrock, State Geologist

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REPORT OF INVESTIGATIONS

No. I.

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MINERAL PRODUCERS IN 1929

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By

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Coal by Walter V. Searight

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Vermillion, S. Dak.

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# SOUTH DAKOTA MINERAL PRODUCERS

By

E. P. Rothrock,  
State Geologist

## I N T R O D U C T I O N

The following report is for the purpose of assembling information as to the condition of mineral production in the state. Much has been said and written about our great mineral wealth but little data has been available as to what products were actually being produced and who was producing them. The State Geological Survey, therefore, undertook a survey of the production during the summer of 1929 with the results contained herein.

No attempt was made to estimate possible reserves of the minerals produced or of the possibilities of unused and undeveloped products. Only those products and places were included which were actually producing during 1929. Every effort has been made to make the list complete but in the case of some products, like sand and gravel where some deposits are worked intermittently and sold only in small amounts some producers may have been overlooked.

## S U M M A R Y O F R E S U L T S

This survey showed that the state was producing eighteen different kinds of mineral products which may be tabulated as follows:-

Products	No. of mines pits, quarries and wells.	No. of companies engaged in production.
Fuels		
Coal	24	24
Gas	6	3
Metals and Rare Minerals		
Gold	6	2
Silver (by product)	1	
Pegmatite Minerals		
Lithium	9	5
Berylium		
Tantalum		
Feldspar		
Rose Quartz	1	1
Structural and Ceramic Materials		
Quartzite	5	5
Granite	5	4

Porphyry	1	1
Sandstone	2	1
Limestone	5	5
Gypsum	2	2
Clay	6	6
Sand and Gravel	19	19
Water		4
	<hr/>	
Totals	102	82

F U E L S

Fuels are of prime importance in the development of any region whether it be industrial or agricultural. South Dakota contains at least two sources of fuel. The large area of coal in the northwestern quarter of the state offers an excellent field for development which as yet has barely been touched. Natural gas has been struck in small amounts in widely separated parts of the state, and the geological conditions suggest that there should be more. The development of both these fuels is still in its infancy and they, and other possible sources of fuel deserve more attention than has been given them as they may become the state's most important mineral asset.

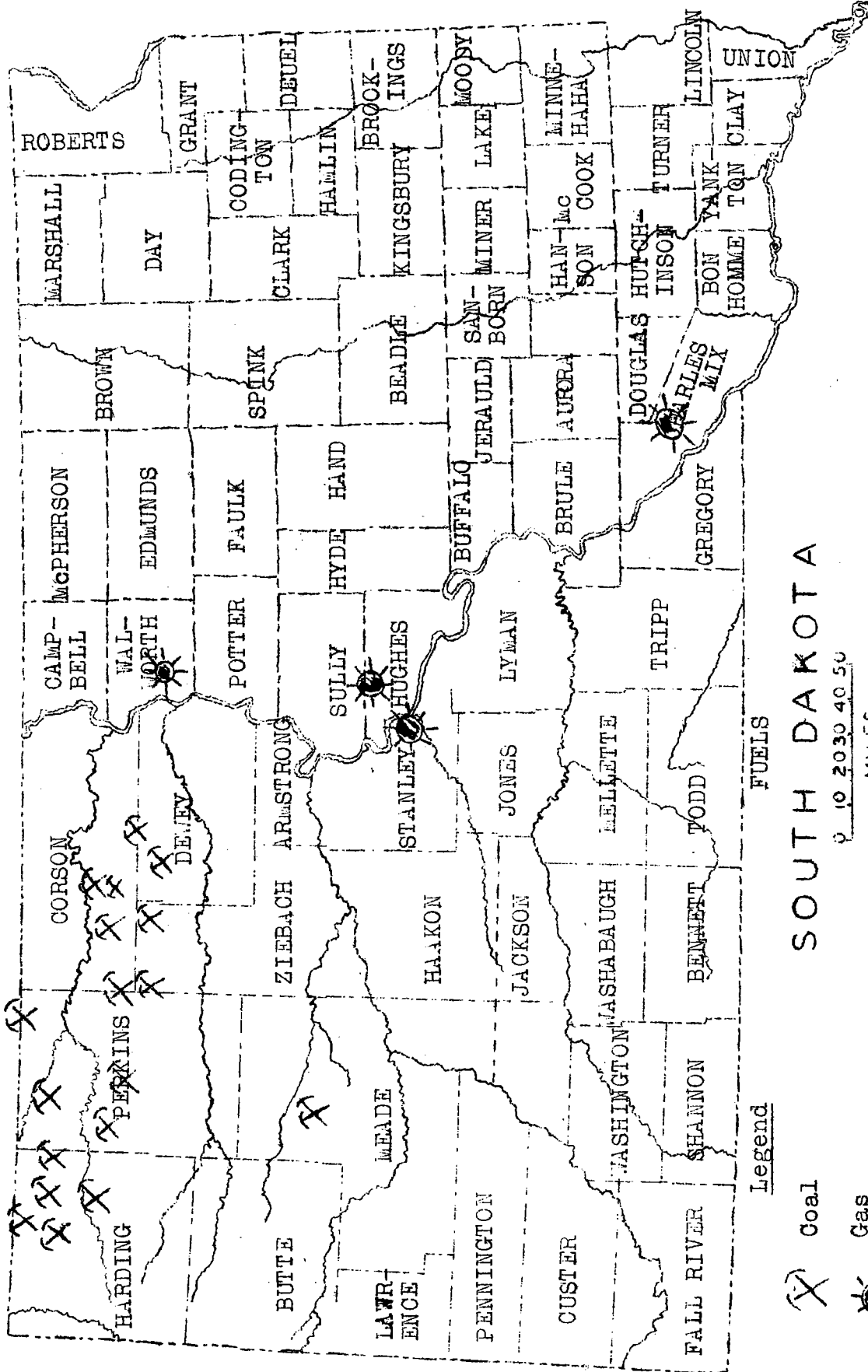
COAL

By  
"Walter V. Searight

INTRODUCTORY STATEMENT

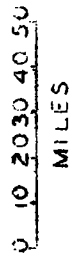
The workable coal beds of South Dakota lie in the Northern Great Plains coal province which, as defined by the United States Geological Survey, includes all the coal fields of the Great Plains east of the Rocky Mountains. The workable coals of the state occupy a southeastern extension of the Fort Union Region, the most extensive coal region of the Great Plains Province. This coal region includes the coal beds of South Dakota, North Dakota, Montana, and Wyoming. In South Dakota, the workable coal beds lie wholly west of the Missouri River and north of the Moreau River, with the exception of a small outlier in Meade County which underlies the divide between the Cheyenne and Moreau Rivers. The South Dakota coal field thus underlies portions of Harding, Perkins, Corson, Meade, Ziebach and Dewey counties.

A few mines operate continuously, but, as in the great portion of the Fort Union region, most mines operate but a few

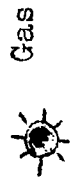
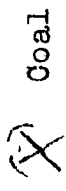


FUELS

# SOUTH DAKOTA



Legend



months in late fall and early winter. Mines, are small for the most part, with an annual output of but a few hundred tons each, but some produce more than a thousand tons each year, and a few mines are now equipped for production on a fairly large scale.

### RANK AND QUALITY OF COAL

South Dakota coal is commonly ranked as lignite coal and is of good quality. The coal beds underlying Harding, Perkins, and Meade counties are, for the most part, to be classed as lignite since they contain much material of a brown color, are more or less woody in texture, and since the moisture content is high, being 40 per cent or more of the weight of the coal when mined. Elsewhere, however, in Corson, Dewey, and Ziebach counties, and in some other restricted areas, there is coal which is black throughout, not woody in texture, and which contains about 35 per cent of moisture. Because of their color and texture these coals are probably to be classed with sub-bituminous coal. Chemically, however, these "black lignites" are high in water, somewhat low in volatile matter, and low in fixed carbon as compared with typical sub-bituminous coal.

