EARTH SCIENTISTS IN STATE GOVERNMENT*

Michigan, from its very beginning as a state, has had a deep and lasting interest in the development of its rich mineral resources. Just two hours after it became a state on January 26, 1837, a bill was introduced in the First Legislature, proposing a thorough geological survey of the state. This bill became law as Act 20 on February 23. It provided for one person to carry out its mandate.

From such modest beginnings, the Michigan Geological Survey has grown and developed until now it employs 62 earth scientists, mostly geologists, in twelve locations throughout the state. Recently, its name was changed from the Geological Survey Division (of the Department of Natural Resources) to the Geology Division but to the oldtimers, it will always be the Geological Survey.

The Division is headed by a Division Chief who is also known as the State Geologist and Assistant Supervisor of Wells. He has two assistants who head up the two main sections of the Division: the Economic and Environmental Geology Section and the Oil and Gas Section. In turn, each of these sections is broken down into units and subunits as follows:

Economic and Environmental Geology Section

- General Geology Unit
- Geology and Minerals Research Unit
- Ground Water Geology Unit
  - Geohydrology Subunit
  - Glacial and Environmental Geology Subunit
- Mineral Wells Unit
  - Brine Wells Subunit
  - Industrial Waste Disposal Wells Subunit
- Test Wells Subunit Mine Reclamation Unit
- Mining and Economic Geology Unit

Oil and Gas Section

- Petroleum Geology Unit
- Production and Proration Unit
- Regulatory Control Unit

All of the above sections and units are housed in the Mason Building, Lansing.

In addition, the state is divided into three regions with Regional and Field Offices located as follows:

Region I - Upper Peninsula - Marquette office
- Escanaba Field Office

Region II - Northern Lower Peninsula - Roscommon office
- Cadillac Field Office
- Gaylord Field Office
- Grayling Field Office
- Mt. Pleasant Field Office

Region III - Southern Lower Peninsula - Lansing Office
- Imlay City Field Office
- Lansing Field Office
- Plainwell Field Office

The various functions of the units and subunits are detailed below under the unit/subunit headings.

Entry into the Division is gained through the medium of the Civil Service examination. Upon completion of a degree in geology, the interested individual should make application to take the next Geologist Trainee 07 exam. A Bachelor's degree in geology is the only requirement to take this exam even though many staff members have Masters degrees.

Over many years, with the emphasis on the preservation of the environment, the Division has expanded greatly. Increased surveillance of oil and gas operations, passage of the Mineral Well Act and the Mine Reclamation Act, and an awareness of the need to protect the ground waters of the state have led to substantial increases in personnel. We see this trend continuing into the future with the possible control of natural gas wells by the Division. As it becomes clear to more and more people that a knowledge of the geology of an area is basic to many of the decisions concerning that area, geologists will play an even greater role in the decision-making process in Michigan, just as they will become increasingly important in the decision-making of the world.

Since geology has been primarily a “man’s profession,” the question might well be asked, “What opportunities are there for women in the Division?”

Many women geologists have worked for the Division. One of the well known Michigan geologists, Helen M. Martin, worked for the Division for many years. At present, there are three women in two different units. Two are supervisors. With almost every position requiring some field work, women, as well as men, interested in obtaining employment with the Division must expect some field experience. With changing times and changing attitudes, there should be many more opportunities for women in earth sciences. The same opportunities for rewarding work, for personal and professional growth, and advancement as her male counterparts enjoy will be available to women.

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*The number of earth scientists in state government are as follows:

Department of Natural Resources,
- Geology Division - 62
- Resource Recovery Division - 2
- Water Management Division - 1

Department of State Highways and Transportation,
- Testing and Research Division - 1, Lansing
  - 8, Ann Arbor

Department of Commerce,
- Public Service Commission, Gas Division,
  - Petroleum Engineering Section – 1

ECONOMIC AND ENVIRONMENTAL GEOLOGY SECTION

!n addition to supervising the six units making up this Section, the Section Chief has several other major responsibilities. The Division administers three tax statutes involving metallic mineral properties. Currently, the Section Chief represents the State Geologist as Appraiser of Mines. He is assisted by two geologists from the Mining and Economic Geology Unit.

