1977-78

ANNUAL REPORT

CONTENTS:

WILLIAM H. DRESHER, Director
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SUMMARY OF ACTIVITIES DURING 1977-78

FY 1977-78 was a landmark year for the Bureau of Geology and Mineral Technology (formerly the Arizona Bureau of Mines) for it marked a transition from an organization which was traditional to one which is innovative and preparing to meet the geological and mineral technology needs of the State for the future.

Commensurate with the name change (effective August 26, 1977), steps were taken to assume the responsibilities of the State's geological survey organization. The first of these was to locate the individual to be the State Geologist and Assistant Director of the Bureau with responsibility for the Geological Survey Branch (the search is still in progress). Dr. Edgar J. McCullough, Head of the Department of Geosciences, has acted as Acting State Geologist in the interim.

As part of its new role in the State, the Bureau has entered into an agreement with the Division of Geothermal Energy of the U.S. Department of Energy and the Bureau of Reclamation and the Geological Survey of the U.S. Department of the Interior to investigate the potential of geothermal energy development in the State of Arizona and, if feasible, to develop one or more demonstration projects within the State. Arizona is one of six states in the nation to be awarded such a project. Work is proceeding on schedule toward the first drilling project to gather geological information at depth and for confirmation of an indicated geothermal resource. While the goal of the project obstensively is energy, another target is water. If subterranean brines of sufficiently high heat content can be located, a multiple effect evaporation process can yield fresh water to supplement other water sources in the State.

The following listing outlines some of the Bureau's major activities and accomplishments in 1977-78:

Public Service

- --Performed analyses on 788 sample lots (as compared with 438 last year) brought to the Bureau by members of the public.
- --Performed metallurgical process amenibility tests on 61 (42 last year) for members of the public.
- --Provided consultative advice to 2,584 individuals (452 last year) who visited the Bureau seeking advice pertaining to geology, minerals, and mining.
- --Distributed 4,766 technical bulletins; 5,776 maps; and 11,000 copies (four issues were combined) of Fieldnotes (all publications related to the work of the Bureau).

--Participated in deliberations of, and provided technical assistance to:

*Governor's Commission on Arizona Environment
*Pima County Planning and Zoning
*Mohave County Planning Department
*Arizona Department of Health
*Arizona Department of Public Safety
*Arizona Oil and Gas Conservation Commission
*Arizona Corporation Commission
*State Department of Education
*Solar Energy Research Commission
*Arizona State Land Department
*Arizona State Department of Mineral Resources
*U.S. Geological Survey
*U.S. Forest Service
*U.S. Bureau of Mines
*U.S. Corps of Engineers
*Kitt Peak National Observatory
*National Park Service
*Senator Barry Goldwater
*Senator Dennis DeConcini

--Provided lectures on geology, minerals, and mining to:

*Grand Canyon College
*Central Arizona College
*Arizona State University
*University of Arizona
*Museum of Northern Arizona
*Arizona Sonora Desert Museum
*Arizona Geological Society
*Geological Society of America
*American Institute of Mining, Metallurgical & Petroleum Engineers
*Arizona Small Mine Operators Association
*Women in Mining

--Provided field trip leadership at:

*Youth Conservation Corps
*Teacher Workshop, Camp Cooper

--Assumed management of operations of the Tucson station of the World-wide Seismic Network for the U.S. Department of the Interior, Geological Survey

Research

Completed:

- --Feasibility study of use of Tucson municipal sewage plant effluent in copper mining and milling operations
- --Scale-up considerations for hydrometallurgical leach processes
- --Copper recovery from solutions using a fluidized cathode process
- --Study of chalcopyrite concentrate leaching in feric chloride solutions
- --Environmental geology of the southern Tucson Mountain region

Published:

- --Index of Mining Properties in Yuma County, Arizona, Bulletin 192
- --Late Cenozoic Geology of the White Mountains, Arizona, Special Paper No. 1
- --Guidebook to the Geology of Central Arizona, Special Paper No. 2
- --Geology of the Soccoro Peak Area, Western Harquahala Mountains, Arizona, Circular No. 20
- --Geothermal Energy Resources of Arizona, Map

Grants Completed:

- --"Reconnoisance of Low-to-Moderate Temperature Geothermal Energy Resources of Arizona," U.S. Department of Energy, U.S. Department of the Interior, U.S. Department of Agriculture. $95,301
- --"General Geology and Chronology of Pre-late Miocene Cenozoic Sedimentary Rocks--Basin and Range Province, Arizona," Phase I, U.S. Department of the Interior, Geological Survey. $30,000

Total Amount of Grants Received:

- --$332,520 (including $250,000 received but not approved by the Arizona Board of Regents as of June 30, 1978)

MAJOR STRENGTHS

The Bureau of Geology and Mineral Technology is the earth science and mineral resource experimental and information agency of the State. Its major strength lies in its affiliation with the University of Arizona and the College of Mines. This affiliation affords the Bureau the freedom from the regulatory, promotional, and policy-making responsibilities of most state agencies and the opportunity to be objective in its scientific and practical interpretation of natural phenomena. Further, the Bureau as a public service agency requires accessibility to the public. Its location near the University campus in the heart of the major mineral-producing area of the State is a decided asset to its geological, mining, and metallurgical services. Changing the name of the organization from the Arizona Bureau of Mines to the Bureau of Geology and Mineral Technology has helped to identify the mission and purpose of the organization. The relocation of the personnel of the Geological Survey Branch of the Bureau to the Arid Lands Information Building in the Marshall Foundation shopping center has helped the Bureau's public relations immeasurably.