South Dakota coals, in general, are of good quality. The quality is determined by the amount of impurities, chief of which are ash and sulphur. Though relatively high percentages of impurities are to be found in some beds in some localities, in much of the available coal, ash and sulphur are present in such small amounts that the quality is excellent.

### TRANSPORTATION FACILITIES

Transportation facilities over the greater portion of the South Dakota coal field are inadequate for large scale production. Railways are inaccessible except in small areas in Dewey and Perkins counties. In Dewey County lands underlain by coal lie near a branch of the Chicago, Milwaukee, and St. Paul Railway, and coal lands in northern Perkins County lie within five miles of the main line of the Chicago, Milwaukee, and St. Paul Railway. Elsewhere, over the coal field good dirt roads and highways are available and in some parts gravel surfaced highways pass through or very near areas underlain by workable coal beds. Although these facilities are fairly satisfactory for local distribution, lack of railroad facilities has prevented extensive development of coal deposits in this field.

### MINING METHODS AND EQUIPMENT

The coal is mined in open strip mines and underground in slope and shaft mines. Approximately two thirds of the mines producing coal for more than the use of the mine owner are of the open type. Excepting the mines now operating in Meade County, which are shaft mines, the remainder are slope mines. In most of the strip mines the overburden is removed from the coal by means of team and scrapers, but in some mines tractors and scrapers or Fresnos are in use. Gasoline power draglines have been used in a few strip mines, and a dragline powered by steam is in use in one mine.

Underground, coal is mined by the room and pillar method exclusively, and mining is done by hand with the aid of explosives. Size of entries is determined to a considerable extent by the character of the roof which, if good, permits wide entries, but if only fair, demands narrow entries. Timbering is reduced to a minimum because of the dearth of suitable material in this region. Other underground equipment, such as cars and tracks, varies with the size of the mine and local mining conditions.

Loading and weighing equipment likewise is variable but is for the most part simple over the coal field. In many places coal is loaded directly from the mine, but some mines are equipped with efficient tipples, the best of which are operated by steam. Some mines are equipped with scales, but in many mines weight of coal is estimated by depth in the wagon box.

### OPERATING MINES

In the list which follows, operating mines of South Dakota have been tabulated alphabetically by counties. Mines are considered to be operating if coal was mined the preceeding fall or winter (1928), or is being mined at the present time. In one or two instances newly opened or reopened mines ready for operation during the fall or winter of the present season (1929) have been listed. Mines operated to provide coal for the use of the operator only are not included in the list.

#### Corson County

Name	Owner	Location	Address
"Lightcap Mines"	Otto Anderson Jack Mitchell Frank Pillar Andrew Roland et al.	Secs. 25 & 26 T. 19 N., R. 21 E.	Lightcap
Anderson Mine	Andrew Anderson	SE $\frac{1}{4}$ , Sec. 7, T. 18, N., R. 20 E.	Gopher
Kennedy Mine	Wm. D. Kennedy	SW $\frac{1}{4}$ , Sec. 7, T. 18 N., R. 20 E.	Gopher

#### Dewey County

Hammond Mine	Frank Hammond	NE $\frac{1}{4}$ , Sec. 8, T. 17 N., R. 22 E.	Isabel
Hammerly Mine	W. C. Hammerly	NE $\frac{1}{4}$ , Sec. 18, T. 17, N., R. 23 E.	Firesteel
Reichert Mine	Peter Reichert	NW $\frac{1}{4}$ , Sec. 7, T. 16 N., E. 22 E.	Isabel
Midwest Mine	Midwest Fuel Co.	SW $\frac{1}{4}$ , Sec. 22, T. 22 N., R. 22 E.	Isabel

Harding County

Gionnanati Mine	John Gionnanati	NE $\frac{1}{4}$ , Sec. 29, T. 21 N., R. 7 E.	Ludlow
Hodge Mine	James E. Hodge	NE $\frac{1}{4}$ , Sec. 17, T. 18, N., R. 8 E.	Reva
Hilton Mine	Enoch Haka	NW $\frac{1}{4}$ , Sec. 6, T. 20 N., R. 5 E.	Buffalo
Pintar Mine	Joe Pintar	Sec. 35, T. 21 N., R. 6 E.	Ralph
Doabe Mine	Elmer Downing	SW $\frac{1}{4}$ , Sec. 26, T. 22 N., R. 5 E.	Ludlow

Meade County

Stainbrook Mine	E. E. Stainbrook	NW $\frac{1}{4}$ , Sec. 10, T. 9 N., R. 12 E.	Stoneville
Taylor Mine	Dennis E. York	NE $\frac{1}{4}$ , Sec. 9, T. 9 N., R. 12 E.	Stoneville

Perkins County

Clark Mine	Mr. M. Clark	1 $\frac{1}{2}$ mi. N., $\frac{1}{2}$ mi. E. of Lodgepole	Lodgepole
Gray Mine	J. C. Gray	SW $\frac{1}{4}$ , Sec. 26, T. 19 N., R. 10 E.	Strool
Van Lee Mine	Van Lee	SW $\frac{1}{4}$ , Sec. 31, T. 18, N., R. 13 E.	Strool
Carlson Mine	Theodore Carlson	NW $\frac{1}{4}$ , Sec. 20, T. 17 N., R. 13 E.	Bison
Hafner Mine	Frank Hafner	SE $\frac{1}{4}$ , Sec. 17, T. 17 N., R. 13 E.	Coal Springs
Sundermeyer Mine	C. E. Sundermeyer	NE $\frac{1}{4}$ , Sec. 20, T. 17 N., R. 13 E.	Coal Springs
Parker Mine	R. G. Parker	SE $\frac{1}{4}$ , Sec. 19, T. 21 N., R. 12 E.	Lodgepole
Butts Mine	F. W. Butts	SE $\frac{1}{4}$ , Sec. 34, T. 22 N., R. 13 E.	Haynes, N. D.
Johnson Mine	K. K. Johnson	NE $\frac{1}{4}$ , Sec. 9, T. 21, N., R. 11 E.	Lodgepole

Ziebach County

Tidball Mine	J. B. Tidball	NE $\frac{1}{4}$ , Sec. 23, T. 16 N., R. 20 E.	Isabel
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## GAS

Natural gas has been reported from a number of wells in the vicinity of the Missouri and northern James River Valleys, from Mobridge to Wagner. In nearly all cases recorded the gas comes from the well with artesian water. A few cases are reported in which it comes from shallow wells which penetrate only to the bottom of the glacial drift (boulder clay).