A staff member of the Division has acted as Appraiser of Mines since 1911. The current amended authority is Act No. 66, P.A, 1963. In summary, the Act directs the determination of the true cash value of metallic mining properties and mineral rights consisting of metallic resources which are either producing, developed, or have a known commercial mineral value. The intent is to compute a sales value or what a willing buyer would pay a willing seller. A value determination is made for each affected property. To do this job effectively, an appraiser must have sufficient educational training and extended experience in structural and economic geology, ore reserve estimation, mineral economics, mining development methods, mining extraction methods, and mining costs.

With the development of methods of concentrating iron ore from low grade iron formation, a specific tax statute was passed to encourage the commercial development of these resources. Act No. 77, P.A. 1951, as amended, provides for the specific taxation of low grade Iron ore. This tax is based upon an average annual production multiplied by a percentage of ore value. The Appraiser computes the specific tax and allocates the tax among the several assessing districts involved for each property annually.

Act No. 68, P.A. 1963, provides for the specific taxation of underground beneficiated or agglomerated iron ore. For those properties which meet the requirements of the Act, the Mine Appraiser computes and allocates the tax annually.

Since about 1940, the Division has supported a cooperative geological mapping program with the U.S. Geological Survey. The area being mapped is the exposed Precambrian In the western Northern Peninsula. Approximately one-half of exposed Precambrian rocks have been remapped. Ordinarily, maps resulting from this work are placed in open-file and later published. In addition, approximately 70 percent of the Northern Peninsula has been flown with an aerial magnetometer under this program and resultant maps published. The U.S. Geological Survey provides one-half of program funds and the Division the other half. The mapping is done by U.S.G.S. geologists. The Section Chief acts as liaison with the U.S.G.S. in program planning and on occasion works with the field geologists.

The Section Chief assists the State Geologist in other matters, including the coordination of Division budgeting.

Robert C. Reed, Section Chief

GENERAL GEOLOGY UNIT

The functions of the General Geology Unit are many and varied. One of the principal tasks involves editing the material prepared for publication by the Division geologists and directing and accomplishing the processes necessary to arrive at final printing and publication. The Unit works in cooperation with the Information and Education Division in carrying out this function. Advice on layout and editorial assistance are provided by information and Education Division but most of the final layout work and preparation of the manuscript for the publisher is done by this Unit.

The Geology Division has various coooperative programs with other agencies; i.e., the U.S. Geological Survey. Some publications are generated through these cooperative programs and publication is done by the Geology Division.

The Unit functions as a general information center for the Division. Many requests for information are submitted by teachers, students and lay people regarding geology, minerals, rocks, et cetera. Such requests are handled by the Unit unless they specifically refer to mining, ground-water problems, oil and gas information, et cetera, in such cases the requests are referred to the Unit dealing with the subject.

As an aid to supplying information on the geology of Michigan, the Unit generates publications of a popular nature which can then be distributed in answer to many requests. On occasions, personnel of this Unit are required to give talks to various groups. The groups may be teachers, members of civic organizations, or people from other state agencies or divisions within our own Department of Natural Resources. Talks may also be given at in-service training sessions.

The Unit is responsible for the management of the Division's library. This involves many aspects of library work including new book acquisitions, library arrangement, organization, updating reference material, cataloging and so forth.

General interviewing of walk-in job applicants is handled by this Unit. Initial correspondence with geologists who write to the Geology Division seeking employment is a function of the Unit.

The outlook for future employment in this Unit appears bright because there is plenty of work to be done and not enough personnel to handle it all. The work is interesting and challenging, and will no doubt continue to be a function of the Division.

Beverly L. Champion, Geologist in Charge of Unit

GEOLOGY AND MINERALS RESEARCH UNIT

The Research Unit is a relatively recent addition to the Geology Division having been staffed in July, 1375. This Unit conducts field, laboratory, and related research oriented toward Identifying metallic and non-metallic mineral resources. The ultimate objective is to stimulate exploration and development of these essential minerals of the state. Such investigations will materially benefit effective land-use planning and contribute to the geologic knowledge of the state.

