

ANNUAL REPORT  
THE GEOLOGICAL SURVEY OF WYOMING  
July 1, 1978 to June 30, 1979

September 1979

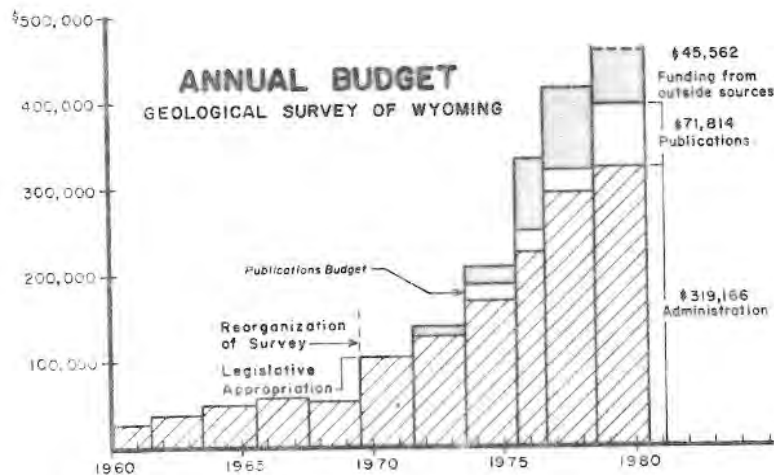
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## INTRODUCTION

The Geological Survey of Wyoming is a State agency established in 1933 and located on the University of Wyoming campus in Laramie. The agency is authorized and functions under Wyoming Compiled Statutes 9-3-1420 through 1430 (1979) Division 2. The Survey is the primary source of geological and mineral resource information for the State of Wyoming.

The fiscal affairs of the agency are handled by means of an Annual Budget appropriated by the Legislature. They include: Administration - that applies to day-to-day public services, field, and laboratory investigations; Publications - that applies to manuscript preparation, publication and distribution of all reports and maps, and the salaries of two employees. Funding from Outside Sources - that applies to cooperative interagency data collecting programs, initiated by the Wyoming Geological Survey but funded in part by sources other than direct General Fund appropriations, as indicated below.



Overall operation of the Survey can be summarized into three general categories as:

Services -- Compilation and continuous updating and maintenance of public files and libraries of all new material, records, maps, and data relating to the surface and subsurface geology and mineral resources of the State; and distribution of this information upon request to city, county, and state officials, state and federal agencies, the minerals industries, research organizations, and the general public.

Investigations -- Through field and laboratory studies that contribute new geological information to the State concerning mineral resources, and other matters or problems that have a practical bearing on Wyoming's communities and people; and by conducting cooperative investigations with other state and federal agencies on problems of mutual concern or interest.

