# THE GEOLOGICAL SURVEY OF WYOMING

D. L. BLACKSTONE, Jr., State Geologist

# Biennial Report of the State Geologist for 1967-1969

University of Wyoming
Laramie, Wyoming
January, 1969

THE GEOLOGICAL SURVEY OF WYOMING
UNIVERSITY OF WYOMING
BOX 3008 UNIVERSITY STATION
LARAMIE, WYOMING 82070

January 2, 1969

The Honorable Stanley K. Hathaway
Governor of the State of Wyoming
State Capitol Building
Cheyenne, Wyoming 82001

Sir:

The Biennial Report of the State Geologist is herewith submitted in accordance with the requirements of Article 11, Section 9-252, Wyoming Compiled Statutes, 1957.

The report covers the period July 1, 1967 to June 30, 1969.

Respectfully submitted,

D. L. Blackstone, Jr.

D. L. Blackstone, Jr.
State Geologist

DLB:sa

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# BIENNIAL REPORT OF THE STATE GEOLOGIST

# OF THE

# STATE OF WYOMING

for

1967 - 1969

by

D. L. BLACKSTONE, Jr.

## INTRODUCTION

The activities and technical work of the Geological Survey of Wyoming for the period 1967-69 are reported herein. The Survey engages in geologic mapping, sampling programs, publication of technical reports, and participates in cooperative activities with other agencies of the State of Wyoming, and with agencies of the Federal government.

The Geological Survey of Wyoming suffered a severe loss in the death of Dr. Horace D. Thomas on May 14, 1967. Dr. Thomas was first appointed to the position of State Geologist and Director of the Geological Survey of Wyoming in March, 1941, and had diligently served the people of the State since that date. Dr. Thomas achieved a national reputation in the field of stratigraphy and petroleum geology, and his sincere interest in the petroleum industry in Wyoming brought him a wide circle of friends, and the respect of the petroleum industry.

Dr. Thomas' talents and mature judgement will be missed. His services have contributed greatly to the State's progress.

## ORGANIZATION

The Wyoming Constitution (Article 9, section 6) provides that there shall be a state geologist. The Geological Survey of Wyoming was established in 1933 under the legislature (Wyoming Statutes Article 11, section 9-255). The statutes provide for an Advisory Board consisting of the governor of the State of Wyoming, the president of the University of Wyoming, and the state geologist (Article 11, section 9-257).

Dr. D. L. Blackstone, member of the faculty of the University of Wyoming since 1946 was appointed to the position of State Geologist on July 11, 1967, by Governor Stanley Hathaway to fill the unexpired term of the late Dr. H. D. Thomas.

The Geological Survey is by statute located at Laramie, and in the physical plant of the University of Wyoming, an arrangement whereby many advantages accrue to the State of Wyoming. The Geological Survey has access to the research facilities of the Department of Geology, the research capabilities of the other scientific departments of the University, the U. S. Bureau of Mines Laramie Petroleum Research Center, the branch office of the U. S. Geological Survey, and the Natural Resources Research Institute.

The Geological Survey of Wyoming occupies five rooms in the Geology Building at the University of Wyoming totaling approximately 1,630 square feet. In addition, the Geological Survey has available a Butler Hut (World War II, 1,000 square feet) used for storage of publications, maps, equipment, and well cuttings and cores. Storage space for cores and cuttings (1,500 square feet) is provided in the basement of another temporary University building.

The staff of the Geological Survey on July 1, 1967, consisted of:

Dr. D. L. Blackstone, Jr. - State Geologist and Director of the Geological Survey of Wyoming, and Professor of Geology, University of Wyoming

Dr. W. H. Wilson - Assistant State Geologist

Mr. Kenneth Pedersen, M.S. - Geologist

Mrs. Stephanie Aker - Secretary

Mrs. Sharilyn Paulson - Clerk-Typist

Mr. Robert C. Michael - Temporary Geologist

Mr. Edward A. Gloor - Temporary Geologist

Mr. James S. McAndrew - Temporary Geologist

## ACTIVITIES OF THE GEOLOGICAL SURVEY

### Publications of the Geological Survey

During the 1967-69 biennium the Geological Survey has published several items dealing with Wyoming geology. The publications with a brief description are listed below.