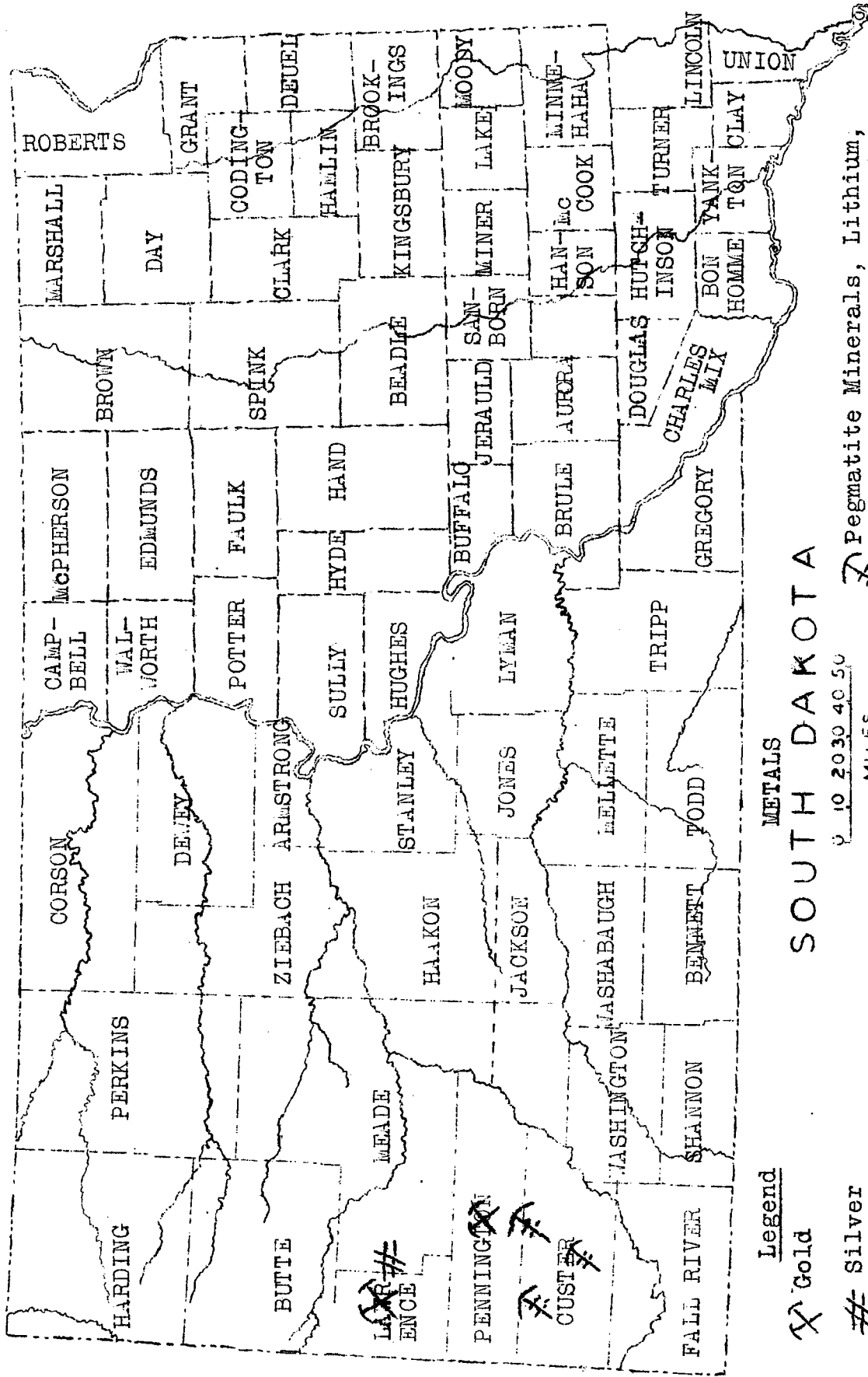
The only commercial use of this fuel supply is in the Cities of Pierre and Fort Pierre, where for more than 20 years wells have supplied gas for local consumption. The City of Pierre owns four wells and in addition buys 470,000 cu. ft. of gas per month from a State owned well on the Capitol grounds. This is sufficient to furnish the city with gas for domestic use which is confined for the most part to cooking and lighting. The city of Fort Pierre has one well which supplies enough for domestic use.

Though the gas from most of the private wells is wasted, that of others is turned to good account by the owner. The Locke Hotel in Pierre is supplied with gas from its own well. The Plunge at Fort Pierre is also lighted and heated from its own well, which in winter requires the constant burning of 20 fires. A few farmers over the state are using their gas supplies for cooking or lighting or both, but most of them allow the gas to escape into the air.

This supply deserves more attention than has been given it. In spite of the fact that its small volume, long life and "dry" condition suggest shale gas, it is quite within the realms of possibility that sufficiently large pools might be discovered to be of considerable commercial value. But even if such pools were not found it should be possible to develop a supply which would be useable locally, either by single farmers or communities.

### No. of gas producing wells reported by counties.

Bon Homme	2
Campbell	1
Dewey	1
Edmunds	3
Hughes	6
Lyman	3
Spink	5
Stanley	8
Sully	5
Walworth	3



Legend

X Gold

# Silver

0 10 20 30 40 50  
MILES

METALS  
SOUTH DAKOTA

X Pegmatite Minerals, Lithium,  
Beryllium, Tantalum, Feldspar,  
Rose Quartz.

## GOLD

The summer of 1929 saw two companies producing gold, eight mines undergoing development work, and a great many claims being held for future development.

The Homestake Mine continues to hold the lead both in production and equipment. This mine has been in continuous operation since 1875. Since its opening it has produced gold valued at \$218,654,434.92. This past production, together with the present annual production, which amounts to about \$6,000,000 per year, gives it the well deserved title of the largest gold mine in the United States. Mining and milling is now going on vigorously and will doubtless continue for some time as the company has enough ore blocked out to insure the present production for about twenty years more.

The second company is the Keystone Consolidated Mining Company with mines and mills at Keystone. This company bought the claims containing the Holy Terror, Bullion, Lucky Boy, and Keystone mines. These old mines have been put into operation again and a new mine, the Columbia, opened across the gulch from the Holy Terror. The present output is gold entirely, but the company expects to put up a plant for arsenic production to supply the demand created by the recent increase of grasshoppers. This company has been in operation since the fall of 1928 and is very active at present. This activity promises to make Keystone an important gold producing area.

### DEVELOPMENT WORK

Development work is being carried on largely on old mines. There is a tendency to consolidate a number of properties, which have produced at some time in the past, under one company large enough to develop the group, thus making a profitable enterprise out of what might otherwise be unprofitable prospects.

Such development is taking place near Terry where the old Mogul and Golden Reward properties are under option by the Homestake Mining Company. The company is carrying on diamond drill prospecting to determine the feasibility of again opening the mines.

Near Trojan, the Bald Mountain Mining Company has taken over the Two Johns and Trojan properties for development work. Mr. C. E. Dawson is in charge of the work.

The old Minnesota and North Homestake Mines at Maitland are being prospected by the Weggoner-Merrill Mining Company. Mr. John Weggoner of Deadwood is in immediate charge of the work.

Development work is being carried on at two single properties. The Echo Mine is being operated by the Echo Mining Company near Maitland and at the Joe Dollar Mine, five miles east of Hill City, by the Halcyon Mining Company.

What this development work will lead to remains to be seen. Most of the claims have been worked profitably in the past. The gold mining industry, however, is still recovering from the effects of wartime slump which put most of the mines out of business. The success of the Keystone Consolidated Company and the activity displayed in prospecting appears to be a favorable sign for the opening of some of the abandoned mines and for an increase in gold production in South Dakota.

### Operating Mines

Homestake Mine at Lead, S. Dak.  
 Homestake Mining Company, Lead S. Dak.  
 Amalgamation and cyanide mills  
 B. C. Yates, Superintendent.

Columbia  
 Bullion  
 Lucky Boy At Keystone, S. Dak.  
 Holy Terror  
 Keystone  
 Keystone Consolidated Mining Company,  
 Cyanide and arsenic roasting plants  
 H. B. Eyrich, Superintendent.

### Mines Undergoing Development Work

Mogul  
 Golden Reward } At Terry, S. Dak.  
 Homestake Mining Company,  
 B. C. Yates, Superintendent, Lead, S.D.

Two Johns  
 Trojan } At Trojan, S. Dak.  
 Bald Mountain Mining Company,  
 C. E. Dawson, Superintendent, Trojan, S.D.

Minnesota  
 North Homestake } At Maitland, S. Dak.  
 Weggoner-Merrill Mining Company,  
 John L. Weggoner, Superintendent, Deadwood.