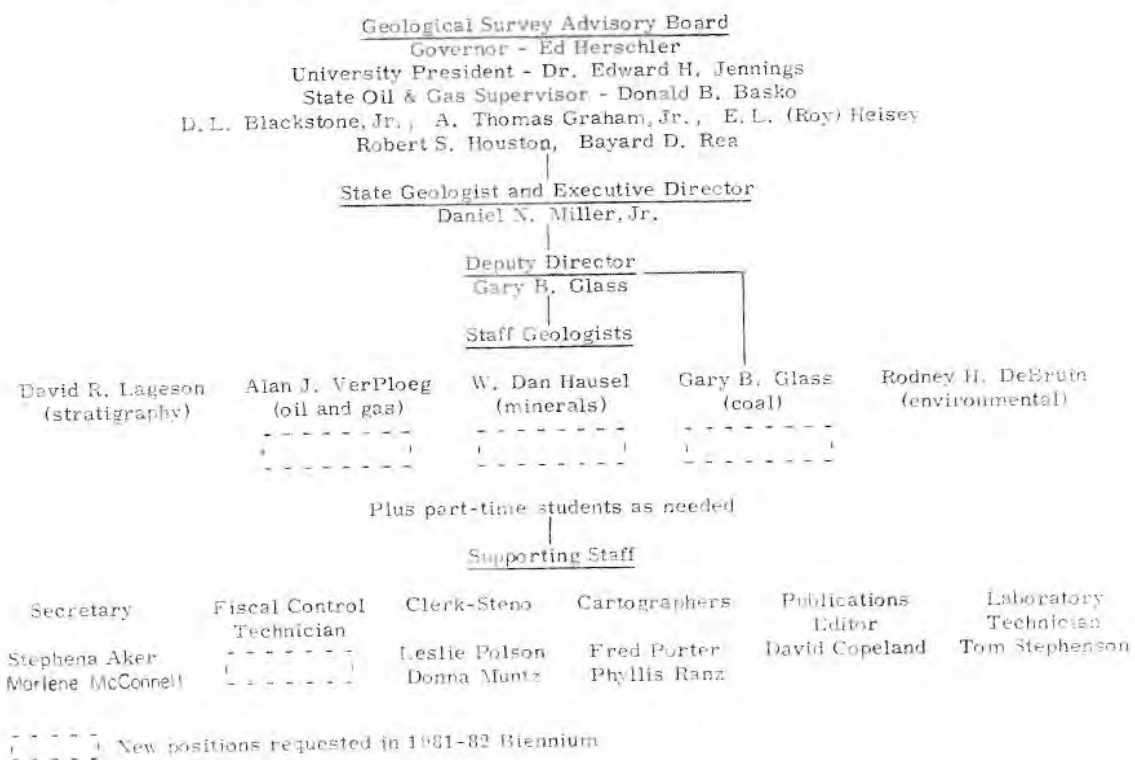
Publications -- By publishing timely and significant reports, maps, books, tables, graphs and charts, in an effort to communicate the results of the investigations to other agencies, the minerals industry, and the public.

In addition, the Survey's professional staff functions rather continuously in an advisory capacity for State officials and for all branches of State government on matters directly and indirectly related to minerals, mining, leasing, proposed legislation, and the impact of federal actions.

Activities within the Survey have been steadily increasing since 1969 in an effort to keep pace with exploration and development of the State's mineral and energy resources. A variety of projects are constantly underway that result in new information that is then made available to appropriate city, county, and state officials, state agencies, and the public. Every available means is used to expedite the Survey's investigations so that completed reports and maps are available when needed.

## ORGANIZATION

ORGANIZATIONAL CHART - THE GEOLOGICAL SURVEY OF WYOMING (FY-80)



During FY-79 the Geological Survey had an operating staff of 14 full-time employees - a director, five staff geologists, a technical publications editor, a laboratory technician, two draftsmen, and four secretaries or clerk-stenos. In addition, the agency employed a varying number of part-time student help to assist with investigations and routine office work.

Activities center around the productivity of the Staff Geologists who are responsible for five specific areas of expertise - oil and gas, coal, minerals, general stratigraphy, and environmental geology. They maintain current files on all new geologic information for the State; attempt to keep abreast of state, federal, and industrial activity; and conduct appropriate field and laboratory investigations as required. The supporting staff assists with the preparation of the material and eventual printing, and the sale of publications. All Survey staff cooperate in responding to the many thousands of inquiries for geologic and mineral resource information received during the year.

Table I shows the personnel categories and the number of employees in each category during FY-78 and 79, as well as the projected needs anticipated during the coming year.

TABLE 1

Projected Staff Needs

	1978	1979	1980	1981	1982	1983
State Geologist and Director	1	1	1	1	1	1
Geologic Program Manager	0	1	1	1	1	1
Staff Geologists	5	4	4	7*	7	8
Publications Editor	1	1	1	1	1	1
Laboratory Technician	0	1	1	1	1	2
Draftsmen	2	2	2	2	2	2
Secretaries	2	2	2	2	2	3
Fiscal Control Technician	<u>0</u>	<u>0</u>	<u>0</u>	<u>1*</u>	<u>1</u>	<u>1</u>
Total Permanent Staff	11	12	12	16	16	19
Part-time technical and office help	15	14	14	11	11	11

\*Three reclassified Staff Geologist positions and one new Fiscal Control Technician position are requested for 1981-82.

There is every likelihood that the responsibilities of the Survey will continue to increase just as they have for the past ten years, and that additional professional and clerical help will be needed in the future.

