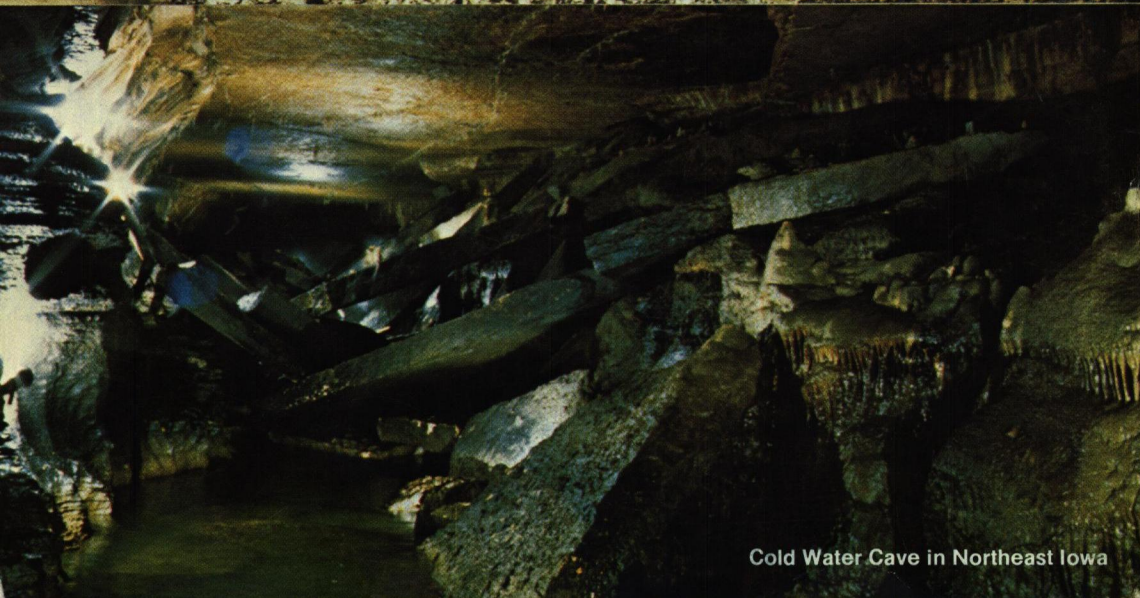


Coal Strip Mine in Southern Iowa



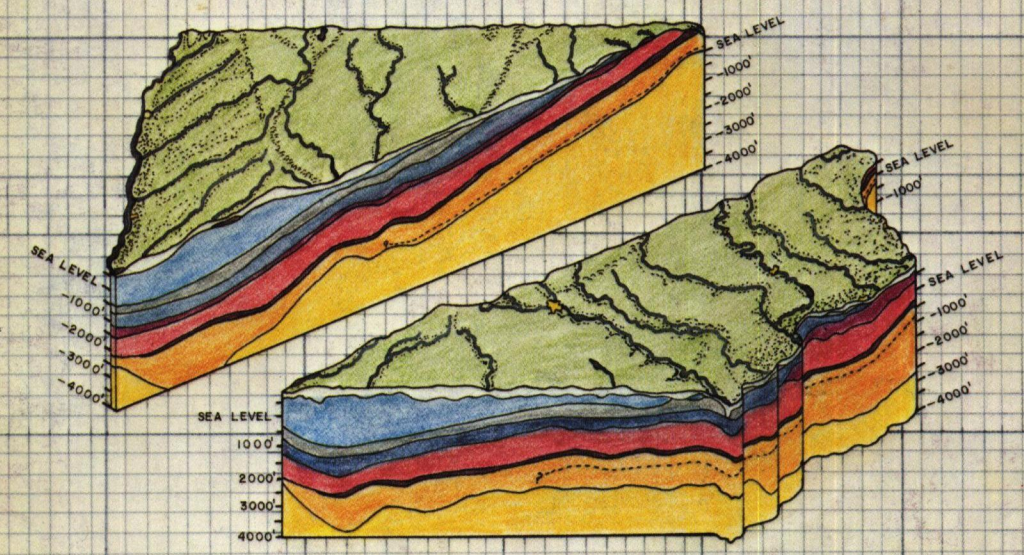
Limestone Quarry in Eastern Iowa



Cold Water Cave in Northeast Iowa

January 1976

# NEWSLETTER



## IOWA

IOWA GEOLOGICAL SURVEY

Volume I  
Number 1



THE GEOLOGICAL BOARD OF IOWA

- |                                       |                                    |
|---------------------------------------|------------------------------------|
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| The Honorable Lloyd R. Smith          | Auditor of State                   |
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| Dr. Paul Meglitsch                    | President, Iowa Academy of Science |

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Stratigraphic illustration of Iowa by John L. Knecht from data supplied by Paul J. Horick

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|---------------------------|----------------------|
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## On the Outcrop with the Director

The Iowa Geological Survey begins the Bicentennial Year with the first issue of this *Newsletter*. We feel that a report to you, the people of Iowa, and our colleagues in State Government and in professional geology, is important, not only from the information standpoint, but also from the credibility standpoint. We want you to know what we do in the Iowa Geological Survey and how we spend the funds entrusted to us. This first *Newsletter* is mostly informative and introductory. It introduces us as people and tells you what we do. It is our hope that this method of communication will provide you with enough basic information concerning our services that you will be able to utilize the Survey facilities even more than in the past.

For the many of you who are familiar with the Iowa Geological Survey but have not visited us in recent months, you should know that we have changed quite a bit. In March of last year, Dr. Samuel J. Tuthill, Director since 1969, resigned to accept a position in Washington, D. C. I was appointed to succeed Dr. Tuthill on June 1st. Several new staff members have been added in recent months. These people are assigned to the State Water Plan and to the Coal Research Program. We now have thirty-six full-time staff employed.

The Survey has been organized into operating divisions for management purposes. On July 1st Mr. Orville Van Eck was appointed Associate State Geologist, which is a new management position. Mr. Donald Koch was promoted to Assistant State Geologist and supervises Survey programs.

In addition to personnel changes, the Survey has changed its physical appearance rather significantly. We moved last August to newly remodeled facilities in Trowbridge Hall on the University of Iowa campus. The old Survey building was demolished soon after we moved. In Trowbridge we occupy more

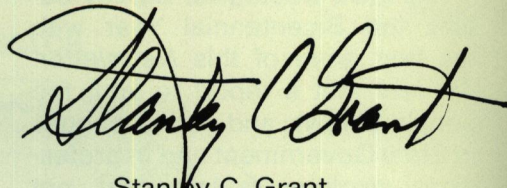


Dr. Stanley C. Grant  
Director and State Geologist

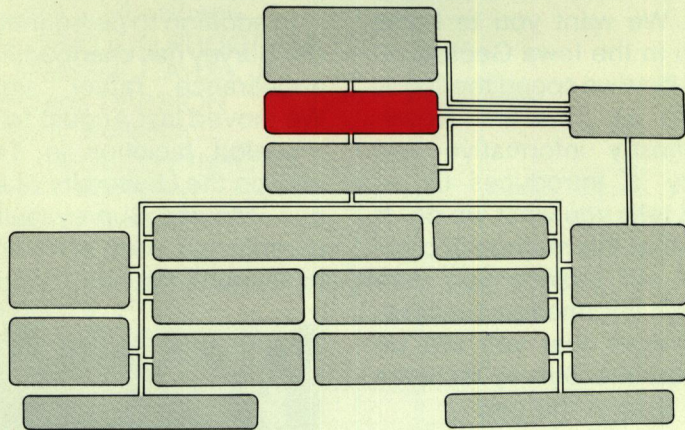


spacious and modern offices and laboratories. The Geology Department of the University also occupies part of the building. On December 5th, we formally dedicated the building in honor of Dr. Arthur C. Trowbridge, who was Director of the Survey and Head of the Geology Department for many years.

The many changes in the Iowa Geological Survey this past year have brought us to the beginning of a new era in research and service for the people of Iowa. In this Bicentennial Year the Iowa Geological Survey enters its 90th year of service to Iowans. We look forward to the challenges of today and the responsibilities of tomorrow.



Stanley C. Grant  
Director and State Geologist



Dr. Stanley C. Grant, Director of the Iowa Geological Survey and State Geologist, assumed his duties June 1, 1975, after five years as Associate Professor of Geology at the University of Northern Iowa in Cedar Falls. From 1966 to 1975 he was also a consultant in environmental geology, engineering geology, and remote sensing. As State Geologist, he holds the concurrent titles of Adjunct Professor of Geology at the University of Northern Iowa and the University of Iowa,

and Professor of Geology (Collaborator) at Iowa State University. Dr. Grant attended Cornell College and transferred to Coe College, where he received the B.A. degree in Geology, *cum laude*, in 1953. In 1954 he earned the M.A. in Geology at the University of Wyoming and received the Ph.D. in Geology in 1971 from the University of Idaho. He was awarded a Danforth Graduate Fellowship in 1953 and is a Distinguished Graduate of the Air Force Reserve Officers Training

Corps. His doctoral field research was conducted in Wyoming on the remote sensing of uranium deposits.

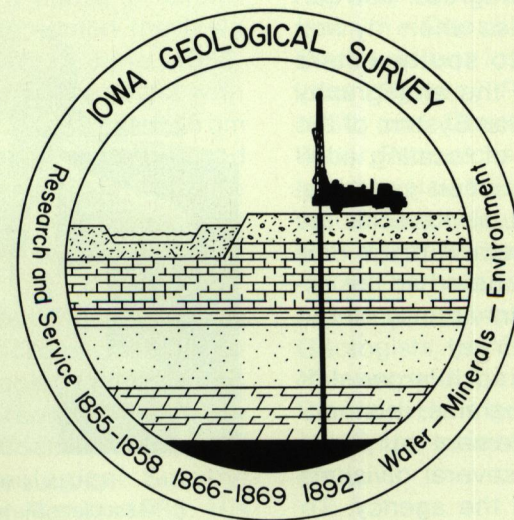
As an Air Force officer from 1956 to 1969 he served at Edwards Air Force Base, California; Webb Air Force Base, Texas; Kunsan Air Base, Korea; and was Commander of the Fifth Air Force Sea Survival Cadets and Senior Instructor of the Air Force ROTC, University of Idaho. Before resigning to complete his doctorate, he attained the rank of Major and Senior Pilot and received an Air Force Commendation for commanding the Sea Survival Center. He currently holds both a commercial and instrument pilot rating, and is qualified for multi- and single-engine aircraft.