Bulletins:

Bulletin 52. - Measured sections of Devonian rocks in northern Wyoming, by Charles A. Sandberg. 93 pages.
Field work was done by personnel of the U.S. Geological Survey. The report will be useful in exploration for oil and gas, and also contains a section dealing with Ca/Mg content of the limestones.

Preliminary Reports:

Preliminary Report No. 7. - The Centennial Ridge Gold-Platinum District, Albany County, Wyoming, by M.E. McCallum. 13 pages, 1 figure, 1 plate (map), 1 table.
A resume of production data for the district with suggestions for further exploration.

Preliminary Report No. 8. - The New Rambler Copper-Gold-Platinum District, Albany and Carbon Counties, Wyoming, by M.E. McCallum and C.J. Orback. 12 pages, 1 figure, 1 plate (map).

Preliminary Report No. 9. - Gypsum Deposits in the Cody area, Park County, Wyoming, by J. Bullock and W.H. Wilson (in press).

Preliminary Report No. 10. - Taconite in the Wind River Mountains, Sublette County, Wyoming, by R.G. Worl. 15 pages, 7 figures, 5 tables, 1 plate (map).

Maps:

Geologic Map of the Medicine Bow Mountains, Albany and Carbon Counties, Wyoming, by Robert S. Houston.
Colored geologic map, scale 1" equals 1 mile, covering 1,500 square miles in southeastern Wyoming. Emphasis is placed on the nature and distribution of rocks of Precambrian age, and their economic potential.

Open File Reports:

Investigations are in progress dealing with glass sands, limestone, bentonite, and iron formations. Analytical work on these commodities has not been completed but the data so far available is on open file in the offices of the Survey.