## MAJOR ACCOMPLISHMENTS BY PROGRAM

### Administration (Budget 01)

During FY-79 the Geological Survey, functioning in its public service capacity, processed more than 6,000 requests for geological and mineral resource information. Many of these requests require only a few minutes, others require several hundred man-hours of effort as in the case of the State assessments of Wilderness Area, and Bureau of Land Management Roadless Area, studies.

Collectively, the staff conducted more investigations and prepared more reports and maps than any time in its history. The following material summarizes these accomplishments in terms of each Section's activities.

### GEOLOGIC PROGRAM MANAGER (Gary B. Glass)

In FY-79, the Geologic Program Manager assumed responsibility for all purchasing, accounting, bookkeeping, inventory, and contracting procedures of the Survey. In this first year, the fiscal procedures of the Survey were reorganized to insure routine pre-auditing of all transactions and to establish better internal accountability of all expenditures. Reconciliation of fiscal control printouts was instituted to expedite early detection of any coding or key-punch errors. For easier accountability and maintenance, the Survey's equipment inventory was redesigned to reflect the physical location as well as the staff section directly responsible for the safekeeping of each item on the inventory. In addition, a formal book inventory was implemented to safeguard books and eliminate unnecessary duplicate purchases. The Deputy Director also made recommendations and advised the Director on many other fiscal, budgetary, personnel, and contractual matters.

The Program Manager also provided advice and recommendations on Survey projects and programs as well as on seven separate grant proposals submitted by various staff geologists. These recommendations included budget estimates, project content, and prioritization of work efforts. Authorization, revenue estimation, budgeting, and other necessary actions were completed for a \$40,450 federal grant to the Environmental Section of the Survey.

Under the present Survey organization, 30 percent of the Program Manager's time is devoted to the Coal Section of the Survey. Those activities are described under the Coal Section.

### OIL AND GAS SECTION (Alan J. VerPloeg)

Throughout the year, the Oil and Gas Section continued to receive, classify and file substantial amounts of new subsurface information provided by the

petroleum industry and directed through the Wyoming Oil and Gas Conservation Commission. All new discoveries were evaluated with respect to State mineral ownership and reported to the Commissioner of Public Lands. All logs, maps, field reports, and production data were filed and made available for public use. During the year, the Section responded to approximately 200 telephone, letter or personal inquiries concerning petroleum, natural gas, and oil shale in Wyoming.

A third revised tectonic reference map of the Overthrust Belt (Wyoming-Utah-Idaho) was published in cooperation with Dr. D. L. Blackstone, Jr., showing the location of all oil and gas tests and producing fields in Uinta, Lincoln, Sublette, and Teton counties, Wyoming, and parts of Utah and Idaho.

Mr. VerPloeg completed the published Public Information Circular 11 - The Overthrust Belt; An Overview of an Important New Oil and Gas Province. The report profiles this important oil and gas province, including discussions of exploration activity, high industry costs, reserves estimates, and various problems and roadblocks faced by industry. In conjunction with this, Mr. VerPloeg constructed a museum display of maps and cross sections illustrating oil and gas activity in the Overthrust Belt that was used in an Overthrust Belt Conference co-sponsored by the Survey, the Wyoming Geological Association and the University Department of Geology.

In addition, the Section completed work on the first of five regional electric log cross sections, three of which will profile the State east-west and two north-south. Input was supplied with regard to oil shale occurrence in Wyoming for the 1979 revision of the Wyoming Mines and Minerals Map. Additional work was completed on the petroleum plates to be included in County Resource Series Report 6 on Natrona County.

Mr. VerPloeg served as the Wyoming Geological Survey's representative on the Governor's Wilderness Review Task Force that involved evaluating the oil and gas potential for RARE II nominated tracts and BLM roadless area nominations.

#### COAL SECTION (Gary B. Glass)

The Coal Section's primary duties are to respond to all coal-related inquiries directed to the Survey, and to conduct studies, interpret data, and publish reports on Wyoming's coal deposits for a wide variety of users. Presently more than 50 percent of the Section's activities are in response to inquiries by other state agencies, federal agencies, municipal offices, industry, special interest groups, and the general public. During FY-79, the Section responded to 623 telephone and letter inquiries and was interviewed by 129 individuals seeking advice or information related to coal in Wyoming.