He has prepared several publications resulting from research and consulting activities in Wyoming and Iowa. He is also an accomplished aerial photographer and interpreter as well as research photographer. One of his most recent research projects dealt with the environmental geology of Black

Hawk County, Iowa, and the karst topography of northeast Iowa. Dr. Grant also has represented the municipality of Cedar Falls on the Black Hawk County Solid Waste Management Commission and was a member of the Ecological Technical Committee of the Iowa Northland Regional Council of Governments.

In addition to teaching and consulting, Dr. Grant served as a petroleum geologist for the California Company and has directed numerous field research programs and trips to Wyoming and the Southwest.

Dr. Grant is a Fellow in the Iowa Academy of Science. He also is a director of the Geological Society of Iowa and holds membership in several additional professional societies, including the Geological Society of America, the American Institute of Mining Engineers, the American Society of Photogrammetry, the Society of the Sigma Xi, and Sigma Gamma Epsilon, national earth science honor society.





## Overview of the Iowa Geological Survey

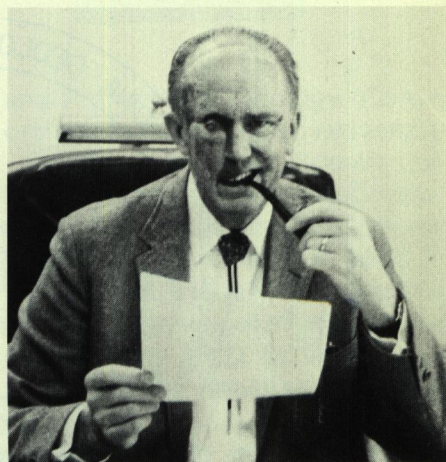
In the twenty-two years since I joined the Iowa Geological Survey as a Geologist I, there have been many changes, both in personnel and programs. In 1953 the Survey was made up of about eight full-time employees, and program emphasis was on subsurface and groundwater geology. Today the staff is much larger and the programs are more diversified. Nevertheless, the real purpose of all our activities remains the same today as it was twenty-two years ago—research for better service to Iowans.

I was originally attracted to the Iowa Geological Survey those many years ago by the strong groundwater program that the incumbent State Geologist, Dr. H. Garland Hershey, had in progress. You can imagine my surprise when my first assignment was to southwestern Iowa to work out the stratigraphy of the Pennsylvanian System of the area in the hope of locating additional road construction materials. Since that time, I, as have all the others who have been with the Survey for some time, have had the opportunity to work in virtually all the activities of the Survey.

Today, with the much larger staff and many new programs, it is necessary for management purposes that we have the several divisions established within the agency. To

some extent, this limits the opportunity for the younger staff members in each of the various divisions to participate directly in all phases of Survey work. In spite of this, there remains a close relationship among divisions, with the expertise of each division immediately accessible to any other division.

Another marked change in the operations of the Survey has been the strengthened role as the research and advisory group for numerous state regulatory agencies. In years past we regularly acted in this capacity largely for the agencies with responsibility for natural resources. While this role has grown dramatically, we find that we are also able to assist a number of non-



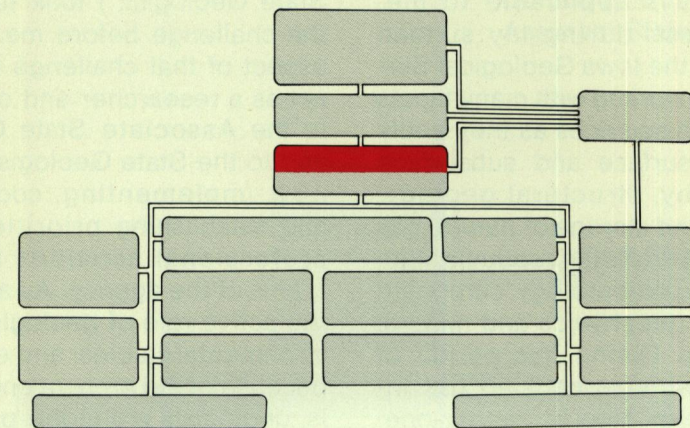
Orville J Van Eck  
Associate State Geologist

resource oriented agencies in the state. Again, this meets the original intent of the Geological Survey—research for better service to Iowans.

Service to Iowans is the funda-

mental theme of the administrative group of the Geological Survey, and it is our intent to continue such programs and to implement such new programs as will best serve the needs of the citizens of Iowa.

Orville J Van Eck  
Associate State Geologist



Mr. Van Eck, a native of Grand Rapids, Michigan, joined the Iowa Geological Survey in June, 1953. He served as a meteorologist with the U.S. Army Coast Artillery from 1942 to 1946. He holds the B.S. and M.S. degrees in Geology from the University of Michigan, where he has an additional year of graduate study.

Since 1953, Van Eck has written several publications of major significance to the geology of Iowa. The most widely circulated of these studies is his *Coal Resources of Iowa* (Iowa Geological Survey, Technical Paper No. 4), 1965. His

*Highway Construction Materials from the Consolidated Rocks of Southwestern Iowa* (Bulletin 15, Iowa Highway Research Board), 1960, and *Geology and Ground-Water Resources of Clayton County, Iowa* (Iowa Geological Survey, Water Supply Bulletin 7), 1961, are also major studies.

Van Eck holds membership in the American Institute of Professional Geologists, the Geological Society of Iowa, and the Iowa Academy of Science. He is also a Fellow in Sigma Xi, the scientific research society.



## The Scope of Iowa Geology

"They said it is to see how the world was made." (Sir Walter Scott, *St. Ronon's Well*, 1824) is a more cosmopolitan reference to geologists than is applicable to me. Nevertheless, during my sixteen years with the Iowa Geological Survey, I have worked with many facets of the earth sciences as they apply to Iowa—surface and subsurface stratigraphy, structural geology, underground storage of natural gas and liquid petroleum products, geohydrology, paleontology, carbonate petrology, geophysics and mineral economics. During this period of time the professional staff has increased from nine to twenty-one, and the programs and services of the Survey have increased accordingly. Much of the present work effort is in the category of studies popularly referred to as environmental geology. In reality, a great amount of the Survey's work ever since its beginning has been related to environmental geology. New technology and applications have been developed, to be sure, but it's still the same game—only the name has changed. We continue to collect and interpret data on the geology of Iowa and provide information needed by state government, municipalities, industry, and the citizens of Iowa for making judicious decisions on the use of

our natural resources, with an awareness of the impact of that use on our environment.

In my new position as Assistant State Geologist, I look forward to the challenge before me. A major aspect of that challenge will be to act as a researcher and consultant to the Associate State Geologist and to the State Geologist in planning, implementing, coordinating and establishing priorities in the professional activities and programs of the agency. As a result of the active role of geologists in environmental studies, and especially because of the present energy crisis, geologists are in the public eye more than ever before. Fewer peo-

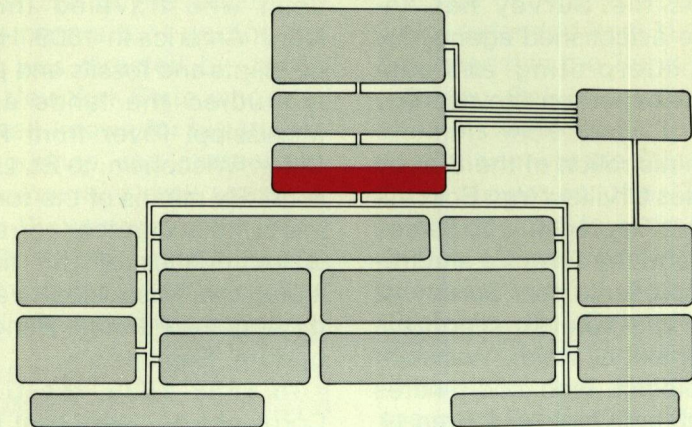


Donald L. Koch  
Assistant State Geologist

ple ask, "What does a geologist do?" or "What does the Iowa Geological Survey do?" More and more people know that geologists search for new petroleum discoveries, explore for new reserves of metallic and non-metallic mineral deposits, and that geologist-hydrologists do research in water availability and water quality. Through the efforts of a competent and dedicated staff, the Iowa

Geological Survey will continue as a viable agency to serve the increasing needs of the State in the fields of water supply and management, coal development, application of remote sensing techniques, subsurface studies, soils research, economic geology, land-use planning, and data management. We shall leave no stone unturned.

Donald L. Koch  
Assistant State Geologist



Mr. Koch, who was promoted from Chief of Subsurface Geology to Assistant State Geologist in June, 1975, is a native of Dubuque, Iowa. He received the B.S. (1959) and the M.S. (1967) degrees in Geology from the University of Iowa, where he is a candidate for the Ph.D. in Geology. He has been with the Iowa Geological Survey since 1959.

He holds memberships in five scientific and professional organizations and is a past president of the Geological Society of Iowa. He is the author or co-author of twenty articles, published either in journals or as monographs, in the areas of stratigraphy and paleontology. His current interests are carbonate petrology and geologic-hydrologic research.



## **The Iowa Geological Survey: Ninety Years of Research and Service**

The Iowa Geological Survey dedicated its new quarters in Trowbridge Hall on the University of Iowa campus with an open house on December 5 and 6, 1975. Dr. Stanley C. Grant, appointed Director and State Geologist June 1, 1975, anticipates an expanding role for the Survey. Although its early existence was twice interrupted, since 1892 the Survey has remained the established agency for collecting, interpreting, and publishing information on the geology of Iowa.

The administration of the Survey also includes Orville J Van Eck, Associate State Geologist, who serves as alternate to the Director and frequently represents the Survey at meetings and scientific conferences; Donald L. Koch, Assistant State Geologist, who coordinates all research activities; and Fred H. Dorheim, Chief Geologist, who also heads the Division of Economic Geology.