Echo At Maitland, S. Dak.  
 Echo Mining Company,  
 Allan Burke, Superintendent, Deadwood, S.D.

Joe Dollar Sec. 23, T. 1 S., R. 5 E.  
 Halcyon Mining Company,  
 En H. Reeves, Superintendent, Rapid City.

### Idle Mines

Note: This list includes mines on which assessment work is being kept up as well as those which are entirely idle.

The list is partial as no complete survey of these properties was possible in the time available for this survey.

T. 5 N., R. 2 E.

Gold- Mine	(Sec.1)
Gold Eagle Mine	(Sec.13)
Big Four Mine	(Sec.36)

T. 5 N., R. 3 E.

Wells Fargo	(Sec.19)
Imperial	(Sec.20)
Hidden Treasure	(Sec.30)
Cutting	(Sec.29)
Pennsylvania	(Sec.32)

T. 4 N., R. 2 E.

Annie Creek	(Sec.3)
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T. 4 N., R. 3 E.

Puritan	(Sec.12)
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T. 4 N., R. 4 E.

Clover Leaf	(Uncle Sam) (Sec.29)
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T. 3 N., R. 3 E.

Custer Peak	(Sec.24)
Montana	(Sec.33 or 34)

T. 3 N., R. 4 E.

Lucky Strike	(Sec.10)
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T. 2 N., R. 3 E.

Stand By	(Sec.24) at Rochford
Montezuma	(Sec.11)
North Star	(Sec.31)
Yellow Bird	(Sec.32)

T. 2 N., R. 4 E.

Gold King	(Sec.17)
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T. 1 N., R. 3 E.

Golden West	(Sec.3)
Black Eagle	(Sec.2)

T. 1 N., R. 5 E.

Gold Dirt	(Sec.27)
Omega	(Sec.17)

T. 1 S., R. 5 E.	
Golden Slipper	(Sec. 22)
T. 1 S., R. 4 E.	
Gold Lode	(Sec. 2)
Sunnyside	(Sec. 13)
Burnt Fork	(Sec. 2)
T. 1 S., R. 5 E.	
J. R. Mine	(Sec. 21)
T. 2 S., R. 4 E.	
Clara Belle	(Sec. 34)
T. 2 S., R. 6 E.	
Ideal	(Sec. 32)

## SILVER

Though there are some silver deposits in the state, no mines are producing this metal except as a by-product. A small amount is refined from the Homestake ores, the average being about .05 ounces of silver per ton of ore. Silver-lead ores have been mined at a number of places along the eastern side of the Black Hills. The only mine of this kind which shows any activity, at present, however, is the Spokane Mine at Spokane in Pennington County, (Sec. 2, T. 2 S., R. 6 E.). This mine has produced lead, silver, zinc, and gold. The damage which was done by a big fire a few years ago is now being repaired and development work is in progress. The mine is owned by the Spokane Silver and Lead Company of Cleveland, Ohio.

### Operating Mines

None

### Mines Undergoing Development Work.

Spokane Mine                                      At Spokane  
Spokane Silver and Lead Company, Cleveland, Ohio.  
Miner T. Phillips, Mgr., Keystone, S. Dak.

### Mines Idle

T. 2 S. 7, R. 7 E.

----- (Sec. 18) Ferguson.

T. 2 S. R. 6 E.

T. 2 Cuyhoga Mine (Sec. 29)

## PEGMATITE MINERALS

### RARE METALS

These rare minerals are mined from masses of volcanic rock known as pegmatites, which are scattered through the heart of the Black Hills. They occur as component minerals associated with quartz, feldspar and mica. Most of the pegmatites contain several of these minerals so that it is their relative abundance and the market demand which determines which minerals a pegmatite will produce.

In the following list the operating properties are arranged according to their location and the metals they were producing in the summer of 1929:-

#### Keystone District

Mine	Metals Produced	Owners
Etta Mine	Lithium	Maywood Chemical Co.
Peerless	Lithium, Berylium, Tantalum	Consolidated Feldspar Co.
Hugo	Lithium	Consolidated Feldspar Co.
The Dike	Lithium, Berylium	Maywood Chemical Co.
Bob Ingersoll	Lithium	Henault
King Mica	Berylium	Maywood Chemical Co.

#### Custer District

Beecher	Lithium, Tantalum	Collingwood & Greene
Tin Mountain	Berylium, Caesium, Lithium	Maywood Chemical Co.
Old Mike	Berylium	Maywood Chemical Co.

#### Tinton District

Tinton Mine	Tin, Tantalum	Black Hills Tin Co.
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The tendency to consolidate properties under one head seems to extend itself to the pegmatite mines as well as the gold properties, as is evidenced by a glance at the owners of the operating mines. The two largest operating companies are the Maywood Chemical Company, which is principally interested in the rare metals, and the Consolidated Feldspar Company, which operates for Feldspar, the metal bearing minerals being a by-product. These two companies operate most of the producing properties. The Maywood Chemical Company operates the Etta Mine, the Dike, and the Tin Mountain and is working the Old Mike under an option for beryl. The Consolidated Feldspar Company operates the Peerless and the Hugo Mines at Keystone. The Beecher Mine is being operated by its owners, Messrs. Collingwood and Greene. The Bob Ingersoll Mine is also worked by one of its owners, Mr. Dennis Henault.

Though there has been considerable increase in the activity in pegmatite mining recently, there still remains a great



number of pegmatite mines which are either shut down or abandoned. There are also many pegmatite dikes which are only partly prospected or are in the assessment or development stage. There should be ample opportunity, therefore, for an increase in the State's production of these rare metals as the demand for them increases.

### Lithium

The demand for lithium continues strong enough to keep a steady production from several mines. This metal is bought largely by the Maywood Chemical Company for use in storage batteries, glass manufacture, etc. This company produces the lithium mineral spodumene (lithium silicate) from the Etta Mine near Keystone, and also from the Tin Mountain Mine near Custer. Most of the lithium from the Peerless, Hugo, Dike, Bob Ingersoll, and Beecher Mines, however, is mined as the mineral amblygonite (lithium phosphate), though these mines also produce some spodumene.

There is still an abundance of lithia mica which used to be mined as an ore. It has fallen into disuse, however, because it is easier to extract lithium from amblygonite and spodumene. There is still an abundance of lepidolite in the Peerless and Ingersoll mines which can be used as a reserve, if there should be a shortage of other ore minerals. Minor amounts of other lithium bearing minerals occur in some pegmatites. There appears to be a sufficient supply of lithium minerals to insure present production for some time to come.

### Beryl

There has recently been great interest in the mining of beryl. It is a source of the rare metal beryllium which until recently has been sought only as a curiosity. Considerable experimenting has been done with it to determine its possibilities as an alloy, and thus has been used in glass manufacture. Its present use has not yet been made public.

The Maywood Chemical Company produces beryl from its Keystone properties, most of it coming from the Dike and King Mica Mines, and from the Tin Mountain Mine near Custer. The Company has recently taken over the Old Mike Mine which it is developing for its beryl content. Beryl is also produced by the Consolidated Fedlspar Company from the Peerless Mine at Keystone.

Beryl is not confined to the pegmatites just mentioned, and doubtless other dikes will be found to yield the mineral as abundantly when the demand for it is sufficiently great to warrant the search.

### List of Beryl producing Mines

Operated by the Maywood Chemical Company

The Dike

Keystone

King Mica  
Tin Mountain  
Old Mike

Keystone  
Custer  
Custer

Operated by Consolidated Feldspar Company

Peerless

Keystone

### Tantalum

Some tantalum is produced from the Beecher Mine south of Custer. It is also reported as a product of the Nigger Hill pegmatite at Tinton which is undergoing development work. The demand for this metal is not great at present but its presence in the form of the mineral tantalite or columbite is reported in a number of pegmatites. It can therefore be mined as a by-product when the market warrants it.