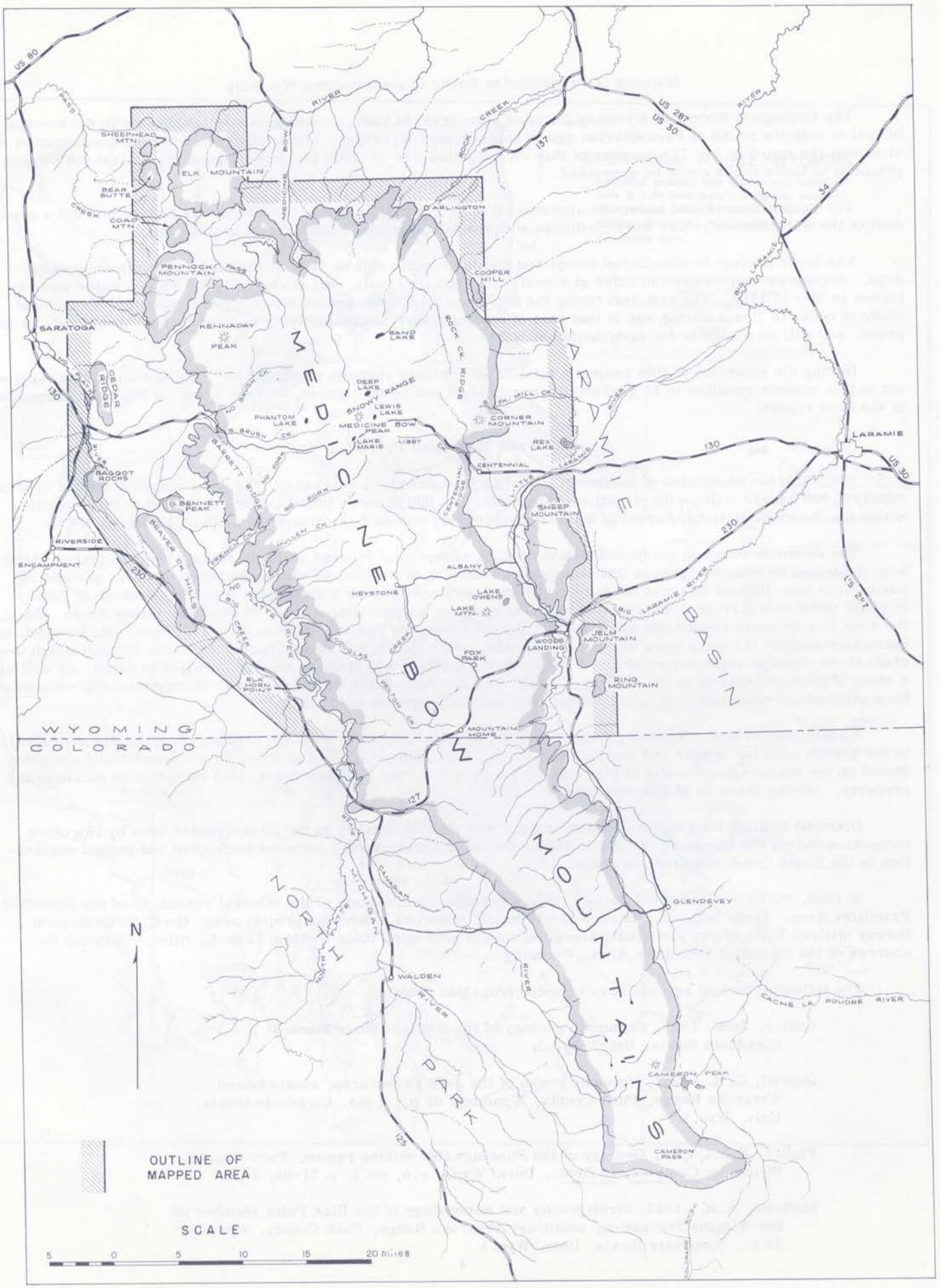



Figure I. Index map of The Medicine Bow Mountains

## Mapping of Precambrian Rocks in southeastern Wyoming

The Geological Survey of Wyoming initiated a program in 1957, funded by a special request in the biennial budget to map the rocks of Precambrian age in southeastern Wyoming. The area covered by this investigation is shown on the map Fig. 1. The purpose of this investigation was to study the general geology, so that the economic potential of these rocks could be appraised.

The project was placed under the supervision of Dr. R.S. Houston of the University faculty who did a great deal of the work himself. The work continued with the aid of graduate students up to this year.

The basic project is considered completed and the results will be fully available in approximately sixty days. A geologic map printed in color at a scale of 1" equals 1 mile, and covering 1,500 square miles was released in May of 1968. The text describing the details will be published as Memoir No. 1, entitled "A regional study of rocks of Precambrian age in that part of Medicine Bow Mountains lying in southeastern Wyoming", is in press, and will be available for distribution shortly.

During the existence of this project a total of 20 graduate students participated. The investigations carried out in this manner resulted in 20 graduate theses, and 10 published reports. All the material has been assembled in the final report.

## Absaroka Mountains Project

The Absaroka Mountains of northwest Wyoming (see Absaroka index map, Fig. 2), occupy an area of approximately 8,000 square miles with elevations ranging from 6,000 to more than 13,000 feet. Most of this area lies within the Shoshone National Forest of which approximately one-half is wilderness or primitive area.

The mountain range is composed of a very thick sequence of layered volcanic rocks which, in places, have been deformed by younger igneous intrusive rocks. Since it is well known that many large metallic mineral deposits have been located in areas of structural complexity and igneous activity, the Wyoming Geological Survey in 1951, undertook a large scale regional mapping program emphasizing a study of the mineralized areas. Since the area is extremely rugged and inaccessible, detailed mapping can only be done on foot. This could be aided by helicopter support if money were available. To date, more than 1,200 square miles have been mapped which include three metallic mineralized areas; Kirwin, Stinkingwater, and Sunlight regions, studied in detail, as well as a study of gypsum deposits in the vicinity of Cody. As a result of this work, a number of major mining companies have utilized our compiled data in conducting exploration programs in the area.

As a follow-up to the Wyoming Geological Survey data, a specific diamond drilling program was conducted in the Kirwin area for copper and molybdenum during the summers of 1963 to 1966, by a major mining company. Based on the encouraging results of this exploration program, the company excercised its option to purchase the property. Mining plans as of this date are indefinite.

Diamond drilling for copper and molybdenum was also undertaken in the Stinkingwater area by two other companies during the summers of 1965 to 1968. Other exploration work included helicopter and ground exploration in the Eagle Creek and Sunlight areas.

In 1965, the U.S. Geological Survey made a reconnaissance study of the mineral resources of the Stratified Primitive Area. Since some of this area is within our Absaroka Mountains project area, the U.S. Geological Survey utilized much of our previously compiled data in preparing their Bulletin 1230-E, titled, "Mineral Resources of the Stratified Primitive Area, Wyoming".