The governing body of the Survey is the Geological Board, composed of Governor Robert D. Ray (Chairman); the Honorable Lloyd R. Smith, State Auditor; Dr. Willard L. Boyd, President, University of Iowa; Dr. W. Robert Parks, President, Iowa State University; and Dr. Paul Meglitsch, President, Iowa Academy of Science and Professor of Biology at Drake University.

### **The Early Years**

The earliest reference to Iowa geology was made by French General George Victor Collot in the records of an expedition along the Mississippi River in 1793. More specific observations were made by Thomas Nuttall, an English botanist who traveled throughout North America in 1809. He collected plants and fossils and particularly studied the lands along the Mississippi River from Prairie du Chien, Wisconsin, to St. Louis, Missouri. By means of the fossil specimens, he accurately correlated the characteristics of the limestones along the Mississippi Valley with those of the Pennine Range in Derbyshire, England.

In 1838-1839, the U.S. Army Corps of Engineers sent the noted French geographer, Jean Nicollet, to map the Upper Mississippi Valley. His completed map is still considered one of the great contributions to American geography, but his incidental notes on Iowa geology are of more than passing interest. He left precise descriptions of the glacial deposits and physiography of the area and noted that the uplands along the Mississippi River at Keokuk contained bedrock units of Carboniferous-age limestone. He also left detailed de-

scriptions of the geodes (rocks containing crystal-lined cavities) of the region and of rock exposures near Burlington. Also in 1839, David Owen of the U.S. Geological Survey studied the mineral deposits of the Dubuque area that included parts of Iowa, Illinois, and Wisconsin.

Because Owen and other early geologists were individually commissioned to conduct specific research projects, they did not comprise a state "geological survey" as we now regard the organization. Although the General Assembly authorized a full-time survey in 1855, it was funded for only three years; yet it was an important stepping-stone to the establishment of a permanent geological survey. It was directed by James Hall from New York State, who later became well-known for his studies of the sequence and characteristics of sedimentary rock strata. In 1886, the Survey was reactivated for four more years under the direction of Charles A. White, both a physician and noted geologist.

### **A Permanent Survey Established**

Finally, in 1892 Professor Samuel Calvin, Head of the University of Iowa Geology Department, was appointed to establish a permanent geological survey. As former Survey geologist Mary (Parker) Wegmuller has noted, Iowa previously was not able "to remedy some of the most serious of the weak provisions of previous enabling acts." However, there developed a successful "continuous policy and uninterrupted course of work . . . for over three-quarters of a century."

Iowa, in fact, is almost a pioneer in establishing a permanent state geological survey. Colorado's survey had lapsed for thirty-eight years before its re-establishment in 1967, Massachusetts had no regular state geologist for 140 years prior to 1971, and Rhode Island is without a state geologist even today.

From the day of its establishment as a permanent state agency, with an office in Des Moines, until 1947, the position of State Geologist was held by the Chairman of the University of Iowa Geology Department, with the exception of Frank Wilder (1904-1906), Calvin's assistant at the University. In 1906, Calvin resumed the joint role until Professor George F. Kay's appointment, which extended from 1911 to 1934, the longest in the Survey's history.

During Calvin's administration, attempts were made to move the headquarters of the Survey to Iowa City. However, the Geological Board decided to keep the offices in Des Moines, where they were overseen by the Assistant State Geologist. Dr. Calvin's time remained divided between teaching in Iowa City and directing the research of the Survey. However, by 1933 the Depression had forced cuts in the state budget; so, when Professor Arthur Trowbridge was appointed Director in 1934, the office was moved permanently to Iowa City, where most of the actual research has been conducted since 1892.

Like Calvin and Kay, Trowbridge served both the University and the Geological Survey with distinction; but the expansion of the Survey, both in size and scope, demanded a full-time director. So, in 1947,



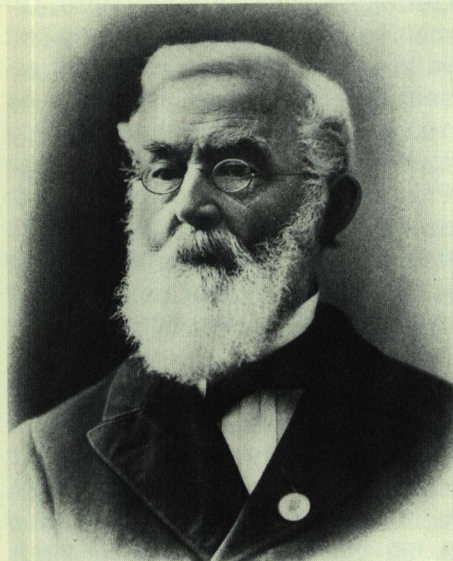
when Dr. H. Garland Hershey was appointed to the post, the Survey achieved administrative autonomy while retaining a close association with the University in research and staff exchange.

In his twenty-two years of service to Iowa geology, Hershey greatly expanded ground-water research, both in scope and precision. This period saw the post-war expansion of Iowa's economy to include industry as well as agriculture. In 1955, Hershey observed that "one of the first needs of a new industry locating in Iowa is a good water supply. Usually they obtain the necessary supply from wells which they drill with the aid of information from our records."

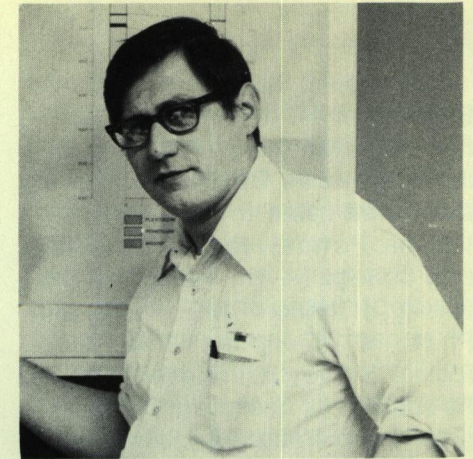
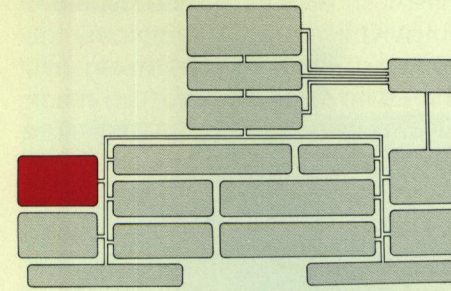
With the administration of Dr. Samuel J. Tuthill (1969-1975), the public services, interagency cooperation, and research of the Survey expanded further to include publication of a miscellaneous map series, a microfilming program, public information circulars, an environmental-geology atlas series,

a new drilling program to study the hydrology of carbonate rock units, a coal resources evaluation program, and the establishment of the Remote Sensing Laboratory. The last was organized by Dr. James V. Taranik, now with the EROS Data Center at Sioux Falls, South Dakota.

With Dr. Grant's administration, the Geological Survey is organized into eight research divisions and five administration and service divisions. The offices have moved from their original building on Jefferson Street to 123 North Capitol Street, Iowa City, Iowa 52242. One still can pick up or have mailed free the lists of Survey publications and maps that are available. Besides numerous *Annual Reports* of the Survey, there are *Bulletins* on various resources, a series of *Technical Papers*, *Reports of Investigations*, *Aeromagnetic Surveys*, and free educational materials for elementary and secondary school students. Each month the Survey distributes some 1,500 pieces of information.



James Hall  
First State Geologist  
1855-1858



Dr. Matthew J. Avcin, Chief

## Coal Exploration Program

The Coal Project is one of the newer research programs initiated by the Iowa Geological Survey and is a direct result of an early awareness in Iowa of the diminishing supply and increasing cost of energy. This awareness was brought about by fuel shortages during the winter of 1972-1973. Although these shortages were remedied by prompt action on the part of Iowa government, it was recognized that the problems were far from solved, and it was further recognized that Iowa must attempt to become more self-sufficient in energy. At that time Iowa was importing approximately ninety-eight percent of its energy needs. Unfortunately, this situation still prevails.

With the experiences of 1972-73 behind it, Iowa was well prepared for the hardships produced by the Arab oil boycott of late 1973, with effective conservation and distribution plans on stand-by. At the same time, Iowa was moving ahead to solve its long-range energy problems. The Coal Exploration Program of the Survey is one attempt to secure a local and reliable source of energy. As originally outlined, the program was multi-faceted, including studies of Iowa's coal quality, quantity, distribution, and geologic history, with an ultimate goal of a predictive model which would facilitate exploration, mining, and state planning for the problems caused by an expanding mining industry.

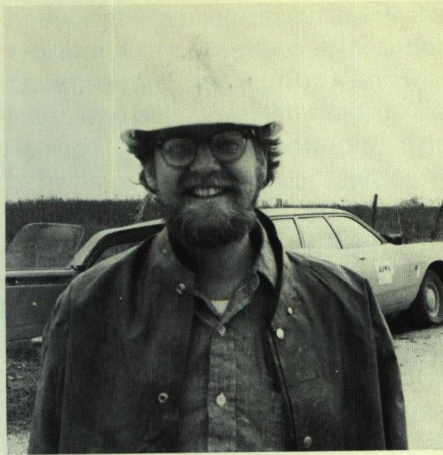


## Division Personnel

The project became a reality in September of 1973 with the addition of Dr. Matthew (Matt) J. Avcin, Jr. to the Iowa Geological Survey staff. Matt came to Iowa City from Verona, Pennsylvania, via Lafayette College (A. B., 1965), the University of Illinois (M.S. 1970 and Ph.D., 1974), and the Illinois Geological Survey. During his travels he acquired a background in stratigraphy, biostratigraphy, sedimentation, paleobotany, and a personal interest in the Pennsylvanian. He can also claim a direct relationship to coal mining, since both his grandfathers were deep miners in the eastern United States.

The drilling phase of the project got under way in July, 1974, and the staff was expanded to include a research driller, a drilling assistant, and an assistant geologist. Randy Bentzinger is the current Research Driller, a position he assumed when "Whitey" Woods, the first driller, decided to go back to private industry. A resident of Mt. Sterling, Iowa, Randy joined the staff in 1974. In spite of a limited time to learn his trade, Randy has developed into a competent core-driller.