### List of Tantalum Mines

#### Producing Mines:

Beecher	Custer	Collingwood and Greene
---------	--------	------------------------

#### Developing Mines

Tinton Mine (Nigger Hill)	Tinton	Black Hills Tin Co.
------------------------------	--------	---------------------

### Tin

There is no production of tin in the state at the present time (1929), though pegmatites containing tin in greater or less quantities are rather abundant in the heart of the Black Hills. The only activity in the summer of 1929 was at the Tinton Mine at Tinton, S. Dak., where the Black Hills Tin Company was going some development work preparatory to selling the property. A large mill of 200 ton capacity has been erected and prospect pits and trenches and pits dug for sampling.

Tin production, however, has been at a standstill since closing of the mines after the big tin boom of the early 90's.

A partial list of tin properties follows:-

#### Development work in progress:-

Tinton Mine	Nigger Hill District	Black Hills Tin Co.
-------------	----------------------	---------------------

#### Abandoned or idle mines and prospects, (partial list):-

Cow Boy	Hill City District
Tin Boom	
Black Metal	
Blue Bird	

Olympia  
Tin Plate  
Sally  
Tenderfoot  
Old Jeff  
Tin City  
Gertie

## NON-METALS

### Feldspar

There has been considerable activity in the mining of feldspar during the summer of 1929, due largely to the interest displayed by the Consolidated Feldspar Company, an organization which controls a large part of the output of feldspar in this country. This company has erected a grinding plant at Keystone with a capacity of 77 tons a day. It owns the Hugo Mine and has leased the Peerless. It is also planning to buy feldspar from a number of other pegmatite mines which are operated by other companies. A second company, which is operating a mine for feldspar alone, is the Abingdon Sanitary Manufacturing Company which bought the White Elephant Mine at Nihart Siding. The product of this mine, however, is all used by the Abingdon Company in their potteries at Abingdon, Illinois.

Feldspar is produced from most of the pegmatite mines of South Dakota, and there are many pegmatites which have been only partially developed, and many that have scarcely been prospected. There should be an ample supply of feldspar for a considerable increase in the production of this mineral, if the market for it can be created.

#### List of Feldspar Mines

##### Operated for feldspar:-

Hugo	Consolidated Feldspar Company
Peerless	Consolidated Feldspar Company
White Elephant	Abingdon Sanitary Mfgr. Company

##### Operating mines which can produce feldspar as a by-product:-

Etta	Maywood Chemical Company
Tin Mountain	Maywood Chemical Company

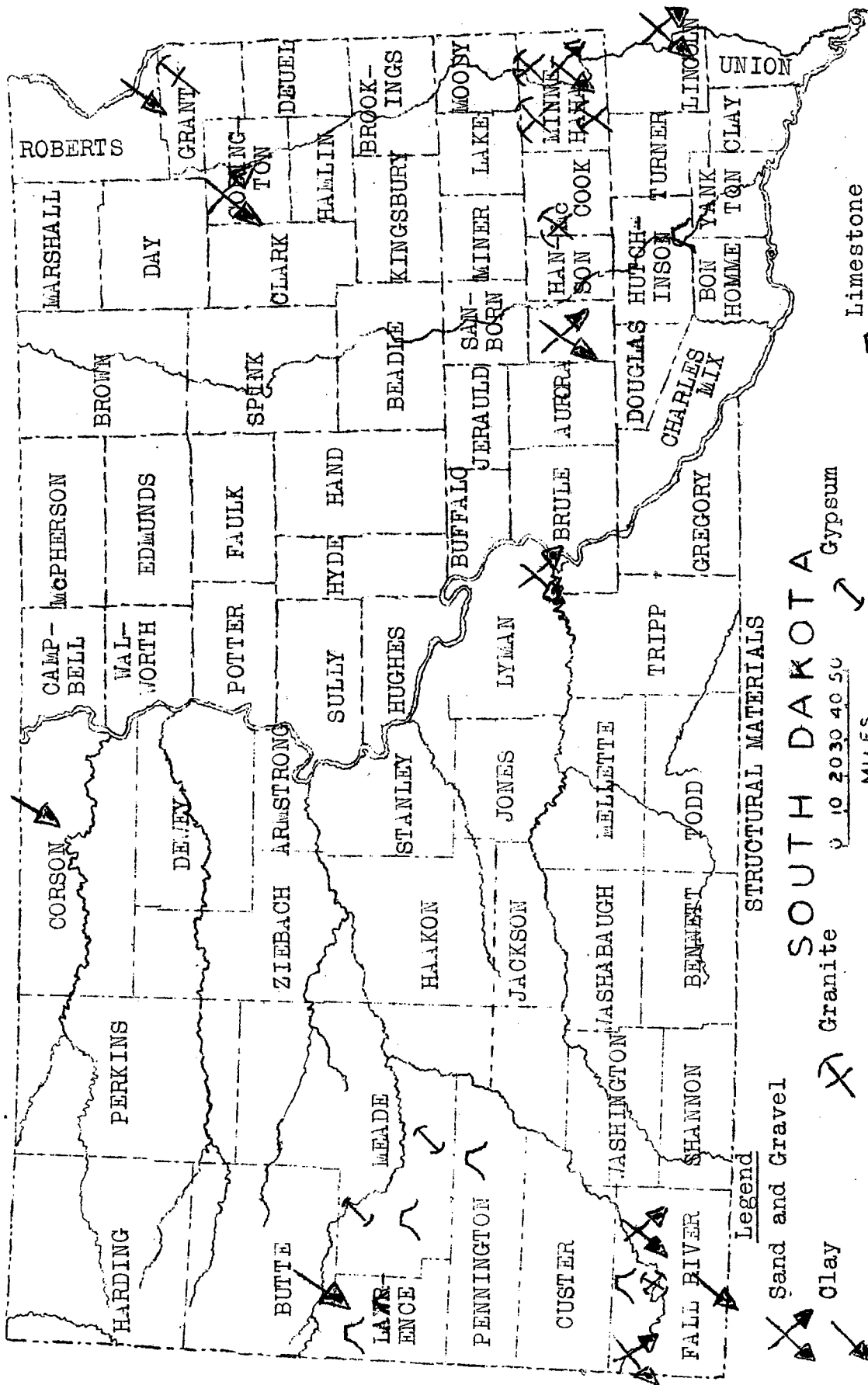
##### Prospects undergoing development:-

Beryl Mine	Dakota Feldspar Company
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## Rose Quartz

A thriving business in ornamental quartz has been built up by Mrs. Edna Scott of Custer, from a vein of rose quartz which she owns. This material is sold in the rough state to jewelry manufacturers and for ornamental pieces. It is also used as decorations on souvenir vases and similar articles. It has a wide sale as polished ornaments, beads, brooch sets, etc. The market is partly local and partly foreign. Much of the production is sold in Custer and neighboring Black Hills towns to the tourist trade, but much is also shipped abroad, particularly to Germany where it is ground for jewelry. No grinding or polishing of this material is done in this country.

Rose quartz is a unique product as it is known to occur in minable quantities in only two veins in this state. Its extraction, therefore, can not become a widespread industry. The veins known, however, are of sufficient size to warrant a thriving small industry unless the demand for such ornamental material declines.



STRUCTURAL MATERIALS

SOUTH DAKOTA

- Sand and Gravel
- Clay
- Granite
- Sandstone
- Gypsum
- Porphyry
- Limestone

0 10 20 30 40 50  
MILES

## BUILDING AND STRUCTURAL MATERIALS

### QUARTZITE

Building and structural materials are abundant in South Dakota but their use is far below their possibilities. Several kinds of building and ornamental stones, concrete and plaster materials, clays, sands and gravels, are included in the list of materials which are now (1929) being exploited to some degree.