The Coal Section prepared all or parts of five technical reports published by the Survey in FY-79. Two of these reports were the culmination of work performed on federal grants from the U.S. Bureau of Mines and the U.S. Geological Survey - studies which would not have been undertaken without this outside funding. Two additional papers and two abstracts of geologic studies were published outside the Survey at the invitation of professional or trade organizations, which were seeking factual, up-to-date information on Wyoming's coal and coal mining activities for both local and national audiences. Similarly, the Coal Section presented nine invited talks and lectures on coal-related topics to professional, industry, social, or educational groups in the interest of public service.

Joint studies and projects with the Mineral Engineering and Geology departments as well as various Institutes at the University of Wyoming, the Wyoming Highway Department, the Department of Economic Planning and Development, and the Department of Environmental Quality were also completed or continued in FY-79. These projects involved coal mine subsidence, coal reserve estimation, coal mine locations, coal production forecasts and the relationship of geologic hazards to coal mining. With this last project, the Coal Section is providing technical support for a grant on Geologic Hazards awarded to the Environmental Section.

#### MINERALS SECTION (W. Dan Hausel)

During FY-79, several hundred public, government, and industrial inquiries were directed to the Mineral Section that required ore, mineral and rock identifications and analyses.

The Mineral Section also conducted field investigations in the State Line District in south-central Albany County in an attempt to define a number of diamond-bearing kimberlite deposits on and adjacent to State owned lands. These investigations have also been the subject of a number of lectures and publications prepared by Mr. Hausel.

A field investigation for kimberlite involving geologic mapping and sampling of State land located west of the State Line District was conducted at the request of the State Land Commissioner's office.

The Section also completed a cooperative publication with the University of Wyoming Geology Department involving a report entitled Radioactive Quartz Pebble Conglomerates in the Sierra Madre and Medicine Bow Mountains. This investigation was supported by a grant from the U.S. Geological Survey to the Wyoming Geological Survey.

Requests from the State Planning Coordinator's office required Mr. Hausel to review a number of Environmental Impact Statements related to



uranium mining, and preparation of two detailed reports on the Forest Service RARE II inventory and the Bureau of Land Management roadless area inventory.

Mr. Hausel also presented other talks and lectures during the year on such subjects as: mineral resources of Wyoming, copper mineralization and potentials in Wyoming, and the general geology of the Sunlight Basin for the benefit of public organizations, industrial, professional, and academic research groups.

Another manuscript presently being completed by Mr. Hausel with the assistance of Ms. Reavis and Mr. Stephenson of the Wyoming Geological Survey, includes a preliminary geological map of the State Line District and the results of a heavy mineral study. The project was partially financed by a grant from the Wyoming Mining and Mineral Resource Research Institute (MMRRI), and will be published as a Wyoming Geological Survey Open-File Report late in 1979.

The Wyoming Mines and Minerals map was published in 1979, thus completing a year-long effort of gathering data on mines and mineral occurrences in Wyoming.

#### ENVIRONMENTAL SECTION (Rodney H. DeBruin)

This Section handles responsibility for the environmental aspects and potential problems associated with the State's geology and mineral resources. During the year the Section responded to over 225 telephone and letter inquiries related to geologic hazards, aerial photography, topography, and ground water.

Mr. DeBruin has devoted considerable time to preparing responses to environmental statements for submittal to the Wyoming State Clearinghouse. He is also responsible for soliciting responses from other Sections when required.

In addition, the Section continually updates a map showing earthquake epicenters in Wyoming. Information on the location of geothermal springs was furnished for the 1979 Mines and Minerals Map of Wyoming and several large scale maps are nearly complete for Natrona County as part of the County Resource Series Report 6. In addition, the Section prepared a display showing geologic hazards that was presented during the Overthrust Belt Conference held in Laramie. Work on a Geological Hazards Manual is progressing satisfactorily and should be completed in the very near future.

Much of Mr. DeBruin's time the last quarter of the year has been spent on compiling information on geologic hazards and field-checking the validity

of this information. This study is being conducted as a cooperative project on a grant from the Wyoming Department of Environmental Quality with funding from the Office of Surface Mining.