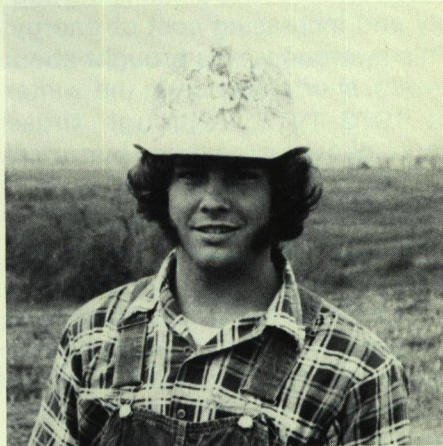
Ora Robinson is the most recent addition, replacing Randy as drilling assistant in October, 1975. As a resident of Ottumwa and a newlywed, Ora has appreciated the recent concentration on drilling in Wapello County. Although Ora has been with the Survey only a short time, his personality, special talents, and work attitudes have contributed a great deal towards making the drilling crew a smoothly functioning team.



Mr. Paul E. Van Dorpe



Mr. Randy R. Bentzinger



Mr. Ora A. Robinson

The last member of the coal project is Paul E. Van Dorpe who replaced James Dockal as Assistant Geologist in the Coal Division. Jim returned to graduate school and is presently working on a Ph.D. at the University of Iowa. Paul came to the Survey from Wayne State University, where he completed course work for a master's degree in Geology. In addition to his work in the coal project, Paul is working on his thesis and is setting up a household with Jill, his recent bride. Although not specifically trained in Coal Geology, Paul is holding up well under the strain of learning a new field and the increasing responsibility for the field operation of the coal project.

## Future of Coal

Concomitant with the growth of the staff, there has been a steady growth in the scope of the coal project. What was originally designed as a scientific project with practical application has become increasingly oriented toward problem-solving. In part, the change in emphasis is the result of a natural maturation, and, in part, it is the result of an increasing realization of the need for near-term solutions to our energy needs.

Coal will have to play an increasingly larger part in the energy mix if America is to achieve a position of practical energy self-sufficiency. Similarly, Iowa will have to expand its coal utilization if it is to maintain an adequate level of energy availability and economic stability. It is already evident that Iowa will expand its coal use from seven million tons in 1974 to at least 15 million

tons by 1985. The electric utilities alone will be using 11.5 million tons a year by 1980.

But why Iowa coal? The answer to this question is complex and is based on economics (both fiscal and energy) and environmental and practical considerations.

Perhaps the most compelling reasons for mining coal in Iowa are to be found in economic needs. If, as estimated above, Iowa will be using 15 million tons of coal a year in 1985, we can expect an annual cash outflow of \$300 to \$500 million if the coal is imported. There are also a number of indirect costs to the state: loss of jobs in the mines and ancillary industries in counties with chronic unemployment, loss of tax revenues from corporate and personal income, further deterioration of railroad branch lines because of insufficient freight, loss of royalty payments to local landowners, and increasing state aid in the form of unemployment benefits and social services necessitated by a lack of an industrial base. Similarly, the energy economics of importing coal from Wyoming, Illinois, and states farther east run contrary to the interest of both Iowa and the nation when local resources are available.

It has become apparent during the present study that most of the environmental problems associated with coal mining are more easily solved in Iowa than in most other areas of intensive mining. With proper regulation, surface mining in Iowa can lead to increased suitability of affected lands for agriculture and/or recreation. Almost more importantly, the present study has also demonstrated coal re-



serves large enough to support a major coal industry.

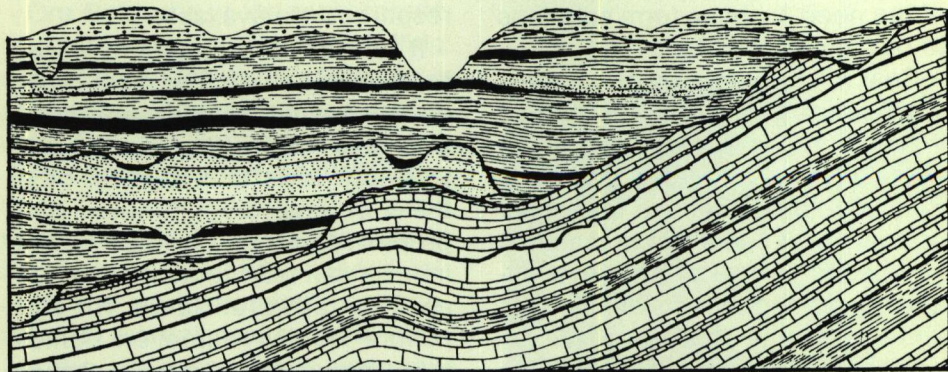
To date, thirty-two exploratory holes have been drilled in the project, indicating in excess of 500 million tons of coal in reserves. Our drilling program, which is based on township corners, tests only about ten percent of the area under study. It was based on this information that the Survey estimated five to ten billion tons of resources in the four-county area, including Davis, Jefferson, Van Buren, and Wapello. Considering only thickness, twenty-five to thirty percent of the coal listed above as reserves is extractable, using present technology. Unfortunately, thickness is not the only factor to be considered in evaluating the minability of a deposit.

Two other important factors which are presently under study are coal quality and lateral continuity. Iowa coal has always been considered to be of poor quality; however, recent tests have shown that Iowa coal, although not a world-beater, is better than its reputation. There is still a serious problem with the sulfur content in average Iowa coal, but the solution to this problem is being

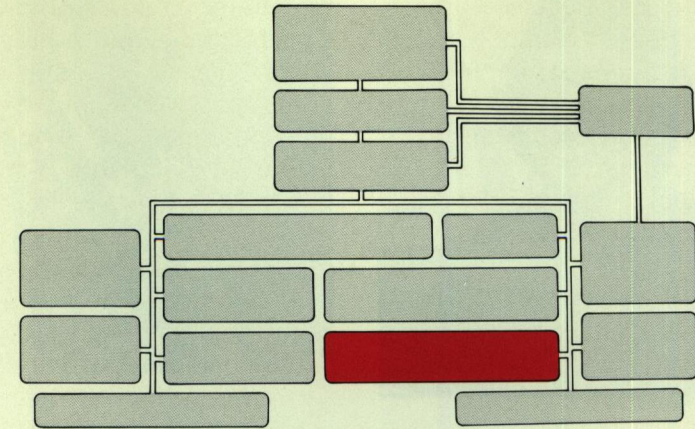
sought on several fronts. Also, there is sufficient evidence developing that there are areas of lower sulfur coal, but the extent is presently unknown. Similarly, lateral extent of coal deposits in general is unknown, but once again the evidence indicates that the picture is better than was previously believed.

It has been assumed for years that Iowa coal is limited to small, isolated pods. The early reports suggested that these pods were the result of isolated basins of deposition and therefore there was little chance of expanded mining. However, the drilling carried out by the Iowa Geological Survey indicates that many of the pods are the result of a complex geologic history, and in many cases the boundaries are nothing more than local interruptions in the coal seam. Therefore, many of the boundaries present no major problems to expanded mining.

Hopefully, the next issue of this *Newsletter* will include the results of several studies presently in progress, which will shed additional light on the Iowa coal supply.



Historical view of Iowa's lower coal measures



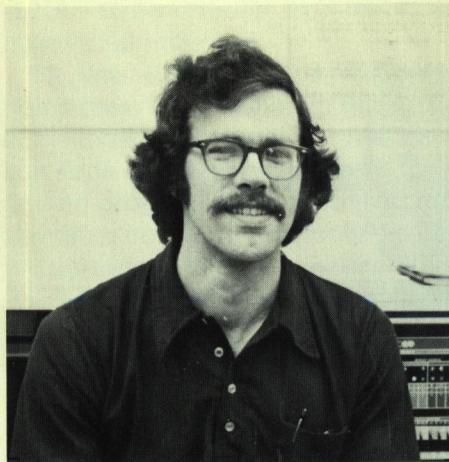
## Data Systems Division

The three members of the Data Systems Division work on a variety of projects relating to geologic, water resources, and energy data. Most of these projects make use of digital computers. Peter Kollasch, Chief of the Division, has a master's degree in Computer Science from the University of Iowa (1974). Douglas Lien is the Computer Programmer and has a master's degree in Engineering from the University of Florida (1971). Suzan Stewart has a master's degree in Library Science from the University of Iowa (1973) and is currently a first-year law student there. She is involved in research relating to energy and environmental issues.

Ms. Stewart has achieved recognition in the area of energy and

energy data systems. She is an advisor to the National Governors' Conference Energy Project on energy data systems and conservation. She is also a member of the Federal Energy Administration Advisory Committee on the National Energy Information Center. Suzan has recently completed a major study for the executive branch of the State government on the impact of prohibiting the use of non-returnable containers in Iowa. She is currently studying the water requirements of energy production for the Water Plan Division and is also compiling a directory and bibliography of land-use classification systems. She hopes in the near future to do work on environmental laws that pertain to Iowa Geological Survey activities.





Mr. Raymond P. Kollasch, Chief

The Iowa Geological Survey data processing section, in cooperation with the U.S. Geological Survey, is involved in gathering and processing geologic and groundwater data in support of the functions of the I.G.S. and the U.S.G.S. Areal Studies Division. Dan Gockel of the U.S.G.S. supervises the coding of data with the assistance of nine part-time personnel.

### Data Files

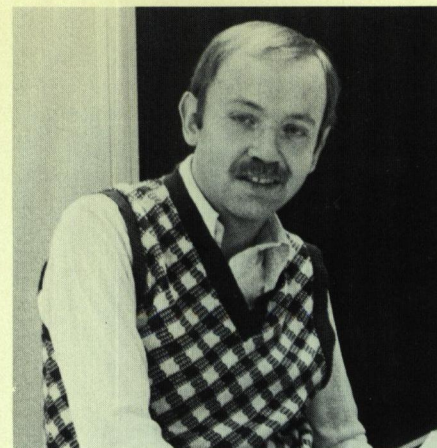
Currently, data is coded for three files: the geologic, hydrologic, and water quality files. Coding began on the geologic file in 1966, and since that time data has been coded for all ninety-nine counties of Iowa. This file contains data from strip logs and drillers logs, which indicate at what depth different geologic formations are encountered. If insufficient information is available, the coded data is not punched, but is held until a ground crew can collect the missing information.