The rock which goes by the trade name of Pink Granite, outcrops between Mitchell and the eastern boundary of the State. It is a pink to red quartzite belonging to the Sioux Formation, very dense and quite uniform over large areas. It was probably the first stone quarried for building in the state, and for a time many of the larger public buildings were made from it. Its color and durability have made it one of the best building stones of the State, but the expense of working it and the competition of cheaper building materials has reduced its use to that of crushed rock for concrete aggregate, road surfacing, etc., rip rap, and some sand.

The business in these materials, however, is sufficient to keep five large quarries in operation, all located in the vicinity of Sioux Falls, Dell Rapids, and Spencer. The following companies were operating during the summer of 1929:

Dakota Granite Company, of Sioux Falls,  
Quarry West of Sioux Falls  
Wisconsin Granite Company, of Chicago, Ill.  
Quarry in Sioux Falls  
The Superior Construction Company, of Dell Rapids,  
Quarry at Dell Rapids  
The L. G. Everest Company, of Sioux City, Ia.  
Quarry at Dell Rapids  
The Consolidate Sand and Stone Company, of Sioux Falls  
Quarry at Spencer

Quarries have been opened at East Sioux Falls, Rowena, and in the vicinity of Mitchell, but are not now operating. As these old quarries can be reopened and new ones opened at many other places, there is no limit to the supply of this stone should the market for it increase.

Quartzite was also being quarried from a quartzite formation near Pactola in Pennington County. This quarry is known as the Minnekahta quarry, and is the only quartzite quarry in the state outside of the Sioux quartzite area. The material has been used for paving blocks and crushed for filter sands. It could also be used for building stone, and takes a polish sufficiently well to allow its use for ornamental purposes. It is operated by the Paving Granite Quarry Company of Rapid City.

## GRANITE

The only granite produced in the state in 1929 came from eastern Grant County about four miles east of Milbank. It is produced from a line of quarries about four miles long extending from section 2, T. 120 N., R. 47 W., to Section 17, T. 120 N., R. 46 W. The rock is a dark granite which takes a beautiful polish and is highly prized because of its rich dark color. It goes by the trade name of "Mahogany Granite". The present output is sold almost entirely as an ornamental stone, much of it being polished in the plants at Milbank. Its market includes much of the United States, most of it going east of Chicago.

Four companies are exploiting this stone:-

1. The Charles Hunter Company of Milbank which operates two quarries producing Mahogany and Royal Mahogany Granites and a large grinding and polishing plant in Milbank.
2. The Dakota Granite Company of Milbank which operates one quarry and a cutting and polishing plant at the quarry.
3. Mr. Alec Dewar of Milbank who owns and operates two quarries.
4. The Columbia Granite Company of Ortonville, Minnesota.

There is no immediate danger of shortage of this excellent stone as the deposit is very thick and covers a considerable area.

## PORPHYRY

A felsite Porphyry is quarried and sold by the city of Lead from a quarry north of that city. This is a very tough rock and makes an excellent material for concrete aggregate or road material. The quarry was opened by the City to supply material for surfacing and paving its streets, but it also supplies a demand for crushed rock. Its market, however, is entirely local. The supply of this rock, is practically inexhaustable and a very much increased demand could be supplied.

City of Lead—Quarry north end of the City.

## SANDSTONE

Although sandstone is fairly abundant in the State it was being quarried in the summer of 1929, at only one place. This was in Fall River County about three miles east of Hot Springs. The operating quarry is known as the Evans Quarry but rock has been quarried in the past in at least two other places in that vicinity.

The stone comes from the Dakota Formation and is a very even, medium to fine grained sandstone, made largely of quartz. Its color is a dark buff which turns a uniform brown on weathering. It dresses easily and is not expensive to quarry. These characteristics make it an excellent building stone and it has been used in many public buildings in Hot Springs and neighboring towns. It also has been shipped into neighboring states.

The quarry is owned by Mr. Henry Behring of Hot Springs. He also has bought for development the old Burk quarry, which lies a mile north of the Evans quarry, and contains the same sort of stone. The plant at the Evans Quarry has facilities for making sawed and turned stone to meet most building requirements. A railroad passes both quarries, giving excellent transportation.

#### Sandstone quarries:

Evans Quarry  
Burk Quarry

Hot Springs

### LIMESTONE

Limestone quarrying is not very active in the State though there is ample opportunity for its development.

Chalk, a porous variety of limestone, underlies large areas in the southeastern part of the state and occurs in a narrow belt encircling the Black Hills in Butte, Meade, Pennington, Custer, and Fall River Counties. Though there are many uses for this material, nearly all of the chalk that is now used in this country is imported. Small amounts of South Dakota chalk have been ground and used as a mineral component in commercial hog feed, from a small quarry in the James River Valley about four miles northwest of Menno.

Though there are dense limestone farther east, the largest amounts outcrop about the Black Hills where four quarries were in operation more or less continuously in 1929. Three of these were producing burned lime and the fourth crushed rock. Of these the largest private quarry is owned and operated by the Homestake Mining Company and is located at Calcite in Meade County. This company operates a crusher and two kilns, the entire output of which is used in the metallurgical processes at the Homestake Mine. The only other quarryman selling burned lime was Mr. H. H. Lewis of Spearfish who operates a small quarry and kiln near the mouth of Spearfish Canyon. His market has been entirely local.

The product of the quarry which the State operates near its cement plant at Rapid City might be put in the class with the two above since limestone is all used in the manufacture of Dakotah Cement. This material, however, is never burned to the form of pure quick lime because the ingredients of the portland cement are all burned together.



Two other quarries that have produced burned lime in the past may operate again in the near future. The kiln at the quarry of the Black Hills Lime Company four and a half miles south of Pringle was being repaired during the summer of 1929. This quarry has produced considerable lime in the past, its product being sold for sugar refining. With the increase of this industry in the western states there will doubtless be a demand created for the lime from this quarry. Another lime kiln is located at the quarry owned and operated by the Black Hills Marble Company. This is located in Pennington County near Rapid City where it is readily accessible to railroads and highways.

A number of quarries have been opened to furnish crushed rock, rip rap and similar materials, but most of them have been idle for the last year or more. The only one which was producing in the summer of 1929 was located in Cold Brook Valley a mile and a quarter north of Hot Springs in Fall River County. This quarry is owned and operated by Mr. D. O. Callan of Hot Springs. It is equipped with a crushing and screening plant.

#### List of Limestone Quarries in South Dakota:

##### Quarries Operating in 1929:

Farmstead Mineral Mfg., Co.,  
Menno, Hutchinson County,  
Equipment:--"Wagon Quarry"  
Product:--Chalk for hog feed.

Homestake Mining Company,  
Calcite, Meade County,  
Equipment:--Two kilns, crushers, screens  
Product:--Burned lime.

H. S. Lewis,  
Spearfish, Lawrence County,  
Equipment:--Kiln  
Product:--Burned lime, sugar lime

State of South Dakota,  
Rapid City, Pennington County,  
Equipment:--Steam shovels, gyratory crusher  
Product:--Cement lime.

D. C. Callan,  
Hot Springs, Fall River County,  
Gyratory crusher and screens  
Product:--Crushed rock

##### Quarries Idle in Summer of 1929.

##### Lawrence County

Roy T. Patterson,  
Spearfish,  
Small crushing and screening plant,  
Product:--Crushed rock.

Pennington County.