STRATIGRAPHY (David R. Lageson)

The Section provides expertise on the State's stratigraphy and general geology in response to inquiries from the staff, public, industry, and government. Mr. Lageson is project coordinator for the County Resource Series Reports and assists other staff geologists in joint projects. He has been engaged in a geological field mapping project in the Thrust Belt of extreme western Wyoming for the past two years and has published the preliminary results as Wyoming Geological Survey Open-File Report No. 78-1. Mr. Lageson has also participated in cooperative projects with the U.S. Geological Survey involving the Carboniferous stratigraphy of Wyoming and Mississippian stratigraphy of southern Wyoming; results of these projects are currently in press. During the spring of 1979 he organized and chaired a geological conference on the Thrust Belt in cooperation with the Wyoming Geological Association and the University Department of Geology. He also presented a paper dealing with the structural geology of the northern Thrust Belt to the Rocky Mountain Section of the American Association of Petroleum Geologists. In addition, Mr. Lageson has published reports on three oil fields in the Green River Basin, two abstracts on his work in the Thrust Belt and a Public Information Circular on the general geology. Mr. Lageson also administers applications for fossil fish permits in the State, and has done limited field work on the distribution of fossil fish-bearing strata in western Wyoming.

TABLE II - Percentage of Staff Time Allocation by Section

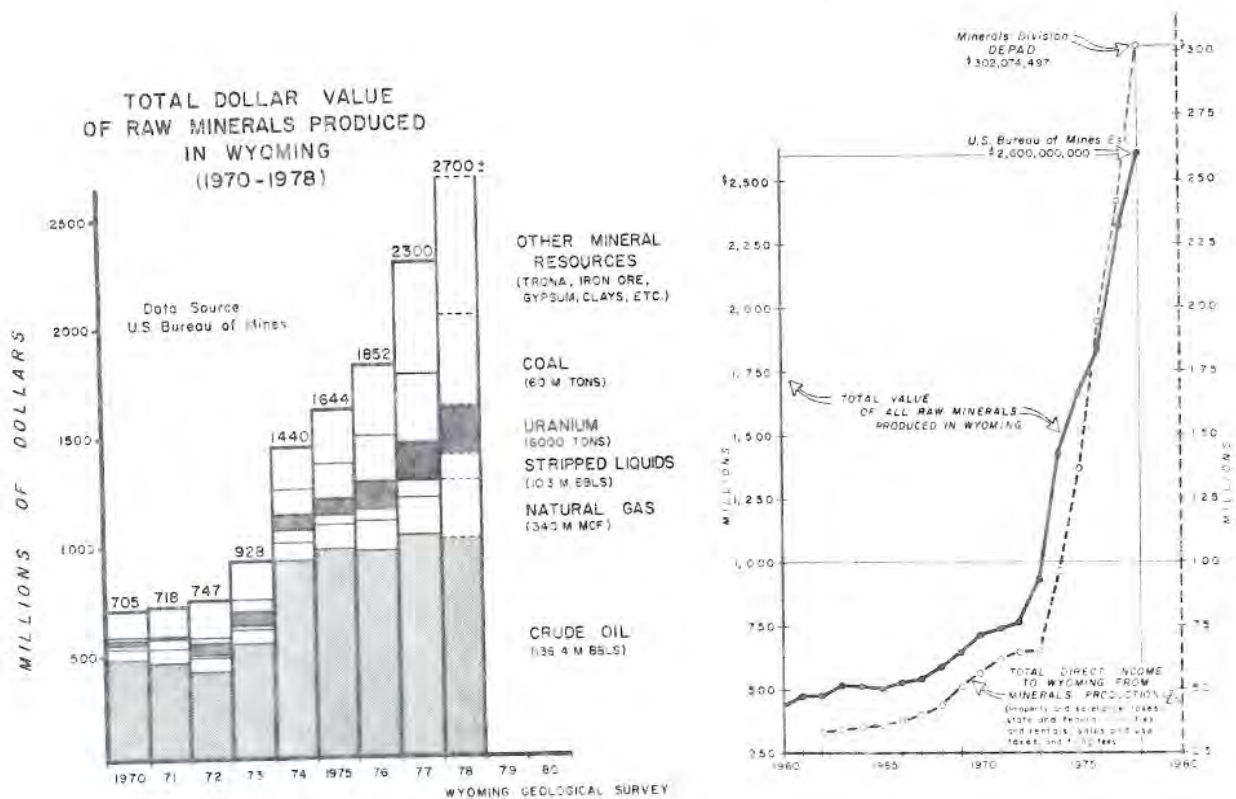
	<u>Oil &amp; Gas</u>	<u>Minerals</u>	<u>Coal</u>	<u>Environ.</u>	<u>Stratigraphy</u>
Services					
Public	15%	40%	38%	25%	5%
State Agency	10%	7%	7%	10%	-
Federal Agency	5%	5%	5%	5%	10%
Field and Laboratory					
Project Investigations	25%	15%	2%	20%	50%
Data Organization	25%	10%	10%	20%	20%
Report Writing and					
Editorial Reviews	10%	18%	32%	10%	10%
Administration	5%	2%	3%	5%	5%
Other Activities	5%	3%	3%	5%	-