Water quality analyses received from the State Hygienic Laboratory are maintained by the Iowa Geo-

logical Survey. These analyses report determinations of the concentrations of from twenty to sixty different chemical constituents and physical parameters in samples collected throughout the state by various agencies. The information contained in these analyses is being coded, and programs are available to print out tables of the desired parameters for any group of counties. This data is coded in formats designed by the U.S.G.S. and will eventually be stored on their WATSTORE System in Reston, Virginia. To date, twenty-seven counties in northeast Iowa have been coded.

The hydrologic file contains physical information about wells, such as the date drilled, cased schedule, water levels, and other data. Coding for this system was initiated in 1975, and approximately ten percent of the counties in Iowa have now been completely coded.

Dan Gockel and Pete Kollasch also provide printouts of data as requested by members of the I.G.S. staff or others outside the Survey.



Mr. Doug A. Lien

### IWARDS

The Data Systems Division is currently developing the Iowa Water Resources Data System (IWARDS), which will become a technical data base in support of the Comprehensive State Water Plan for Iowa. Pete Kollasch is managing this effort and Doug Lien is the programmer for the system.

The goal of IWARDS is to bring a wide variety of types of data into a single computerized system which is readily accessible to most state agencies, thereby improving the ease of access to water and natural resources data held by other state and federal agencies. It is intended to develop the system as a powerful, but flexible, tool for the retrieval, processing, and output of data. The goal of improving the accessibility of water resources data will also be served by the compilation of a bibliography of water resources publications, a directory of state and federal agencies involved with water resources, and an index of the



Ms. Suzan M. Stewart

*Code of Iowa* as it relates to water resources.

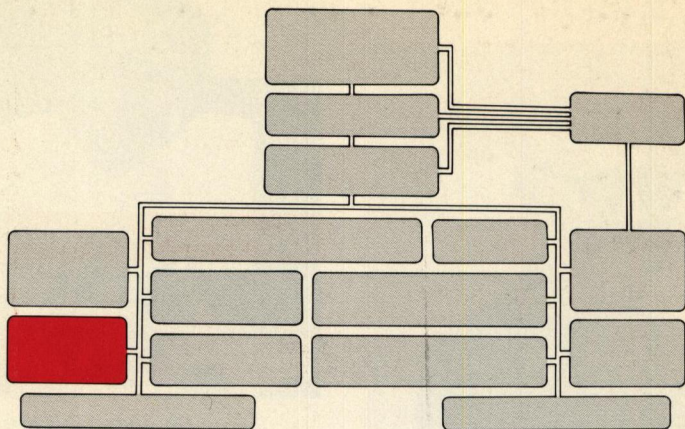
A search was made to locate computer software which could be used to support the computerized storage and retrieval system of IWARDS. Other states which have similar systems were queried to determine whether their systems have the capabilities envisioned for IWARDS. While no system which satisfied all the requirements was found, the OMNIANA system, developed by the New Mexico District of the U.S. Geological Survey, was chosen as an excellent starting point on which to base the development of the system. Doug Lien has already begun programming the system and is utilizing concepts and techniques gained from studying the OMNIANA system.

Development of the IWARDS system is coordinated with other agencies by means of an advisory committee formed of representatives from several state agencies. This group meets every two months to discuss problems related to the handling of data and the development of the system.







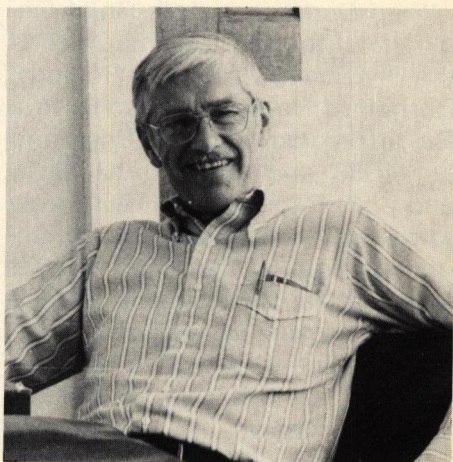


## Ground-Water News

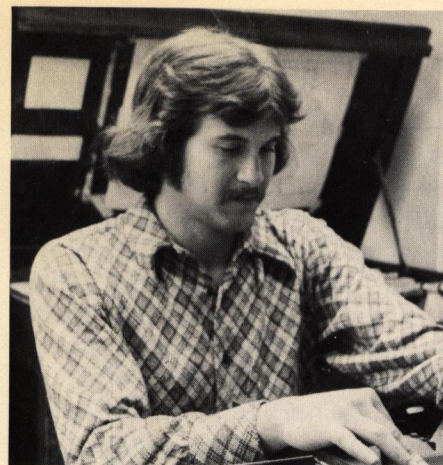
The Ground-water Division of the Iowa Geological Survey is responsible for replying to public requests for information and advice on the predictions and problems of availability and quality of ground-water supplies. Approximately seventy percent of lowans rely on underground sources for their water supply. Thus the division is kept busy answering a wide variety of requests, ranging from ordinary farm and livestock needs to complex problems of municipalities, industries, and planning agencies. Inquiries for this assistance come from engineering consultants, the water-well industry, state and federal agencies, municipal and industrial representatives, farmers (including irrigators and feedlot operators), rural water associations, housing developers, schools, rec-

reation facilities (e.g., golf courses and parks), and various other groups and individuals.

The replies are in the form of original-letter reports summarizing the hydrogeologic conditions at



Mr. Paul J. Horick, Chief



Mr. Greg A. Ludvigson

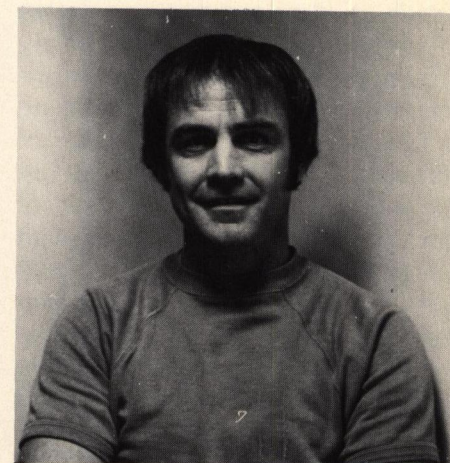
specific sites or over a countywide or area basis. Usually the reports point to a solution to a specific problem, with associated recommendations. Based on the thousands of well logs, driller's logs and pumping test records in the Survey files, predictions can be made on the various aquifers present beneath an area and their depths and water-yielding and quality characteristics. Frequently, advice is given on where to locate wells to avoid pollution, on well construction, proper spacing to reduce interference effects, development techniques, and well abandonment. Each problem is unique, depending on the local hydrologic conditions and the availability of data. With the voluminous hydrologic data and years of experience in handling these problems, the Ground-Water Division is capable of providing advice needed for practical solutions to most problems.

Although the service aspects of the Ground-Water Division are of primary importance, research activ-

ity is also stressed. Two projects now under way, and slated for completion this year, are the Jordan aquifer study and the East-Central Iowa Regional Water Supply Atlas. Both projects are cooperative programs with the U.S. Geological Survey.

### Present Ground-water Studies

The Jordan aquifer is one of the major bedrock aquifers of the state because of its widespread occurrence and generally high water-yielding properties. The objectives of the project are to map and describe the occurrence, movement, yield, development methods, general availability and quality of the water in this aquifer. The project itself is part of the Division's overall plan to study and report on all major aquifers in the state. The large number of wells now tapping this aquifer and the increasing pumpage rates have created problems that demand early attention. The pressure surface has been



Mr. Darwin L. Evans



dropping regionally and significantly at several pumping centers. The aquifer must be protected from contamination by leakage of highly mineralized water entering through poorly constructed wells and improperly abandoned old wells. The areas where contamination is most likely to occur must be pointed out. Landuse and water planners and managers will find such reports invaluable.

The east-central Iowa report is to be a schematic summary of water availability and water quality usage patterns and potential for both surface and ground-water sources in a twelve-county area from the Mississippi River west to Tama and Poweshiek Counties. Eventually these regional reports will be available for the whole state. Regional reports are presently available on central Iowa and southeastern Iowa.

### Personnel

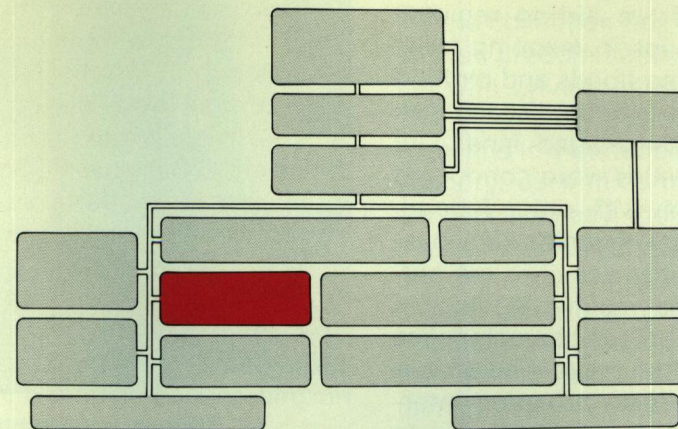
The Division staff consists of Paul J. Horick, Chief; Greg A. Ludvigson, Research Geologist; and Darwin L. Evans, Research Driller. Horick, a native of Illinois, has been active in the Iowa Geological Survey ground-water program for more than twenty-five years, specializing in forecasting. He is a graduate of Augustana College (B.A., 1945), Rock Island, and the University of Iowa (M.S., 1948). Ludvigson, with a B.S. degree in Geology in 1972 from the University of Iowa, is employed full time as a geologist on the east-central Iowa cooperative program. He spent three semesters at the University of Iowa as a graduate teaching assistant for introductory-level geology courses. He has

maintained his interest in teaching and hopes eventually to enter that profession. Greg joined the Survey staff in May of 1974 and is assigned as a Research Geologist for the East-Central Iowa Water Supply Atlas. Outside of this principal responsibility, Greg has helped other ground-water researchers obtain field data and occasionally represents the Survey at public schools that have requested guest lecturers. He hails from Cedar Rapids. Evans, another Iowa native, from Pacific Junction, came to the Survey in 1971. His previous experience was with Thorpe Well Company of Des Moines, beginning in 1959. Darwin is qualified to operate several types of rigs and has worked with a wide range of geologic sediments from unconsolidated alluvium and glacial till to deep Cambrian-age carbonates and sandstones.