Metals typically investigated include ferrous, base, precious, strategic, and radioactive resources. Various nonmetal commodities may be investigated also. Program emphasis is placed on those mineral commodities for which shortages exist or are anticipated. These investigations are expected to result In new discoveries and production.

Investigations in the field include geologic and geochemical surveys; collecting samples of rock, soil, and vegetation for trace element analysis; and geophysical surveys utilizing magnetic, electromagnetic and radiometric instrumentation to identify non-exposed mineralized areas.

The data generated during the field season Is then analyzed by various methods such as: a) petrographic and petrologic studies of rocks, minerals and ores using a petrographic-metallographic microscope, b) synthesis; statistical analysis; and interpretation of geologic, geochemical trace element, chemical whole-rock, physical, and geophysical data.

The results of the Investigation are then released to the public in the form of published articles and reports or placed In open-file.

David Snider, Geologist

GROUND WATER GEOLOGY UNIT

GEOHYDROLOGY SUBUNIT

The Geohydrology Subunit of the Ground Water Geology Unit acts as a ground-water consultant to state governmental agencies responsible for licensing or issuing permits for land disposal/treatment systems of liquid and solid wastes. The Subunit also investigates ground-water pollution problems and responds to general public, industrial and governmental requests concerning ground-water evaluation and protection. Included in the services of the Subunit are evaluation, development and maintenance of ground-water supplies at state parks, fish hatcheries and other state installations. The Subunit also maintains a file of over 200,000 water well records filed under Public Act 294 (1965).

The staff of the Subunit are all trained In the basics of the geologic science. However, to adequately answer many of the requests concerning groundwater evaluation and protection, a multidisciplinary approach must be used. Depending upon the project, knowledge of the following sciences may be necessary: glacial geology, chemistry, geochemistry, physics and geophysics, geomorphology, soil mechanics, sanitary engineering, hydrology, and geohydrology.

Field studies are necessary on some projects and may involve all of the following: soil borings, well construction, sediment analysis, water sampling, surveying, aquifer testing, and geophysical testing.

The major concern of the Subunit is the protection and evaluation of the state's ground-water resources.

Because of the increasing multiuse demands on the ground-water resource, the need for personnel trained in evaluating and protecting ground-water resources will increase significantly in the near future.

Wm. M. Iversen, Ass't. Geologist
in Charge of Unit

GROUND WATER GEOLOGY UNIT

GLACIAL AND ENVIRONMENTAL GEOLOGY SUBUNIT

The Subunit1s programs are geared toward the long-range evaluation, planning, and protection of the state's ground-water resource. This is accomplished, in part, through the Geology Division's cooperative ground-water and surface-water programs with the U.S. Geological Survey. These include the county environmental geology series, the lake gaging program, the ground-water data collection and analysis program, the stream gaging program, and special studies, such as the Muskegon County Spray Irrigation Site model development.

The Subunit advises local and regional planning groups on long-range water resource planning. It is beginning a surface geologic (glacial) mapping program and an inland lake study. The Subunit also acts for the State Committee on Geographic Names.

The staff of the Subunit, at present, consists of two geologists, both women.

A large portion of the Subunit's time is spent in providing back-up help for the ground-water evaluation and protection projects handled by the Geohydrology Subunit.

A slightly greater emphasis is placed upon long-range environmental problems and a knowledge of the glacial geology of the state in this Subunit than in the Geohydrology Subunit. Other than that, the training and background needed to perform the work in the two Subunits is the same.

The work is extremely varied, interesting, and challenging. In addition, the staff member has the satisfaction of knowing that he/she is contributing an important element in the evaluation and protect ion of the state's vital ground-water resource. The need for

highly motivated, concerned people in the future can only increase as an enlarging population makes continuing demands upon the ground waters of the state.