Table II illustrates the percent of time allocated by each Section to different functions during FY-79. It should be noted that Mr. Glass has divided his time between his position as Geologic Program Manager that required approximately 70% of his time and as Staff Coal Geologist for the remaining 30%.

### Other Related Functions

During FY-79 the Survey made its first concerted effort to develop the analytical capability of the laboratories. Thomas R. Stephenson, the Laboratory Technician, joined the staff and devoted most of the year to organizing the laboratories, acquiring equipment and supplies, assisting the staff geologists with field sampling and sample preparation. He also conducted a survey of the other laboratory facilities in Laramie and Cheyenne, and prepared a report establishing a priority of equipment needs for the future.

In addition to the day-to-day functions of the Survey, the staff maintains records and files on all mineral production compiled by the Minerals Division of the Department of Economic Planning and Development in cooperation with the Department of Revenue and Taxation, the State Land Commissioner, the State Treasurer, and the U. S. Bureau of Mines. The graphs below illustrate the relative increase in mineral production from 1960-1978.

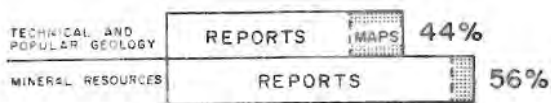


## Publications (Budget 02)

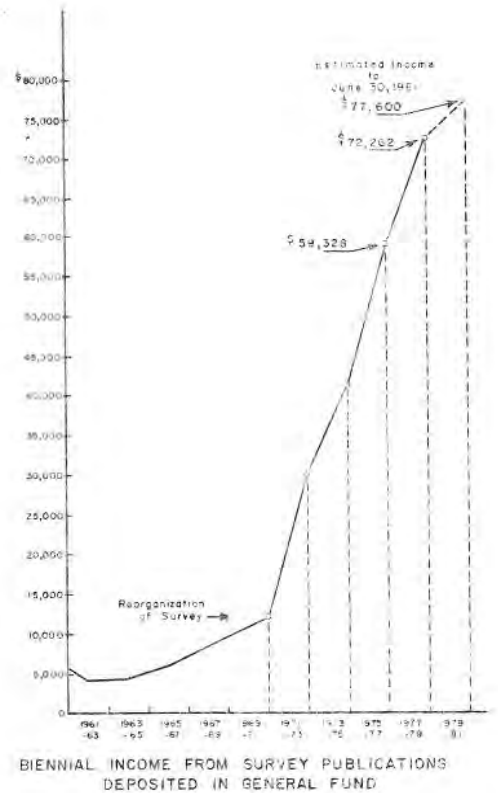
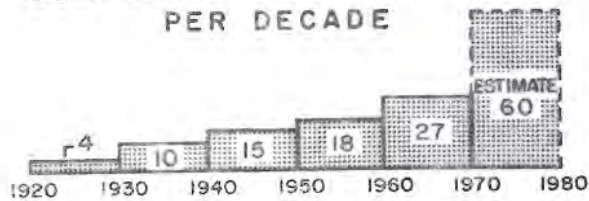
The Publications Section of the Survey is an integral part of overall agency operations. The staff consists of the Technical Publications Writer-Editor, David Copeland, and two clerk-stenos who assist in the preparation of manuscript material and handle all publication sales, stock inventories, and accounting. The chief responsibility of the Section is to assist the Staff Geologists with the preparation of the material to be published and the negotiation of printing contracts in a timely fashion.