### Drill Rig

The Survey drilling rig, a Failing #1250 rotary machine capable of reaching depths of about 1,000 feet, currently is being used to drill test wells and obtain cores for the carbonate-aquifer study in north-eastern Iowa. Other projects in which the rig has been used are the test drilling to locate Cold Water Cave, in selection of sanitary landfill sites, a pesticide contamination study, bedrock mapping, and Pleistocene sampling.

The Ground-Water Division provides assistance with ground-water problems anywhere in the state. Inquiries should be directed to the Chief, Ground-Water Geology, Iowa Geological Survey, 123 North Capitol Street, Iowa City, Iowa 52242.



## The Remote Sensing Laboratory

The Iowa Geological Survey Remote Sensing Laboratory (IGSRSL) was established by the Iowa Legislature in 1971 to help apply the rapidly developing technology of remote sensing to environmental

problems in Iowa. The Laboratory is intended to serve as a consultative resource for state, federal, and local agencies that have planning, management, or regulatory responsibilities in Iowa. This consultative responsibility includes the education of agency personnel in the potential application areas, the development of techniques for specific planning, management, or regulatory functions, and the coordination of data-collection interpretation and utilization among many state, federal, and local agencies.

In this multifaceted role of consultation, technique-development, education, and coordination, the Remote Sensing Laboratory has been in a unique position to participate in a wide variety of problems. Projects have ranged from inven-



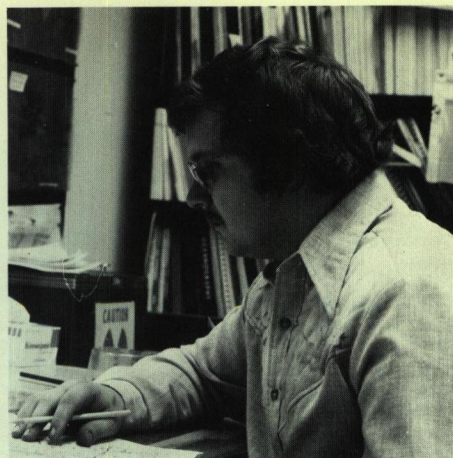
Mr. Bernard E. Hoyer, Chief



torying migratory geese to mapping unlawful encroachment onto floodplains, and from aiding regional planning groups in mapping land-use to mapping floods and plotting the occurrence of the disease, oak wilt, on state-managed lands. All of these activities were conducted in conjunction with other federal, state, and local agencies. Obviously, many of these activities are outside the normal realm of geological surveys. The unique characteristics of imagery often make it adaptable to many agencies of varied interests and promote coordinated data collection and utilization.

### Personnel

IGSRSL is rather small by most standards, but it has the capability of providing technical assistance or information in most areas of remote sensing. Three full-time permanent staff members form the core of the laboratory: Bernard Hoyer, Chief; Raymond Anderson and Patrick McAdams, Remote Sensing Analysts. Hoyer received the B.A. degree in Geology from Augustana College (1969), studied soils for two years under an NDEA fellowship at the University of Idaho, and is currently working for a Ph.D. in Geology at the University of Iowa. Anderson has the B.A. (1970) and M.S. (1974) in Geology, both from the University of Iowa, where he is pursuing doctoral study in Geology. McAdams received the B.A. (1974) in Geology at the University of Iowa, where he is also studying for the Master's degree. In addition, one Geological Survey staff member, Dr. George Hallberg, worked in the laboratory for two years, and



Mr. Raymond R. Anderson

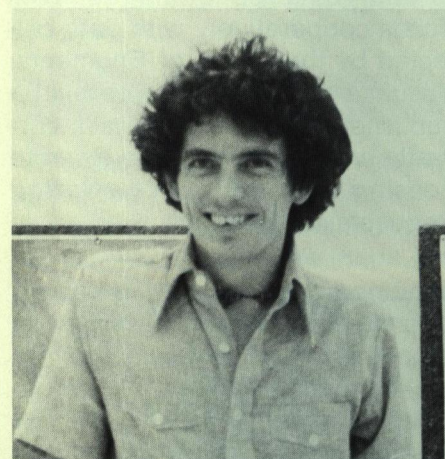
another, James Lucas, is Principal Investigator of a contract IGSRSL has with NASA in cooperation with the Jet Propulsion Laboratory and the EROS Data Center, concerning computer-enhanced satellite imagery for land-use interpretation. The Laboratory also has been fortunate during the last four months of 1975 to have Dr. Paul Christianson, a plant ecologist on sabbatical leave from Cornell College in Mount Vernon, Iowa, studying and working with our staff. Crucial to this diverse, yet small, program are cooperative programs conducted with other agencies, whereby personnel from these other agencies utilize IGSRSL equipment for their own interpretation and analysis under our instruction.

### Equipment

The Laboratory is well equipped for conventional optical photointerpretation, which is still overall the most effective form of remote-sensing analysis. Two light tables equipped with stereo-microscopes

are available for interpreting transparencies up to 10 x 10 inches and two 3x mirror stereoscopes are available for viewing 10 x 10 inch prints. In addition, there are three other light tables for viewing film with conventional magnification. A Map-o-graph and a Zoom Transfer Scope greatly aid the transfer of photographic information to maps and scale adjustments for comparisons. These facilities, combined with adequate drafting space, greatly aid the Laboratory in serving the needs of agencies cooperating on remote-sensing projects.

Other equipment is available which can be used for special purposes. The Laboratory has a color-additive viewer for viewing all types of multiband imagery as well as density-slicing equipment. Digital processing has not been a major activity at IGSRSL. However, a contract between IGSRSL and NASA concerned with producing enhanced imagery from digital tapes is helping the Survey remain current on the state-of-the-art of digital processing.



Mr. Pat McAdams

### Operation

Data collection has been accomplished predominantly by contracting with private aerial companies. The Laboratory has contracted for high- and low-altitude photographic imagery, as well as thermal imagery. Occasionally, the remote sensing analysts have mounted the Laboratory's own multiband camera aboard private aircraft and contracted for only the flying. However, they also have the capability of obtaining imagery from state-owned aircraft. Modifications were made to the Iowa Conservation Commission's Aztec plane to carry the Laboratory's multiband or T-11 camera mounted in its gyro-stabilized mount. This arrangement has worked effectively when used for demonstration projects, research, or emergencies. The Laboratory's reliance on private contractors assures maximum staff time for developing cooperative programs with other agencies, conducting research, developing information, and doing the image interpretation. The Laboratory appreciates the service provided by the private aerial contractors and expects to continue a close working relationship with them.

### Funding

Funding for the program is provided primarily by appropriations from the Iowa Legislature through the Iowa Geological Survey. This provides salaries, equipment, services, and some operating expenses. However, much of the data collection is provided by cost-shar-



ing or contract arrangement with cooperating agencies. Agencies cooperating in these ways have included the Iowa Conservation Commission, Iowa Department of Environmental Quality, Iowa Natural Resources Council, U.S. Geological Survey Water Resources Division, U.S. Army Corps of Engineers of the Rock Island District, and the U.S. Soil Conservation Service. Further funds have derived from two grants from EROS, U.S. Geological Survey, and a current contract with NASA. These have concerned land-use data from satellite imagery and the capabilities of satellite data to map Quaternary deposits in the Middle West.

### Current Projects

Many projects are currently in progress, but six seem most significant. A generalized land-use map of Iowa, consisting of eight categories, is being prepared. About eighty percent of the state is completed and is being checked by regional planning agencies. Final publication will be made at a 1:500,000 scale. Concurrent with this mapping, the Remote Sensing Laboratory has a NASA contract for developing digital-processing techniques to produce enhanced imagery useful to land-use interpretation.

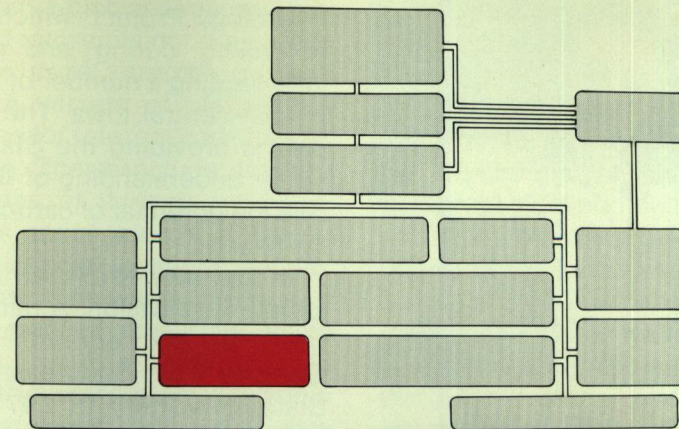
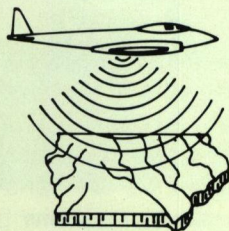
Final statistical analysis is being conducted on a cooperative project

for mapping the occurrence of oak wilt (*Ceratoyxis facacerum*) on state-regulated lands. Results indicate that the disease is not as widespread as originally feared, but it deserves continued surveillance.

Another recent environmental study concerned the distribution and effect of leaf fires in Des Moines and vicinity. Data is currently being used for consideration of a ban on such burning.

Flood studies have been conducted at the Laboratory since 1972. The latest technique-development work has been directed at measuring the vertical and horizontal accuracy of the flood boundaries as interpreted from color-infrared imagery which has been acquired up to five days after the flood has receded. Photogrammetric measurements and detailed topographic maps of the flood boundaries were constructed and are currently being evaluated in cooperation with the U.S. Geological Survey and the U.S. Army Corps of Engineers. Associated with this flood study, the Laboratory is beginning to analyze crop damages from floods cooperatively with data collected by the Corps of Engineers. Results on all these studies will be published, and further details currently are available in the Remote Sensing Laboratory *Newsletter*. Requests are welcome.

IOWA GEOLOGICAL SURVEY  
REMOTE SENSING LABORATORY



## Subsurface Division

The Subsurface Division of the Iowa Geological Survey is charged with the responsibility of acquiring and analyzing data on the subsurface rock units or stratigraphy of the state. This information is made available to the general public through publications and open-file procedures.