Dorothy M. Skillings, Supervisor
Glacial and Environmental Geology Subunit

MINERAL WELLS UNIT

BRINE WELLS SUBUNIT

Brine, either natural or artificial, is produced in 28 of the contiguous 48 states. Michigan has always enjoyed a pre-eminent position among brine-producing states because of the ready accessibility of its salt deposits and rich concentration of its naturally-occurring connate brines. The salt from these brines has, far and away, the greatest variety of uses of any mineral or compound known to man. Salt is the primary source of the elements sodium and chlorine and eleven of the basic Industrial chemicals (soda ash, calcium chloride, chlorine, caustic soda, hydrogen, sodium, sodium sulfate, sodium bisulfate, hydrochloric acid, sodium cyanide and sodium hypochlorite) are produced directly from brine. In short, from the production of Aspirin to the use of Zeolites in your water softener, our culture is dependent upon the products and materials supplied by the brine and salt-based Industries.

These Industries, established in Michigan shortly after the midpoint of the 19th century, have become a substantial part of the economy of the state. As a result, countless hundreds of natural brine and solution-mining wells have been drilled to supply the needs of this Industry. During much of this time, concern for the surface and subsurface environmental values was minimal and only a large measure of luck and the forgiving nature of earth materials have prevented untold damage. Fortunately, the passage of Act 315 of the Public Acts of 1969 - the Mineral Well Act - brought an end to the uncontrolled drilling and operation of this class of mineral wells.

The Mineral Well Act provided control of all brine wells (and some other wells) and rules and guidelines were established to regulate location, construction, and permitting, and to oversee production, transport, and abandonment. The thrust of the Act is, of course, environmental and may be summed up in the words, “protection from surface and subsurface waste due to mineral well operations.”

Administration of the brine wells portion of the Act Is accomplished through the activities of the Brine Well Supervisor who bears responsibility for all activities permitted and performed under his authority. Considerable field work, state-wide, is required with as much as 50 percent of the incumbent's time being devoted to observation, surveillance, and Inspection of new and ongoing operations.

Educational and experience requirements for the position are sound grounding in general geology, acquaintance with evaporite minerals and their chemistry, at least a nodding acquaintance with rock mechanics and surveying, and a thorough understanding of the practices of good well construction.

Alford Rarick, Brine Well Supervisor

MINERAL WELLS UNIT

INDUSTRIAL WASTE DISPOSAL WELLS SUBUNIT

In the early 1950’s it was recognized that there was a need for a liquid waste disposal method that would protect the waters of the state.

The oil industry had many years earlier started using deep wells for reinjection of unwanted brine that was produced with their oil and gas.

The various industries in Michigan having toxic liquid wastes adopted similar methods for the disposal of their waste. By 1965 there were about 80 of these wells in Michigan. There were, however, no state laws regulating their construction or operation.

A number of ground-water pollution occurrences resulted in the Mineral Well Act of 1969 to regulate this and other well operations that were not covered by the oil and gas law or water well act.

Upon implementation of this law, regulation of deep well disposal was delegated to one man.

This job requires a knowledge of deep well drilling and construction, a good knowledge of Michigan geology, and the understanding of that portion of Petroleum Reservoir Engineering dealing with Reservoir Pressure Analysis and well condition evaluation. This training is obtained by academic training in Petroleum Engineering plus several years practical experience with the oil and gas industry in production and drilling activities.

The program requires a review of application of permits to drill, and plug waste disposal wells plus the overview of their ongoing opera operations to be sure that no faulty operations develop.

Ray Ellison, Geological Engineer

MINERAL WELLS UNIT

TEST WELLS SUBUNIT

The Test Wells Subunit implements the test wells part of the Mineral Well Act, Act 315, P.A. 1969. This portion of the Act regulates the drilling and abandonment of test wells to prevent surface and subsurface waste and contamination.

For the purpose of administration of the Act, test wells are defined as wells drilled from the surface to determine the presence of a mineral, mineral resource, or rock unit, or to obtain geological or geophysical information or other subsurface data, but does not include holes drilled in the operation of a quarry, open pit, or underground mine.