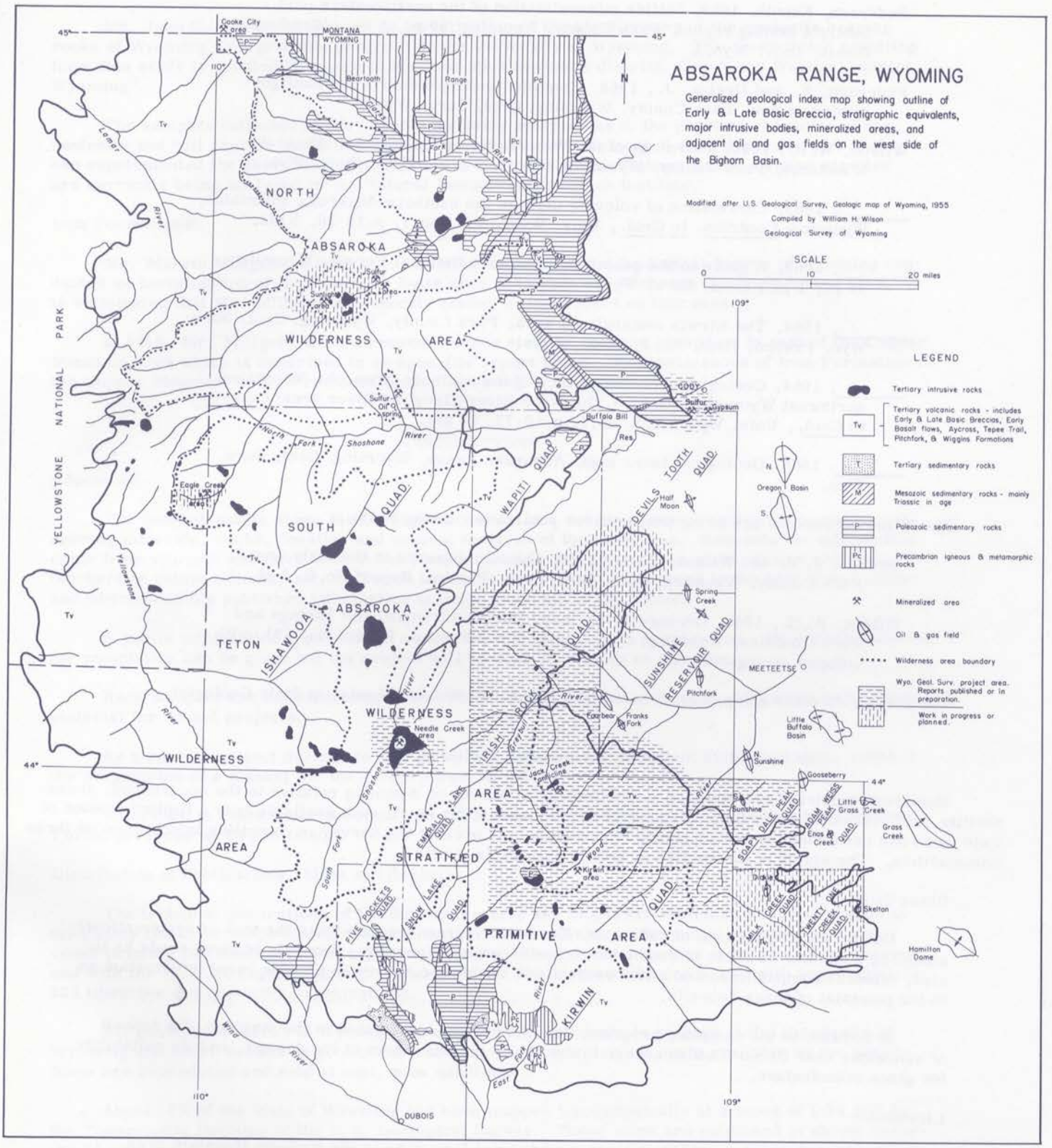
The following formal reports have resulted from this project:


Dreier, John, 1967, Economic geology of the Sunlight Basin area: 81 p., 1 pl. (Graduate thesis, Univ. Wyo.).