Black Hills Marble and Quarry Co.  
Rapid City  
Crushing and screening plant and kiln,  
Product:-Crushed rock, Burned lime

Northwestern Quarry Company,  
Rapid City  
Crushing and screening plant  
Product:-Crushed rock

Dark Canyon Stone Company,  
Rapid City,  
Crushing and Screening plant  
Product:-Crushed rock

Custer County

The Black Hills Lime Co.  
Pringle  
Kiln  
Product:-Sugar lime

The Holly Sugar Corporation  
Pringle, quarry at Loring siding  
No equipment  
Product:-Sugar lime

Ingleside Limestone Company  
Pringle, quarry at Loring Siding  
No equipment  
Product:-Sugar Lime

Fall River County

L. J. Bishop  
Hot Springs  
Small Crushing and screening plant  
Product:-Crushed rock

Union County

J. F. Webber  
Richland  
No equipment  
Crushed rock

Vic Olson  
Richland  
No equipment  
Crushed rock

## GYPSUM

All the gypsum produced in the state in 1929 came from two quarries in Meade County. One of these is located at Black Hawk. It is owned and operated by the Dakota Plaster Company, which produces an excellent grade of plaster and manufactures gypsum tile. The market is local at present, but has been fairly steady since the opening of the plant in 1910.

The other quarry is located immediately northeast of Piedmont and is owned and operated by the U. S. Gypsum Company. Their product at present is plaster which is widely distributed over the United States in the various products of the U. S. Gypsum Company.

### Gypsum Quarries

#### Operating Quarries:

The Dakota Plaster Company,  
Black Hawk, Meade County,  
Calcining plant,  
Product:--Plaster and tile.

The U. S. Gypsum Company,  
Piedmont, Meade County,  
Calcining Plant,  
Product:--Plaster.

## CLAYS

Clays suitable for a great variety of uses lie in the State, but very little development has been attempted. Brick tile, and bentonitic clays are the only kinds that have been developed. Clays for brick and tile can be found in most parts of the State, though such clays are usually the shales which form the bed rock. Most of the glacial clays which cover the eastern part of the State carry amounts of lime which make the brick "soft". Glacial clays are being used, however, in the plant of the Miller Brick Company, at Big Stone City where an excellent yellow brick is made. The clay used is the deposit of a glacial stream, and it is probable that similar clays could be found in other parts of the glaciated area of South Dakota if the proper search were made, as glacial water channels are fairly common.

Shales of the Pierre Formation outcrop in the valleys of the Missouri and James Rivers and underlie a large part of western South Dakota. These shales are being used for brick and tile by the Standing Rock Brick and Tile Company whose plant is located at Wautauga in Corson County. The same material was used at the plant (now abandoned) of the Aberdeen Pressed Brick Company whose pit was located at Mina in Edmonds County. This shale makes a red brick of good quality.

Similar shale belonging to the Fuson Formation is used at Belle Fourche by the Black Hills Clay Products Company. This company lists among its products common and face brick, building block, and tile.

Bentonitic clays are white clays possessing unusual physical and chemical characteristics which have made them valuable for many purposes. Those being quarried in South Dakota are used almost entirely for softening water in commercial plants built for this purpose.

Bentonite is to be found in both the eastern and western parts of the State. The present development, however, is entirely in the west. The Refinite Company, of Omaha, operates a plant at Ardmore in Fall River County where this clay is prepared for use in water softeners manufactured by the company, and is also sold to other markets. Bentonite pits are also operated in the vicinity of Belle Fourche, in Butte County, by the Bentonite Products Company of Belle Fourche, and by Mr. George Stetta, of the same place. These pits are worked rather sporadically, however, though they produce a material of good quality. The information now at hand indicated that there is an adequate supply of this material to allow a considerable increase in its production should a demand for it be created.

### Brick and Tile

#### Operating Pits

Miller Brick Company (Minneapolis, Minn.)  
Big Stone City, Grant County.

Black Hills Clay Products Company,  
Belle Fourche, South Dakota.

Standing Rock Brick and Tile Company,  
Watauga, Corson County

#### Idle and Abandoned

Aberdeen Pressed Brick Company,  
Mina, Edmunds County.

### Bentonitic Clays

Refinite Company (Omaha, Nebraska)  
Ardmore, Fall River County.

The Bentonite Products Company,  
Belle Fourche, Butte County.

Mr. George Stetta,  
Belle Fourche, Butte County.

## SANDS AND GRAVELS

In the last few years sands and gravels have been by far the most important resource as a structural material. Their use has greatly increased with the introduction of concrete and stucco into the building trades to take the place of stone and wood. Enormous amounts have also gone into road construction, with the rapidly increasing demand for gravel roads.

In spite of this increased use, large commercial operations have not developed as extensively as might be expected. The center of commercial production in 1929 was in the Big Sioux Valley. Large plants were operated at Sioux Falls and Watertown because the local market was sufficient to give an impetus, and shipping facilities were good. Great deposits occur at these locations, but many other deposits of equal or greater size are scattered over the state. The tendency has been for builders either to ship materials from the plants at Sioux Falls and Watertown, even to points west of the Missouri, or to take it from "wagon" pits near the job, rather than to develop new centers of production.

Where a very clean material is wanted it is necessary to wash or screen our gravels, for most of them have been only fairly well sorted naturally. Those east of the Missouri River are of glacial origin and therefore contain quite a mixture of materials both as to size and composition. Those west of the Missouri are either sands and gravels washed into the stream valleys from the Bad Lands or Black Hills, or sands and gravels concentrated in the valleys from the rocks of the valley walls. All these deposits contain excellent material which can be separated by washing and screening. For this reason, the products of the Big Sioux washing plants have been in great demand for concrete work over the state.

The "wagon pit" has hindered the scattering of larger washing plants over the state because sand and gravel is a bulky product and transporting it is expensive. Therefore, it is found profitable, in many cases, to use an inferior grade of material which can be obtained by hauling from a nearby pit, rather than to ship in graded material.

The "wagon pit" has also become very important in the building of highways since 1,500 to 2,000 yards of gravel is needed for every mile surfaced. A clean gravel is not the most desirable for this purpose as it does not pack as well as one that contains some fine material. The "roadside" pits, therefore, can be used to good advantage, to supply this material and thus cut down the cost of long shipments. Nearly 400 such pits were used in graveling State and county highways in 1929.

Though large amounts of sand and gravel are produced from these pits, they are worked so intermittently that it is impossible to get a list which is anywhere near complete. In most of them sand and gravel is bought by the wagon load, the buyer paying for the right to load and haul away so many yards. The

largest operations in these pits are those in which the county and state highway commissions take material for road surfacing. A crew and considerable machinery are often installed for such operations but remains in one pit only a few weeks at most, after which the pit may lie idle for many months or even years.

### COMMERCIAL PITS

There were nineteen commercial pits operating continuously in 1929, sixteen of which were in the eastern half of the State. Their distribution was as follows: thirteen in the Big Sioux Valley, one in the James Valley, one in the Missouri Valley, one on the uplands south of the White River, and three in the Cheyenne Basin.

#### Big Sioux Valley

##### Codington County

Watertown and Lake Kampeska are located on an old glacial spillway which emptied into the Big Sioux Valley. The great quantities of sand and gravel deposited in this spillway and the abundant supply of water available have made the development of washing plants easy. Four companies are operating in this deposit, all in the vicinity of Watertown. Three of them, The American Sand and Gravel Company, The Kampeska Materials Company, and the Zeller Concrete Materials Company, operate electrically driven washing and screening plants of large capacity. The fourth is a small pit operated by the Watertown Cement Products Company which uses all the output for its own products.

##### Lake County

Lake Madison lies in a glacial spillway similar to that at Watertown though not quite as extensive. The deposits in this spillway are being made use of by the Ketchum Elevator Company, which has a small washing and screening plant of about 600 yards daily capacity on the shores of Lake Madison. During 1929 the material was being taken from the bottom of the lake by a suction pump, but the large deposits along its shores will allow for a great expansion of the plant.