Test wells are categorized as follows:

Foundation Borings - These borings, ranging in depth from 10 to 500 feet, are used to determine soil and rock characteristics underlying an area of a planned structure or activity. Observation wells, drilled to obtain information on ground-water flows, also fall into this category.

Geophysical Testing Holes - Explosives are detonated in these holes, which range from 7 to 300 feet in depth, to obtain information regarding the oil and gas potential of an area.

Mineral Exploration Holes - These holes, 10 to 3,000 feet in depth, are drilled to determine the quantity and quality of a mineral resource.

Miscellaneous Test Wells - These are wells drilled for various experimental or pilot projects, which do not fall into any of the above categories.

The primary goal of the program is to insure proper plugging to prevent ground-water contamination and to contain gas or water flows. Other concerns include prevention of surface damage and proper handling of explosives. This program can be broken down as follows:

1) Administrative/Enforcement - Issuing of permits required under the Act and correction of known violations.

2) Field Surveillance - Surveillance of test well activity to ensure compliance with the Act. Proper drilling and plugging procedures and surface cleanup are some of the activities checked in the field.

3) Review of Records - Formation records are required for most of the test wells drilled under the provision of the Act. These records are reviewed to ensure proper drilling and plugging procedures.

4) Research - Studies of records to define areas of potential geologic hazards.

There is a need for additional employees in this Subunit.

Innaiah Pothacamury, Geologist

MINE RECLAMATION UNIT

The major emphasis and responsibility of the Mine Reclamation Unit is administration of the Mine Reclamation Act (Act No. 92, P.A., 1970, as amended) and the Sand Dune Protection and Management Act (Act No. 222, P.A. 1976). As a result of increasing public awareness and concern relating to reclamation of mined lands, this Unit continually expands Its program functions. These functions would best be described as advisory, evaluation, and review.

Mine Reclamation Act: On November 16, 1976, this Unit culminated a 2½-year effort to promulgate mine reclamation rules which in effect sets the standards and requirements for reclamation of those mined lands which fall under the statutory controls of the Mine Reclamation Act.

Annual plan-maps submitted for 45 operating properties are reviewed and evaluated. Also, mining areas are examined to observe progress of reclamation activities and associated problems. In lieu of the promulgation of rules, this Unit encouraged open-pit operators to voluntarily follow the reclamation guidelines in the proposed rules and to incorporate an end-use or multiple land-use strategy in their plan of operations.

Sand Dune Protection and Management Act: On July 30, 1976, Governor Milliken signed this act into law. It provides for study, management, and reclamation of Great Lakes sand dunes by prescribing powers and duties of the Department of Natural Resources; prescribing fees for the administration and enforcement of this Act; and providing penalties. Responsibilities of administration of this Act have just recently been assigned to the Mine Reclamation Unit and program organization is now under way.

Mine Reclamation Research: This Unit acts as coordinator in research activities related to reclamation of mining areas conducted under agreement with Michigan Technological University. In previous years, research activities have been directed toward problems associated with metallic mining, but under the new agreement, as authorized by Act 260, P.A., 1975 (the appropriations act for the Department of Natural Resources), this program is expanding to Include non-metallic mining areas as well. Research shall be concentrated on revegetation of tailings basins, overburden and stockpiles, and dam berms; determination of the chemical and physical characteristics of the “soils” contained In tailings deposits, dam berms, and overburden and rock piles; determination of kind and level of nutrients required In the “soils”; stabilization of mining areas against wind erosion by plantings and use of dust control agents; tests and studies to determine limiting factors and make recommendations for using tailings in the construction of tailings basin dikes so as to prevent injury to the property or person of others.

The initial success of these research activities has encouraged greater involvement in reclamation practices by some open-pit operators. This is exemplified by the successful revegetation and stabilization of an 80-acre abandoned tailings basin at the Humboldt Mine and revegetation of waste rock dump pile areas at the Republic Mine. (Both are iron mines in the Upper Peninsula.)