Dunrud, C.R., 1962, Volcanic rocks of the Jack Creek area, southeastern Absaroka Range, Park County, Wyoming: 92 p., 2 pls. (Graduate thesis, Univ. Wyo.).

Fisher, F.S., 1967, Geology of the Stinkingwater mining region, Park County, Wyoming: Contribs. to Geol., Univ. Wyo., v. 6, no. 1, p. 71-86, 1 pl.

McGrew, A.R., 1965, Stratigraphy and mineralogy of the Blue Point Member of the Wiggins Formation, southeast Absaroka Range, Park County, Wyoming: 52 p., (Graduate thesis, Univ. Wyo.).


ABSAROKA RANGE, WYOMING
Generalized geological index map showing outline of Early & Late Basic Breccia, stratigraphic equivalents, major intrusive bodies, mineralized areas, and adjacent oil and gas fields on the west side of the Bighorn Basin.
Modified after U.S. Geological Survey, Geologic map of Wyoming, 1955
Compiled by William H. Wilson
Geological Survey of Wyoming
SCALE
0 10 20 miles
LEGEND
Tertiary intrusive rocks
Tertiary volcanic rocks - includes Early & Late Basic Breccias, Early Basalt flows, Aycross, Tepee Trail, Pitchfork, & Wiggins Formations
Tertiary sedimentary rocks
Mesozoic sedimentary rocks - mainly Triassic in age
Paleozoic sedimentary rocks
Precambrian igneous & metamorphic rocks
Mineralized area
Oil & gas field
Wilderness area boundary
Wyo. Geol. Surv. project area. Reports published or in preparation.
Work in progress or planned.
MONTANA
WYOMING
YELLOWSTONE NATIONAL PARK
NORTH ABSAROKA WILDERNESS AREA
SOUTH ABSAROKA WILDERNESS AREA
TETON WILDERNESS
STRATIFIED PRIMITIVE AREA
Cooke City area
Beartooth Range
Lamar River
Clarks Fork
North Fork Shoshone River
Eagle Creek area
Sunlight area
Sulfur Oil & Gas area
Buffalo Bill Res
Yellowstone River
Shoshone River
Needle Creek area
Wood River
Kirwin
Wind River
South Fork
East Fork
DUBOIS
Oregon Basin
Half Moon
Spring Creek
Pitchfork
Franks Fork
Fossil Basin
Little Buffalo Basin
N. Sunshine
Gooseberry
Sunshine
Little Grass Creek
Grass Creek
Enos Creek
Dickie
Skelton
Hamilton Dome
MEETEETSE
WAPITI QUAD
DEVILS TOOTH QUAD
SUNSHINE RESERVOIR QUAD
IRISH CANYON QUAD
EMERALD LAKE QUAD
SNOW LAKE QUAD
FIVE POCKETS QUAD
ADAM PEAK QUAD
DALE CREEK QUAD
MILK CREEK QUAD
TWENTY CREEK QUAD
45°
44°
110°
109°

Pedersen, Kennth, 1968, Sulfide mineralization of the northwestern part - Sunlight mining region, Park County, Wyoming: 50 p., 1 pl., (Graduate thesis, Univ. Wyo.).

Pedersen, K. and Dreier, J., 1968, Compiled geologic map of the Sunlight mining region, Park County, Wyoming: Geol. Surv. Wyo.

Wilson, W. H., 1960, Petrology of the Wood River area, southern Absaroka Mountains, Park County, Wyoming: 122 p., 2 pls., Geol. Surv. Wyo.

_____, 1963, Correlation of volcanic units in the southern Absaroka Mountains, Wyoming: Contribs. to Geol., Univ. Wyo., v.2, no.1, p.13-20, 3 pls.

_____, 1963, A guide to the geology of Shoshone National Forest, Wyoming: 43 p., 1 pl., Geol. Surv. Wyo.

_____, 1964, The Kirwin mineralized area, Park County, Wyoming: Geol. Surv. Wyo. Prelim. Rept. No. 2, 12 p., 2 pls.

_____, 1964, Geological reconnaissance of the southern Absaroka Mountains, northwest Wyoming, Part 1 - The Wood River-Greybull River area: Contribs. to Geol., Univ. Wyo., v. 3, no. 2, p. 60-77, 12 pls.