The past year has seen a turnover of approximately one-half of the Bureau staff as new objectives were set and a stronger research role was established for the organization. Personnel shifts within the Geological Survey Branch of the Bureau are already bringing the organization new energy and foresight. This, coupled with the recognition that the Bureau is indeed Arizona's geological survey, affords the organization wide-ranging opportunities for expanded research and service into all fields pertaining to "things geological." The close association of the Bureau with the geology or geoscience departments of the three State universities (as well as State agencies whose responsibilities carry them into geologic matters) is a major strength that is growing. The geothermal program of the Bureau is a good example of interagency and interuniversity cooperation. This rapidly growing program currently involves personnel from Arizona State University, University of Arizona Department of Chemical Engineering, the University of New Mexico at Las Cruces, State of Arizona Oil and Gas Commission, Solar Energy Research Commission, and the State Land Department. Funding for this program is expected to exceed $350,000 during FY 1978-79.

MAJOR LIMITATIONS

The major limitation of the Bureau of Geology and Mineral Technology is its small size. The Bureau serves as both the geological survey and the mines bureau for the State of Arizona (which is one of the larger states--approximately 115,000 square miles, has the largest non-fuel mineral industry, and is one of the fastest growing states in the nation). In spite of this, the Bureau has one of the smallest budgets of any of the survey organizations in the United States and, consequently, has one of the smallest professional staffs.

The budgeting treatment of the Bureau as a research unit of the University is a detriment to its operations in times of budget restrictions to education. This is well demonstrated by the funding restrictions the Bureau has suffered in support of its professional staff. The Bureau is a statutory unit of the State government and is a research and information arm of the State as well. While funding is sought and obtained from non-state sources (1978-79 non-state funds will actually exceed state funds), it is entirely appropriate for the State to be the major contributor to the Bureau's budget.

The Bureau suffers from the lack of a full-time individual who is responsible for the programs and well-being of the organization. Arizona is only one of two states to have the responsibility for the organization to be shared by that of a college dean. The output of the Bureau, in terms of information derived and disseminated about the natural environment of the State, suffers as a consequence of its small size and part-time directorship. We hope that recruitment of an assistant director during the coming year (who will also assume the responsibilities of a full-time State Geologist) will help to alleviate this problem. In addition, the Bureau has never had the services of an editor for its publications. Professional staff and secretaries have previously performed the editorial and production function for its many publications. We feel that the quality and timeliness of the Bureau's publications have been compromised and reflect negatively upon the image of the Bureau and the University.

Space has continued to be a major problem for the Bureau during 1977-78, both with regard to amount and location. The Bureau has already begun to occupy rented commercial office space in the Marshall Foundation shopping center for its office needs. The Bureau has only one laboratory equipped to carry out research and ore testing. At times as many as five simultaneous projects are conducted in this laboratory. Such diverse and crowded use of one laboratory leads to confusion, low efficiency, mistakes, and safety hazards. The Bureau needs additional office and well-equipped laboratory space if it is to function as a viable research-service organization.

The Mineral Technology Branch staff are involved in both service and investigative research. The nature of the work performed requires a large amount of technical support to perform the detailed and routine tasks. Since there is no technical support for the Mineral Technology Branch, the professional staff members must be their own technicians. This is not only a wasteful use of manpower, but it limits the amount of research that can be accomplished and eliminates other functions in which the Bureau should be involved. The Branch needs a metallurgical technician and an analytical chemist to free the professional staff for more productive work.

The Bureau is responsible for the rock crushing and grinding facilities that are jointly used by the Bureau, College of Mines, and College of Earth Sciences. In addition to normal University use, this equipment is also used by non-University personnel. The dust control system in the crushing and grinding laboratory is very poor and presents a health and safety hazard. Our efforts to have this situation corrected by the Division of Physical Resources have not yet been successful. We fear that the facility will be condemned as a health hazard if the dust condition is not corrected.

FUTURE PLANS

During the past year plans were formulated with the Arizona Oil and Gas Commission to update the geological information available pertaining to the State and to publish the information obtained in the form of a 1:250,000 scale map series. Support was obtained from six additional state agencies for the project. During 1978-79 we intend to assist the Commission in the preparation of an appropriations bill to be placed before the State legislature to fund the project. If funded, the project will then be undertaken for approximately five years duration and will involve the geology faculty of the three State universities in addition to the Bureau's professional staff.

Continuing its efforts to grow apace with the needs of our changing society, the Geological Survey Branch of the Bureau will continue its analyses of the various forms of geologic hazards which are present in Arizona and how they can be expected to influence the continuing urban development of the State. The Branch will also attempt to develop recommendations on how to alleviate some of the more common detrimental effects of these hazards. (Some hazards present in our state are: subsidence, swelling clays, caliche, sheet and channel flooding, earthquakes, rock slides, etc.)

The Mineral Technology Branch of the Bureau is planning to develop an in-house expertise in fine particle technology as pertaining to mineral processing operations. In addition to original research performed in this area, the services of the staff will be offered to the industry of the State for the characterization of dusts and other particlates evolving from mineral preparation and smelting operations. Dr. Krishna Seshan from the University of California-Berkeley has been hired to assist in the development of this facility.

A rapid rise in the activities of the Geological Survey Branch (largely the result of the geothermal energy program) has already led to the need for off-campus space. Rather than realize the organization dissected piecemeal due to space needs, an attempt will be made next year to find suitable space in a commercial building near the campus for the use of the entire Geological Survey Branch of the Bureau.

Lastly, the Bureau is looking forward to the recruitment of the individual to be named as State Geologist. Once this is accomplished, the Bureau can progress rapidly and participate on an equal basis with the other forty-nine state geological surveys in the United States.