Mining Plan Program: It is this Unit's responsibility through field personnel to prepare mining and reclamation plans upon request from the Forestry Division for state-owned mineral pits; for example, gravel pits. Our goal is the use of good mining practices on state-owned lands utilizing all material possible with as little waste as possible, maintaining adequate safety

measures and promoting progressive and continual reclamation.

Advisory and informational Activities: This Unit tries to maintain up-to-date mine reclamation information and to stay well informed in reclamation technology advancements and in legislative developments on Federal and state levels. This role is accomplished through the staff's active involvement and participation with such groups as the National Association of State Land Reclamationists, the American Mining Congress, and the Interstate Mining Compact Commission.

Through our endeavor to keep abreast of environmental and reclamational problems relating to mining, we are able to Intelligently respond to the many inquiries made by the general public and local, state, and Federal agencies and administrators.

Public pressure for more controls over the mining industry has led many counties and townships to consider passing ordinances to control mining and require reclamation of mined lands. As a result, these local governments consult with us for advice and guidance in formulating these ordinances. Some ordinances that are already in effect or are now being considered require mining and reclamation plans of operators. Local governments, because of the lack of expertise in evaluating these plans, have approached our staff for assistance.

R. Thomas Segall, Geologist in Charge of Unit

MINING AND ECONOMIC GEOLOGY UNIT

Working in this Unit can be a very gratifying experience. This is one of the few units left concerned with the implementation of the basic dictates of the law establishing the third Geological Survey of Michigan in 1369. Briefly stated, this law, Act 65, P.A. 1869, as amended, directs this Division “to make or cause to be made, a thorough geological and mineralogical survey of the state, embracing a determination of the succession and arrangement, thickness, and position of all strata and rocks; their mineral character and contents, and their economical uses; . . .” This includes all metallic and non-metallic minerals including natural brines ” . . . and all other products of the geological world within the limits of the state capable of being converted to the uses of man.”

Presently being conducted is a brine analysis program. This year 87 samples were collected and analyzed. This data will be added to that acquired in previous years.

Since 1974 the Unit has been actively involved in a cooperative drilling program with the Institute of Minerals Research, Michigan Technological University. Carbonate rocks in both the Upper and Lower Peninsula are being analyzed chemically and stratigraphically. This is the outgrowth of twenty-five years of field study by the senior member of the Unit.

The Unit accommodates highly varying interests whether they be in Pre-Cambrian stratigraphy, ore genesis, petrography, paleontology, glacial geology, mineral processing, or mineral statistics and economics. Pursuit of individual interest or specialty is encouraged.

Michigan's mineral production amounted to over one and one-quarter billion dollars in 1975 which was slightly under two percent (1.8) of the state's gross national product. This growing need for domestic mineral sources gives the work of this Unit greater importance each year.

As surmised from the above, a broad background in the geologic sciences is basic to working in this Unit. Specialization or experience in a particular area of geology is beneficial but not mandatory. The main requirement for a person entering this Unit is a sincere interest in the geologic sciences and the willingness to learn and develop professionally.

William A. Walden, Supervisor
Industrial Minerals

OIL AND GAS SECTION

PETROLEUM GEOLOGY UNIT

A career in the Petroleum Geology Unit offers a diversity of duties and learning experiences concerning many facets of the oil and gas industry.

The primary function of this Unit is maintaining accurate, up-to-date records for all oil and gas test wells drilled in Michigan. Among the duties of the geologists are: posting location maps of wells drilled, determining formation tops from mechanical logs and sample studies, maintaining a drill-cutting sample library, compiling drilling statistics, and consulting with members of the public, industry, and government on inquiries relating to petroleum geology.

In addition to these responsibilities, these positions offer opportunities for the geologist to become engaged in independent research projects, Some decisions of the Geology Division are based partially or totally on the results of such research where the geologist uses his expertise to analyze the various electrical and radioactivity logs that have been run in completed wells. Other research programs involve structural and stratigraphic problems related to petroleum geology. Many of these project results are later published. Such publications provide valuable information for the use of the public and industry as well as increasing geologists’ knowledge of the subsurface geology of the Michigan basin.