_____, 1968, Geological index map, Absaroka Range, Wyoming: Geol. Surv. Wyo.

The following reports are being prepared for publication during 1969:

Bullock, J. M. and Wilson, W. H., 1969, Gypsum deposits in the Cody area, Park County, Wyoming: Geol. Surv. Wyo. Prelim. Report No. 9, 1 pl.

Wilson, W. H., 1969, Geology of the Soapy Dale quadrangle, Hot Springs and Park Counties, Wyoming: Geol. Surv. Wyo. Prelim. Report No. (?), with colored geological map.

The project director and principal investigator is W. H. Wilson, Assistant State Geologist.

## Commodity Studies

Numerous inquiries are directed to the Geological Survey of Wyoming relative to the occurrence, accessibility, and volume of many mineral materials. Because of the small staff available only a limited amount of field work has been done toward supplying information. At present the Survey is compiling information on three commodities. The status of the studies is briefly summarized below.

### Glass Sand:

During the field season of 1968, Mr. Kenneth Pedersen was assigned the task of systematically sampling a number of areas of dune sand in south-central Wyoming. Analysis of these sands as to size, mineral composition, and silica content will enable the Survey to provide basic information as to the potential of these deposits.

In addition to the sampling program, Mr. Pedersen participated in the mapping of a deposit of sandstone near Como Bluff to ascertain the character and extent of the deposit, and its suitability for glass manufacture.

### Limestone:

Mr. Pedersen conducted systematic sampling of limestone in the Bighorn Mountain area. These limestones will be analyzed as to content of CaO, thereby providing data relative to sources of limestone in that part of Wyoming.

Bentonite:

Mr. John C. Davis carried out an investigation of the stratigraphy of the bentonite bearing rocks of Wyoming as a graduate program at the University of Wyoming. The dissertation resulting from this study is entitled "Geology of the Clay Spur bentonite district, Crook and Weston Counties, Wyoming".

The samples collected by Mr. Davis are being analyzed as to the physical character of the bentonite and will provide useful information relative to development of such deposits. Mr. Pedersen supplemented the above with investigation of bentonite in the Bighorn Basin. These samples are currently being analyzed by the Natural Resources Research Institute.

Iron Formations:

Mr. Marvin Millgate, a former member of the staff of the Geological Survey of Wyoming conducted an investigation of the Rawhides Butte area in Goshen and Niobrara Counties during 1964. It is anticipated that Mr. Millgate will shortly render a final report on this area.

In 1965, Mr. Millgate made a reconnaissance study of the iron formation in part of the Copper Mountain area which is described in an open-file report titled, "Reconnaissance of Iron Formation in the Copper Mountain area, Fremont County, Wyoming".

## Public Services

Education:

The general public views the Geological Survey as a source of non-technical information concerning minerals, rocks, fossils, and unusual features of the landscape. Requests for information come from tourists who have been in the state or are en route through the state, school children, teachers in public schools, etc. All such inquiries are promptly answered to the best of our ability, and where possible published information is made available to the public.

A public information type bulletin on fossils of Wyoming is in preparation. No definite schedule for completion can be given but the project will be done as rapidly as possible.

Rock samples are distributed to at least 250 school children each year, who write and request material for school projects.

As a special project during the last year, Dr. Wilson, the Assistant State Geologist, aided in the preparation of a manual for the 4-H program in geology.

Reference is made under the Absaroka Mountains program to a guide to the Shoshone National Forest prepared by Dr. Wilson.

Distribution of Publications, Maps and Reports:

The technical publications of the Survey (reports and maps) are distributed free of charge to all County libraries in the State. The publications are available to the public at a cost which will cover printing and handling. The publications are exchanged with all other state geological surveys, and with the U.S. Geological Survey. In addition the publications are exchanged with approximately 225 libraries and scientific organizations.

All geologic research in Wyoming done by graduate students in geology at the University of Wyoming and which results in geological maps, charts, or tables, is made available by the Survey. Maps are reproduced and sold at cost, plus handling.

About 65% of the State of Wyoming has been mapped topographically at a scale of 1:24,000 by the Topographic Division of the U.S. Geological Survey. These maps are published in sheets covering $7\frac{1}{2}$ minutes of latitude and longitude (approximately 60 square miles) known as quadrangle sheets.

The Geological Survey of Wyoming stocks all available topographic quadrangle maps for distribution to the public, and other state agencies.