##### Minnehaha County

Minnehaha County has six plants operating in sand and gravel pits. Five of these are near Sioux Falls, due to the demand for concrete material and the large deposits in the vicinity. The sixth is at Sherman.

The largest are washing and screening plants located a couple of miles northeast of Sioux Falls. The Consolidated Sand and Stone Company of Sioux Falls operates a large washing and screening plant

here and the Hays Sand and Gravel Company a large screening plant. These two are the largest producers in the county. A commercial pit is also operated by the Nelson Dairy Farm which sells "pit run" or small lots of screened material.

Aside from the above firms which produce both sand and gravel there are three which produce only sand. These are The Sioux Falls Pressed Brick Company, and Mr. W. F. Gage, both of Sioux Falls, and Mr. Lous Wold of Sherman. The first company uses all the product of its pit in the manufacture of sand-lime brick and is operating a plant with a capacity of about 20,000 brick a day. The other two are using most of their product in their own plants for the making of concrete blocks.

#### Lincoln County

A small pit with a semi-portable washing and screening plant is in operation near the river level east of Canton. Its product is used entirely by the company (The Canton Block and Tile Company) in the manufacture of concrete products. A large pit was opened by the Chicago, Milwaukee, St. Paul and Pacific Railroad southeast of Fairburn. The gravel bank here was being operated along a quarter mile front (1929). No washing or screening equipment was used, the material being shoveled directly into cars and shipped as "pit run". Much of it is used by the railroad itself.

#### James Valley

#### Davison County

The only plant operating on the gravels of the James Valley is located at Mitchell. It is owned by the Spears Ide, Sand, and Gravel Company which operates a crushing, screening, and washing plant of about 200 tons daily capacity. The gravel deposits of this vicinity are large and the shipping facilities good. Their market, is largely local at present. The size and location of the deposits, however, allow a considerable expansion of the industry in this vicinity when conditions warrant.

#### Missouri Valley

#### Lyman County

There are a few very large deposits of sand and gravel in the valley of the Missouri but in only one place is there commercial production. This is at Oacoma in Lyman County where the Chicago, Milwaukee, St. Paul and Pacific Railroad is operating a pit. Most of the material is used by the railroad, but considerable quantities have been sold for highways and for other purposes. The railroad operates a small screen in connection with its car loader. It is used to remove the coarsest materials only.

## Rosebud Uplands

### Gregory County

Sand and loosely consolidated sandstone occurs as bedrock at many places in the state. This has been made use of in Gregory County by the Burke Concrete, Sand and Stone Company which operates a small pit west of Burke. Nearly all the production is used by the company in the making of concrete products. They are engaged in the manufacture of concrete block, tile and brick, their plant having a daily capacity of about 700 block and 15,000 brick per day. The bedrock, which furnishes the sand, is an extensive formation so there is no shortage of material in sight, either at the present rate of production or at a considerable increase.

## Cheyenne Basin

### Fall River County

Two pits are operating on gravels in the valley of the Cheyenne. The largest is at Oral, in a great gravel terrace high on the east bluff of the Valley. It is owned by the Chicago, Milwaukee, St. Paul and Pacific Railway and operated by the firm of Rites and Crites. The company operates a washing and screening plant with a small jaw crusher for crushing oversize material. It is electrically operated and has a daily capacity of about 500 or 600 cubic yards.

The second pit is in the western end of Fall River County at the Chicago, Burlington and Quincy Railroad Station of Marietta. This is owned and operated by Mr. G. W. Tubbs. The material here is furnished as "pit run", but as it comes from bars in the Cheyenne River bed fairly well sorted, material of several grades can be furnished. The material is all shipped in car load lots to markets in the southwestern part of the state and to adjacent parts of the neighboring states.

### Pennington County

A small screening plant is operated in the Farmingdale Pit which lies in the valley of Rapid Creek. The pit is owned and operated by the Rapid River Gravel Company of Rapid City. The material has been sold largely for railroad ballast but the company plans to install a washing plant in the near future to furnish material for other purposes.

## List of Commerical Pits

(In Operation During the Summer of 1929)

### Big Sioux Valley

The American Sand and Gravel Company,  
Watertown, Codington County,  
Washing and screening plant.



The Kampeska Materials Company,  
Watertown, Codington County,  
Washing and Screening plant

The Zeller Concrete Materials Company,  
Watertown, Codington County,  
Washing and screening plant

Watertown Cement Products Company,  
Watertown, Codington County,  
Pit run

The Ketchum Elevator Company,  
Madison, Lake County,  
Washing and screening plant.

Consolidated Sand and Stone Company,  
Sioux Falls, Minnehaha County,  
Washing and screening

Hays Sand and Gravel Company,  
Sioux Falls, Minnehaha County,  
Screening plant

Nelson, Dairy Farm  
Sioux Falls, Minnehaha County,  
Pit Run

Sioux Falls Pressed Brick Company,  
Sioux Falls, Minnehaha County,  
Sand

F. W. Gage,  
Sioux Falls, Minnehaha County,  
Concrete sand

Lou Wold,  
Sherman, Minnehaha County  
Concrete sand

C. M. St. P. & P. Railroad,  
Fairburn, Lincoln County,  
Pit Run gravel and sand

Canton Block and Tile Company,  
Canton, Lincoln County,  
Washing and screening plant.

#### James Valley

Spears Ice, Sand and Gravel Company,  
Mitchell, Davison County,  
Washing and Screening plant.

#### Missouri Valley

C. M. St. P. & P. Railroad,

Oacoma, Lyman County,  
Screening plant on car loader.

Rosebud Upland

Burke Concrete, Sand and Stone Company,  
Burke, Gregory County,  
Concrete block and tile plant using pit run

Cheyenne Basin

Rites and Crites,  
Oral, Fall River County,  
Washing and Screening plant with crusher.

G. W. Tubbs,  
Marietta, Fall River County,  
Pit Run

Rapid River Gravel Company,  
Farmingdale, Pennington County,  
(Office in Rapid City, S. Dak.)  
Small Screening plant.

## WATER

Four companies in the state are engaged in the treatment of water which is sold as drinking water, for battery service, in the manufacture of ice, and for medicinal and chemical purposes. These companies are able to produce water from local supplies, which is much "purer" than the water would be naturally. The market for this product, so far has been largely local and therefore the business has developed in the larger cities, and, in somecases, as a side line to other businesses which needed purified water.

The Sioux Distilled Water Company, Inc., of Sioux Falls, operates a distilling plant with a daily capacity of 4,000 gallons. They are operating on spring water pumped from shallow wells north of the City.

A plant treating deep well water is located at Aberdeen and is operated by the Culbert Spring Water Company. The water of this region is notably hard and by a softening process this company is able to produce a soft water of excellent potability. The plant has a capacity of 40 gallons per minute.

Mitchell is served by the Mitchell Distilled Water Company which operates a distilling plant in the city.

An excellent water is produced at Chamberlain in a plant operated by the Chamberlain Water Company. This company treats Missouri River water by a combination of filtration and electric treatment. The plant has a capacity of about 600 gallons per day, and the water is marketed rather widely over the southern part of the state.

### Companies Producing Distilled and Treated Water.

Sioux Distilled Water Company, Inc.,  
Sioux Falls, Minnehaha County,  
Distilling plant.

Culbert Spring Water Company,  
Aberdeen, Brown County,  
Softening Plant.

Mitchell Distilled Water Company,  
Mitchell, Davison County,  
Distilling plant.

Chamberlain Water Company,  
Chamberlain, Brule County,  
Filter and electric treatment plant.