College courses helpful in preparing for a career in petroleum geology include such subjects as geochemistry, geophysics, stratigraphy, paleontology, mineralogy, sedimentology, structural geology, lithology, and petroleum geology. Once employed by the State of Michigan, the geologist is encouraged to participate in

training sessions offered by the Department of Civil Service and in the many seminars offered by petroleum companies.

In view of the increasing public concern for energy resource utilization, there is a growing need in state government for talented, qualified geologists to help regulate the oil industry. These professionals must work together with the public and industry in attempting to achieve a balance between the development of our hydrocarbon resources and the preservation of the state's ecosystems.

D. Michael Bricker, Acting Geologist
in Charge of Unit

PRODUCTION AMD PRORATION UNIT

The Production and Proration Unit collects, compiles, and evaluates engineering, geological, and production data for all petroleum reservoirs.

It is responsible for establishing a regulatory program to control production, obtain the maximum ultimate recovery of oil and natural gas, and prevent waste. This program Includes oil well allowables, well test procedures, gas to oil ratio tests, and production schedules. Production records, well test data, and reservoir data are also maintained for regulatory control and for public information. Monthly, quarterly, and annual production reports are prepared and published. Specific reports on production and individual fields have been prepared and published by this Unit.

With the rapid increase in the discovery rate and development of small, new, widely scattered reservoirs in Michigan, the Unit's work load has increased significantly. This development along with responsibility for a multitude of other duties will require additions to Unit personnel in the future.

There is a good possibility, pending legislative and budgetary approval, that the Unit will become responsible, in large part, for the controlling of wells that produce natural gas. Natural gas wells also produce hydrogen sulfide, a highly toxic gas. Control of this gas not only assures the safety of the personnel working on natural gas wells but also protects the environment.

Floyd Layton, Field Operations Coordinator
Production and Proration

REGULATORY CONTROL UNIT

As the state, nation, and world all move to reduce pollution and protect the environment, special effort is being made in Michigan to preserve natural conditions and processes. To regulate oil and gas operations according to state laws and regulations, Petroleum Regulatory (field) geologists, directed by a district and regional geologist, inspect and oversee oil and gas industry operations. Many of these duties are related to minimizing disturbance to the environment in an effort to preserve ecological and environmental quality. These activities are necessary if the Petroleum Regulatory Unit is to carry out its charge of management of Michigan's petroleum resources.

Most of the activity of this Unit Is carried out in the field. Field geologists, often in company of other Department of Natural Resources field employees, determine whether the proposed sites for oil or gas test wells are acceptable. Their requirements for location and construction will prevent pollution of waters of the state and the unnecessary destruction of, or hazards to, life, property or ecological values. These decisions govern issuance of permits and are communicated to District, Region, and Geology Division offices.

Once wells are drilled and construction is completed, field geologists inspect operations checking for compliance with requirements in order to reduce or eliminate hazards of fire and explosion and conditions contributing to waste, leakage, pollution of waters, destruction of property, hazards to life, and ecologic degradation. Operation inspections continue until wells are abandoned. At that time a field geologist prescribes the procedure for plugging and closely supervises the work.

In addition to petroleum regulatory activities, field geologists are called upon to work in areas relating to mineral well geology, ground-water geology and mining and economic geology as well as other, petroleum-related activities, A few, in fact, specialize in these other areas of geologic interests. As a part of their work, all field geologists collect geologic and technical data that they compile into reports, records, and maps.

Of the 62 geologists employed by the Geology Division, 29 of them work in field offices. When job openings occur in the Division office, field personnel are given an opportunity to fill them. Many staff geologists In the Geology Division office started their employment In a field office and have subsequently transferred or been promoted to their present jobs. Opportunity for diverse experience is a valuable and desirable aspect of the Geology Division. Many employees have taken advantage of this opportunity over the years. A number have used this experience as a steppingstone to jobs in private industry and other governmental agencies.

Samuel Algulre, Field Operations Coordinator
Regulatory Control

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