Bibliography:

The Geological Survey is charged by statute with the preparation of bibliographies of published material dealing with all phases of the geology of the state. At present there is in preparation such a bibliography for the period 1917-1945. The material was compiled by Mr. Max Troyer several years ago, and it is now being put in shape for printing.

Mineral Identification Service:

Mineral identification service is provided free of charge to any resident of Wyoming. The number of calls for this service has been over 500 per year. The Survey does not provide assay service, or quantitative chemical analyses. Individuals requesting such service are referred to other state agencies, or to commercial enterprises whichever may be appropriate.

Preservation of Cores and Cuttings from Exploratory Drilling:

The Geological Survey of Wyoming, in cooperation with the Department of Geology, University of Wyoming, has accepted and preserved cuttings and cores from significant wells drilled in the course of exploration for oil and gas in Wyoming. The collection currently contains samples representing about $7\frac{1}{2}$ to 8 million feet of drilling. In addition, several thousand feet of cores derived from trona exploration are preserved.

The storage problem has become acute. Currently the State Geologist is investigating other possibilities relative to maintaining this repository.

## COOPERATION WITH AND SERVICE TO STATE AGENCIES

### Commissioner of Public Lands

The Survey provides to the Commissioner on request, an evaluation of the minerals under any lands in which the state has an interest. This service should be expanded.

The State Geologist must certify to the Land Commissioner all requests for permits to collect scientific specimens from state lands.

### State Highway Department

The Survey has provided advice and field investigations to the Highway Department on numerous occasions. Staff members make frequent use of the library of the Survey, and also consult the well log files.

### Natural Resource Board

The Geological Survey has cooperated with the Resource Board on all matters where advice has been sought. Over a period of years liason between the agencies has not been fully developed. Since these two agencies should compliment each other in function, it is the intent of the State Geologist to further the cooperation in all ways possible.

### State Game and Fish Commission

Problems relative to water supply for fish rearing sites have been discussed and investigated on numerous occasions. Personnel have also consulted relative to suitable maps for range studies, and for reports.

### Oil and Gas Conservation Commission

The State Geologist is by statute a member of the Wyoming Oil and Gas Conservation Commission. The activities of this Commission has been greatly increased during the last two years because of changes in the statutes in 1967. More frequent meetings have resulted and additional office investigations.

Figure 3. Mineral Production in Wyoming[1/]

| Mineral | 1966 | | 1967 (preliminary) | |
|---|---|---|---|---|
| | Quantity | Value (thousands) | Quantity | Value (thousands) |
| Clays - - - - - - - - - - - - - - - - thousand short tons - - - | 1,559 | $15,874 | 1,640 | $16,056 |
| Coal (bituminous) - - - - - - - - - - - - - - - - - - - do - - - - | 3,670 | 11,840 | 3,750 | W |
| Gem stones - - - - - - - - - - - - - - - - - - - - - - - - - - - - | NA | 120 | NA | 125 |
| Iron ore (usuable) - - -thousand long tons, gross weight - - - | 1,978 | 19,700 | 1,850 | 18,486 |
| Natural gas (marketed) - - - - - - - - million cubic feet - - - | 243,381 | 35,290 | 254,000 | 37,592 |
| Natural gas liquids: | | | | |
| LP gases - - - - - - - - - - - - - - - thousand gallons - - - | 166,080 | 7,308 | 178,100 | 8,371 |
| Natural gasoline and cycle products - - - - - - do - - - - | 96,372 | 6,281 | 99,100 | 6,541 |
| Petroleum (crude) - - - - - thousand 42-gallon barrels - - - | 134,470 | 344,243 | 135,580 | 349,796 |
| Sand and gravel - - - - - - - - - - thousand short tons - - - | 7,187 | 7,496 | 7,225 | 7,535 |
| Stone - - - - - - - - - - - - - - - - - - - - - - - - - - do - - - - | 1,393 | 2,560 | 1,311 | 2,372 |
| Uranium[2/] (recoverable content $U_3O_8$) thousand pounds - - - | 4,593 | 36,741 | 4,545 | 36,358 |
| Vanadium - - - - - - - - - - - - - - - - - - - - short tons - - - | W | 555 | W | 88 |
| Value of items that cannot be disclosed: Cement, feldspar, gypsum, lime, phosphate rock, sodium carbonate, sodium sulfate, and value indicated by symbol W - - - - - | XX | 36,379 | XX | 47,472 |
| Total - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - | XX | r/524,387 | XX | 530,792 |

r/ Revised. NA not available. W Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed." XX Not applicable.