The following graphs illustrate the type and number of publications prepared by the Survey along with the income derived from sales. All income is deposited in the General Fund.

**CONTENT OF SURVEY PUBLICATIONS  
(1911 TO 1978)**



**NUMBER OF SURVEY PROJECTS  
COMPLETED AND PUBLISHED  
PER DECADE**



During FY-79 the Survey completed, published and distributed the following reports and maps:

Public Information Circular No. 9 - Wyoming Coal Fields, 1978, by G.B. Glass

Public Information Circular No. 10 - Update on the Wyoming-Idaho Thrust Belt (Abstracts), David R. Lageson, Editor

Public Information Circular No. 11 - The Overthrust Belt, An Overview of an Important New Oil and Gas Province, by Alan J. VerPloeg

Report of Investigation No. 13 - Stratigraphy and Uranium Potential of Early Proterozoic Metasedimentary Rocks in the Medicine Bow Mountains, Wyoming, by Karl E. Karlstrom and Robert S. Houston

Report of Investigations No. 16 - Core Analysis and Lithologic Descriptions of Five Core Holes Drilled in the Carbon Basin of Southcentral Wyoming, 1978, by G.B. Glass

Report of Investigations No. 17 - Remaining Strippable Coal Resources and Strippable Reserve Base of the Hanna Coal Field in Southcentral Wyoming, 1979, by G.B. Glass

Map - Tectonic Map of the Overthrust Belt, 1979 Edition, by D. L. Blackstone, Jr., Scale 1:316,800

Map - 1979 Mines and Minerals Map of Wyoming, by W. Dan Hausel, G.B. Glass, Alan J. VerPloeg, David R. Lageson, and Rodney H. DeBruin, Scale 1:500,000

The following publications were reprinted during FY-79:

Memoir 1 - 2,000 copies

Bulletin No. 48 - 500 copies

In addition, the staff prepared manuscripts, maps, and other material for publication by other organizations including the Keystone Coal Industry Manual for 1979, U.S. Geological Survey, the Wyoming Geological Association, and the Association of American Petroleum Geologists.

Copies of all publications are distributed free to all county and public libraries in Wyoming, and to agencies and officials in State government who request them. The Survey also participates in an interlibrary exchange program with all other state geological surveys, the U.S. Geological Survey, and the U.S. Bureau of Mines, and contributes copies to the Library of Congress.

During FY-79 the Publications Section spent \$38,974 on special services, supplies and printing. Income from the sale of publications for the same period amounts to \$41,537. During the past two years the Survey has recovered a total of \$72,262 from the sale of publications that was deposited in the General Fund.

### Cooperative Programs (Budget 03)

During FY-79 the Survey completed three federally funded, cooperative projects under Budgets 03.07, 03.09, and 03.10, with the U.S. Geological Survey and the U.S. Bureau of Mines.

Two new cooperative programs were initiated: 03.11 - \$40,450, with the Department of Environmental Quality from the federal Office of Surface Mining to define and map geological hazards throughout the State.

A special \$4,642 (MMRRI) allocation was received from the University Department of Engineering (from the office of Surface Mining) for a heavy mineral study of diamond-bearing kimberlites in the State-Line area of Wyoming.

### PROBLEM AREAS AND RECOMMENDATIONS

The Survey has no significant problems at present that require legislation. On the other hand, we do call your attention to the agency's Expanded Budget request for reclassification of three Staff Geologist positions and the need for a Fiscal Control Technician II as described under "Factors Influencing Agency Services" in the agency narrative of the Budget.

We recommend further that the Legislature consider reinstating the position of State Mineral Supervisor in State government, to assume full responsibility for exploration activity and mineral production on State lands and help to coordinate interagency programs with the federal government. The position could be placed within the offices of the State Land Commissioner, Minerals Division of DEPAD, or the Geological Survey.