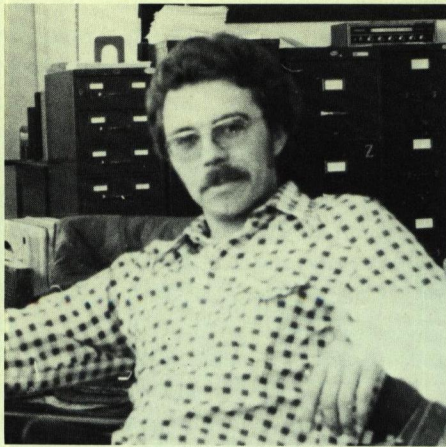
### Personnel

Mr. Jack L. Gilmore was recently appointed Division Chief after seven years of related experience with the Survey. Prior to his initial employment as a research geologist, he received his B.A. degree from the University of Iowa and completed two years of military service with the Second Armored Division. One of his most recent accomplishments is a gravity investigation of

a magnetic anomaly in Fayette County. This project, currently in final review, consists of the geological interpretation of data acquired from a network of approximately 130 gravity stations. It is hoped that this work will be an impetus to further mineral exploration in the area.

Mr. Bill J. Bunker joined the Survey staff in August of 1971 and has been involved almost exclusively in subsurface geology activities. After graduating from Iowa State University, where he majored in Geology and Mathematics, he served as a nuclear weapons maintenance technician in the U.S. Army. This experience has proved helpful in the handling and use of radioactive bore-hole logging equipment used in many Survey subsurface investigations. Most of his time





Mr. Jack L. Gilmore, Chief

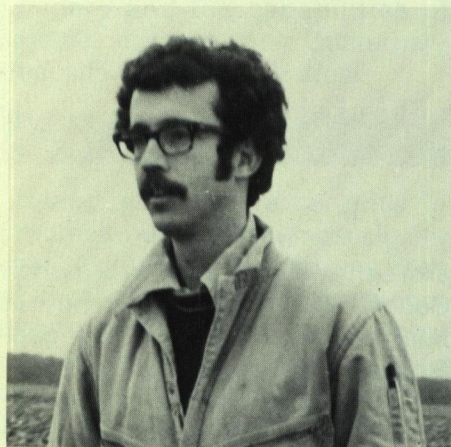
has been allocated to field work and research with the Carbonate Hydrology Project, which consists of drilling, coring, and geophysically logging a number of test wells in east-central Iowa. The acquired data is providing the State with a better understanding of the water-bearing potential of carbonate rock formations.

In January Michael J. Bounk joined the Division. A native of St. Louis, Bounk received a B.S. in Geology from Southeast Missouri State University in 1971 and an M.S. in Geology from the University of Iowa in 1975.

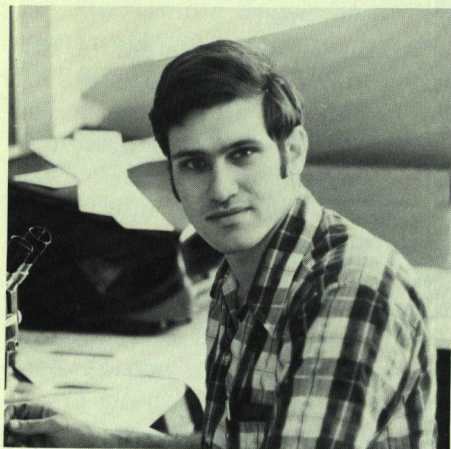
### Operation

One of the major functions performed by the Subsurface Division is the logging of drill cuttings obtained from well drillers around the state. Approximately 22,000 sample sets have been studied to date, and they provide the basic data for mapping the rock strata beneath Iowa's land surface. Consultation with well drillers and engineers concerning well problems and well forecasting is highly dependent upon this source of information. Occasionally the staff is requested to examine sample cuttings of an uncompleted well to determine the proper depth to set casing. This determination is often critical to insure maximum performance and longevity of a water well.

Other tasks within the Division's capabilities include geophysical surveys, such as magnetic, gravity, and earth resistivity. Surveys of this nature supply useful subsurface data where little or no drill-hole information exists. Similarly,



Mr. Billy J. Bunker



Mr. Michael J. Bounk

the Division has the facilities to conduct bore-hole geophysical investigations which provide information about rock units not readily apparent in core samples or drill cuttings. A variety of file data is maintained for reference and public inspection. These include detailed descriptions of surface rock outcroppings, active mine plats, elevation control-point locations, drillers' logs of unstudied well cuttings, and an assortment of subsurface maps depicting the characteristics of most of the state's stratigraphic rock units. A complete file of data relating to oil and gas exploration and development is also housed within the Division. Subsurface information in these files is highly detailed and is often replete with

extensive bore-hole geophysical logs.

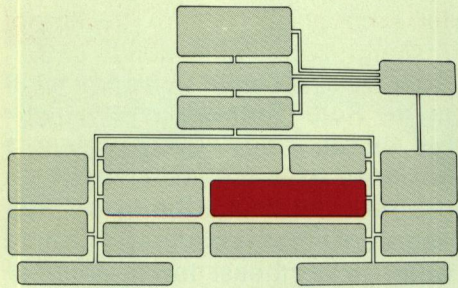
### Current Projects

A current project of significance is the Rural Domestic Water-Supply Nitrate Study. This program is designed as a preliminary investigation to determine the extent and degree of nitrate pollution of ground water in northeast Iowa. Approximately 150 water wells are being periodically sampled in three major geographic areas. Water samples are analyzed and the results are interpreted with respect to influencing factors such as land-use, well construction, proximity to sink-holes, and the water-producing formation.



*pumping*  
Test drilling for the Carbonate Hydrology Project with the Survey's Failing #1250 rotary rig.





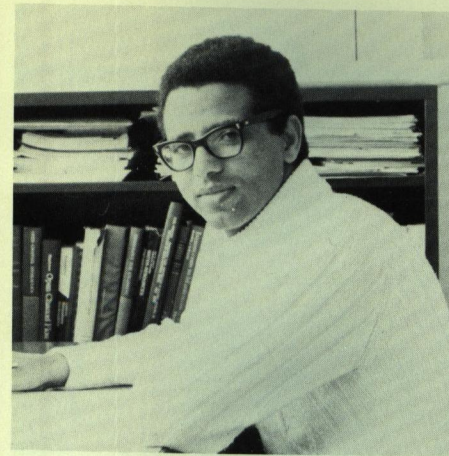
Mr. Donovan L. Gordon, Chief

## Water Plan Division

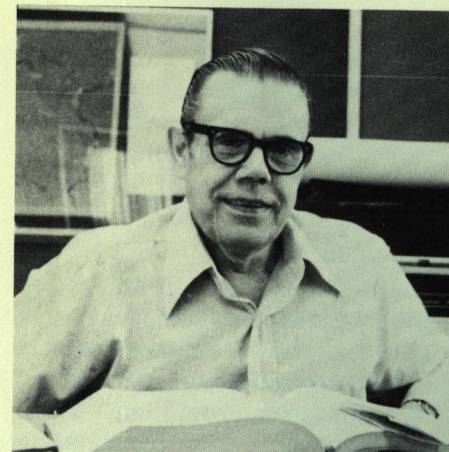
The Water Plan Division has been assigned the function of representing the Geological Survey and coordinating its activities as a principal in state water planning activities. This division of the Survey has been established to develop background information relative to the mode of occurrence, distribution, quality, and variability of the state's ground- and surface-water resources. Additionally, the Survey has been asked to develop a system for collecting, organizing, and managing this and related water information.

The Water Plan Division has four full-time and one half-time staff members, who, in turn, are supported by the general Survey clerical and technical staff. The Division staff may be subdivided, for definition purposes, into four sections: ground water, surface water, energy and water, and library research. The ground-water section is staffed by

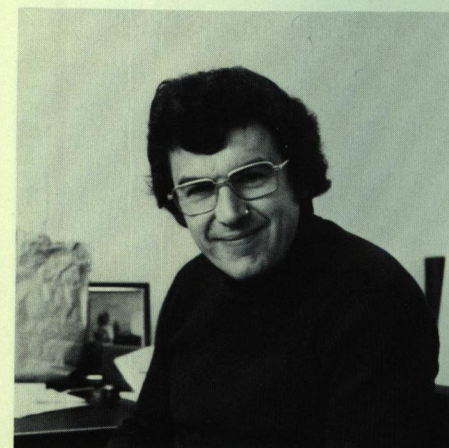
Don Gordon (Division Chief) and Gary Kress, both geologists with backgrounds in hydrology and economic and environmental geology. Gordon has a B.A. and M.S. in Geology from the University of Iowa and Kress has a B.A. from the University of Northern Iowa. The surface-water section is capably manned by a recent addition to the Survey, Mr. Ogbazghi Sium, who holds a B.S. from Haile Selassie Imperial University, and has come to us from Asmara, Ethiopia, via the University of Iowa and the Institute of Hydraulic Research. He has also completed an M.S. in Engineering at the University of Iowa. His experience in dam construction, streamflow modeling, and water resources management qualify him well. Ms. Suzan Stewart, Survey research librarian, will be investigating the water requirements of fuel conversion and energy production. Suzan returned to the Survey from



Mr. Ogbazghi Sium



Mr. Charles J. Huelsbeck

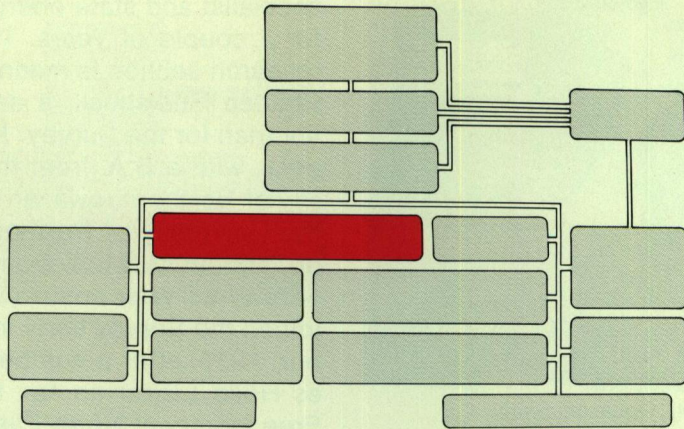


Mr. Gary E. Kress

the Energy Policy Council where she functioned as an information specialist and state energy advisor for a couple of years. The library research section is manned by Mr. Charles Huelsbeck, a senior staff librarian for the Survey. Mr. Huelsbeck, with a B.A. from the University of Northern Iowa, an M.A. from the University of Northern Colorado, and an M.S.L.S. from the University of Wisconsin (Madison), joined the Survey early in September, 1975, after a number of years as Head Librarian for the Ames Free Library at North Easton, Massachusetts, and as an associate professor of English at Merrimack College, North Andover, Massachusetts.