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

2/ Method of reporting changed from short tons of ore and f. o. b. mine value (AEC Circular 5, Revised, price schedule) to recoverable pounds of uranium oxide and f. o. b. mill value.

Data furnished by U. S. Bureau of Mines in cooperation with the Geological Survey of Wyoming.

## COOPERATION WITH FEDERAL AGENCIES

### U.S. Geological Survey

The U.S. Geological Survey Geologic Division maintains a branch office at the University under the supervision of Dr. J.D. Love. The presence of this office housed in the same building as the Geological Survey of Wyoming and the Department of Geology provides an excellent means of direct contact with the Federal agency. The U.S. Geological Survey has been most helpful, and has provided data and services on an informal basis which would have been unavailable otherwise.

The U.S. Geological Survey Geologic Division has carried on an extensive program of geological work in the state because of the extent of Federal lands. The Geological Survey of Wyoming is kept fully advised of projects to be started in the state, and are given ample opportunity to help formulate such projects.

On July 8, 1968, Mr. M.R. Klepper, Acting Chief Geologist, advised me that projects in the following categories were in progress: Fuels (6); Heavy Metals (2); Radioactive Materials (6); Regional Geology (10); Geophysics (4); Paleontology and Stratigraphy (4); Experimental Geology and Geochemistry (10).

### Fund-matching Projects

Formal cooperation with the U.S. Geological Survey for the purpose of carrying out specific types of investigations has been in effect since 1941. The state funds amounts to $1,500 per year for this purpose.

During the 1967-1969 biennium the project to which these funds were assigned has been a study in the Wind River Basin. No publications appeared in this biennium as a result of the joint program. Three publications are in the process of printing by the U.S. Geological Survey but will not be available until the next biennium.

### U.S. Bureau of Mines

Since 1953 the Geological Survey of Wyoming has formally cooperated with the U.S. Bureau of Mines for the purpose of collecting basic statistical data concerning mineral production in Wyoming. The mineral production figures for Wyoming published annually by the Bureau of Mines provide the only reliable long term statistical data available. Fig. 3 presents the mineral production figures for 1967 for the state compiled by the Bureau of Mines.

Informal exchange of information between the Survey and the U.S. Bureau of Mines Laramie Petroleum Research Laboratory goes on continually.

### U.S. Coast and Geodetic Survey

The Geological Survey of Wyoming aids in the data gathering by the above agency relative to earthquake occurrences in Wyoming.

## RELATIONSHIP WITH THE UNIVERSITY OF WYOMING

By statute (Article 11, Section 9-255), the Survey and the State Geologist are headquartered in Laramie. Space for offices is provided by the University in the Geology Building, and storage for samples is provided in other temporary buildings.

The State Geologist is a full-time tenured faculty member of the University and carries out a full load of instruction. Without the faculty arrangement it would not be possible to employ a State Geologist under present statutory salary. The situation at present is inequitable to both organizations.

The Geological Survey lacks many types of laboratory equipment and is dependent upon the resources of the University in this respect. The assistance and interest of faculty members has been excellent, and without this faculty support much less could be accomplished.

Location of the Survey at the University has another advantage in that students enrolled in graduate programs in geology provide a source of technical help for projects carried out by the Survey. The financial support given for such projects has been inadequate, barely providing subsistence in the field. Despite the limited funding, a great many areas in the state have been investigated geologically that would have remained unknown otherwise.

The Natural Resources Research Institute has provided analytical services on many occasions. Since the Geological Survey does not have any analytical capabilities, we rely heavily upon them and have found them responsive to our needs.

## CONCLUSION

The Geological Survey of Wyoming has provided sound technical knowledge concerning many phases of the mineral potential of the state. The investigations of the Survey have been accomplished under a very modest budget, and limited personnel. Substantial changes designed to increase the potential of the Survey will be presented to the 40th Legislature for consideration. It is the hope of the State Geologist that the Geological Survey of Wyoming can continue to be an active and useful part of the state government.