The Water Plan Division is currently engaged in the development of a formal report that will interrelate ground-water quality, distribution, flow systems, yield potentials, and other hydrologic matters. Companion information, all part of a study on water resources availability, is being documented for surface water, in which will be coordinated discharge/flow information, annual and monthly flow variability, evapotranspiration, precipitation information, and other characteristics. In the area of fuels and energy, initial investigations are being made into the water demands of the state-of-the-art techniques and processes. This information will later be coupled with demands and long-term needs. The library research section is currently working with the Data Systems Division toward the preparation of the initial sections of the IWARDS catalogue (discussed under the Data Systems Division).

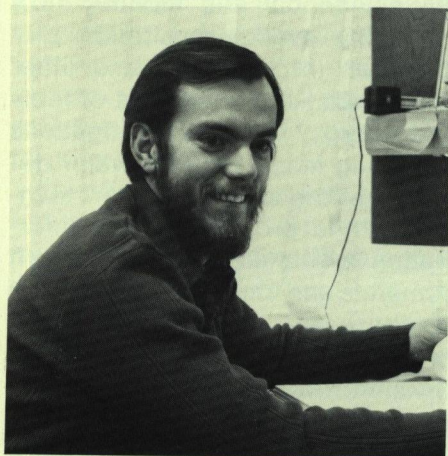




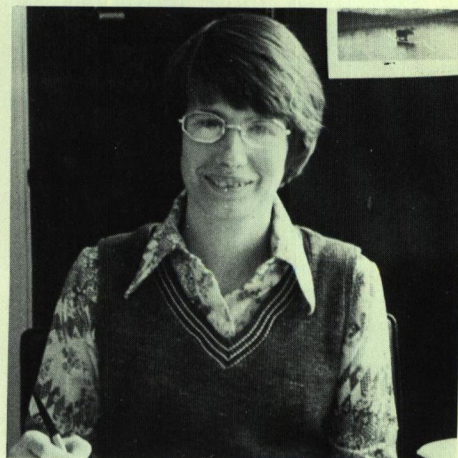
## The Research Division

The newly formed Research Division brings together some diverse elements of the staff. The term "research division" purposefully does not bring to mind a clearly

defined set of activities as does "subsurface stratigraphy" or "economic geology," because projects and responsibilities vary and often tie to immediate problems.



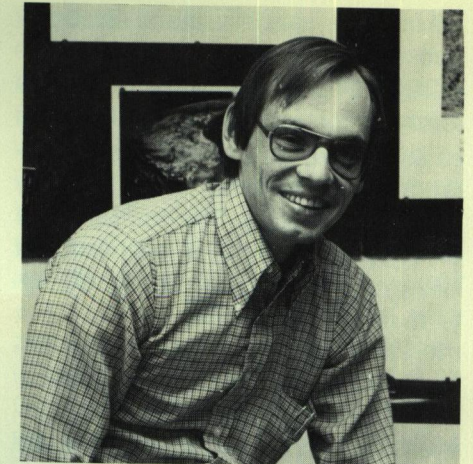
Dr. George R. Hallberg, Chief



Mrs. Jean C. Prior



Dr. Logan K. Kuiper



Mr. James R. Lucas

Examples of the diversity of projects undertaken are Jean Prior's research on the state's energy problems to her analysis of the alluvial history of portions of the Missouri River bottoms to aid in solving land-boundary disputes for the Attorney General's office. Dr. Logan Kuiper, with several graduate degrees in physics, brings a unique and invaluable viewpoint to focus on various problems. His understanding of physical systems has involved him in numerical modeling of the problems of thermal remote sensing, energy inflow and use in Iowa, and currently a state-wide water model of Iowa's ground-water system.

The aim of the Research Division will be to conduct, initiate, and stimulate these applied research activities which are fundamental to the proper use and understanding of Iowa's physical resources. Also, the Division will work to integrate the efforts of other divisions and agencies to prepare and provide physical resource information for planning agencies in the state.

### Personnel and Projects

Dr. George R. Hallberg heads the Research Division, with a Ph.D. in Geology from the University of Iowa. He is a specialist in Quaternary geology. Ongoing research of particular interest involves the analysis of the stratigraphy and hydrology of the Pleistocene deposits in northeastern Iowa. This project examines the water resources and water movement in Pleistocene deposits and also how these deposits affect the water availability and quality of the important bedrock "carbonate aquifers." He is participating in a joint project with the Nebraska Geological Survey to evaluate the Pleistocene stratigraphy of southwestern Iowa in relation to volcanic ash beds which may be radiometrically dated. This will provide some framework for an absolute chronology of these deposits, which is necessary for the safety analyses for proposed nuclear power-plant sites in Iowa and adjacent states.



Hallberg also directs a cooperative program with the Iowa Cooperative Soil Survey Program. This joint effort involves establishing the stratigraphic and geomorphic relationships of Iowa soils in many areas of the state. The modern soil surveys, as they are prepared in Iowa, are the most detailed information on surficial materials that the state will ever have on a state-wide basis. Within this program, Hallberg and the Soil Survey co-investigators are conducting tests to evaluate the foundation engineering characteristics of these materials. Also, with Fred Dorheim, Chief of Economic Geology, they have initiated an evaluation of sand and gravel resources for northwest Iowa.

Dr. Logan Kuiper is a member of the Research Division and is currently conducting research relating to ground-water flow systems. His state water model gives an answer to a problem of great interest to many people in the state. It finds the maximum water-level depth in a well pumping from any of the water-bearing rock formations beneath the state. A common problem for deep municipal wells and others is that the water level in these wells drops as more and more water is withdrawn. The further the water level is lowered the more expensive it becomes to pump the water to the surface. Fortunately, after a period of years the water level stabilizes if the pumping rate remains constant. The question that the model answers is, "How far down will the water level go before stabilization is achieved?" The model can provide an approximate answer to this question for any

number of wells of any size at any location. Thus, it can analyse the present or any future pumping situation that may exist in the state.

For any location within the bedrock units of the state, the model also finds the direction, rate, and amount of ground-water flow as it moves toward natural features, such as streams, or to pumping wells. The model obtains these answers by solving the fundamental mathematical equation for the flow of water through porous materials, the same equation used for the flow of heat in a non-homogeneous media.

Certain hydrologic and geologic data must be fed into the model before it can be used. The answers that the model gives are no more accurate than the data that is fed in. This is the primary reason why the answers produced by the model are only approximate. However, the accuracy is sufficiently high that the model will be a very useful tool for those interested in well draw-down and a general understanding of the ground-water hydrology of the state.

Mrs. Jean C. Prior, a member of this division, obtained the B.A. from Purdue University in Political Science and Geology. Her M.S. degree in Physical Geography was taken at the University of Illinois, where she also acquired two year's experience in coal petrography as Research Assistant for the Illinois Geological Survey. Her research interests are primarily in geomorphology and Pleistocene geology, and her published investigations relating to Iowa deal with Pleistocene Lake Calvin in eastern Iowa, and the excavation of a mammoth site in Pottawattamie County.

The diversity of her past projects typifies the wide-ranging nature of research opportunities in a state geological survey the size of Iowa's. Reports compiled at the request of various state and federal agencies have dealt with the origin of sediments in Waubonsie Creek Ditch of southwest Iowa, the physiography and geology of several Iowa drainage basins, the geological resources and effects of flooding within the Lower Ledges State Park, the physiography and geology of Pike's Peak State Park, a Mississippi River overflight to identify sources of warm effluent, ground-truth studies associated with thermal remote sensing of the Mississippi River, land-use, and energy demands and environmental quality in Iowa. She also was able to assist in the subsurface photography of Cold Water Cave in northeast Iowa. A considerable amount of her time during the 1973-1974 period was spent coordinating staff support and performing editorial duties associated with the meetings and technical reports of the Midwestern Governors' Conference Task Force on Midwestern Energy Requirements and Environmental Protection. Her current research projects include the preparation of an educational series publication on the landforms of Iowa and an environmental geology atlas of Linn County.

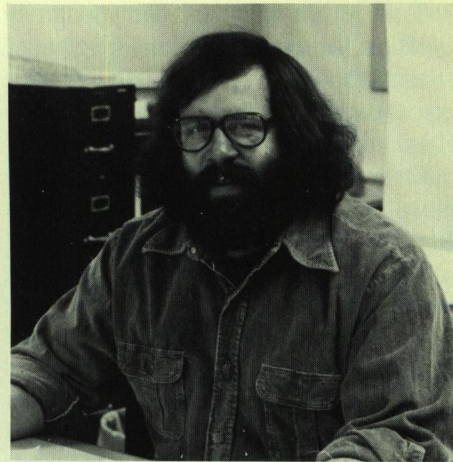
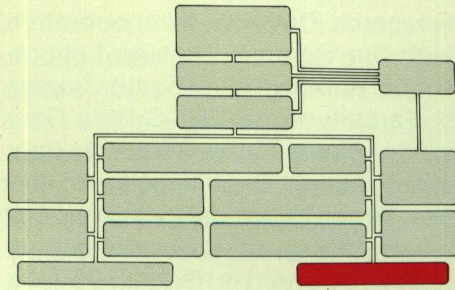
The Iowa Geological Survey Remote Sensing Laboratory, with the Jet Propulsion Laboratory in Pasadena, California, has been funded by the National Aeronautics and Space Administration (NASA) to develop land-use classification maps from computer-enhanced

LANDSAT images for portions of an eleven-county area of south-central Iowa. James R. Lucas of the Research Division, in cooperation with the Remote Sensing Laboratory, is Principal Investigator. James V. Taranik of the EROS Data Center in Sioux Falls, South Dakota, and Frederic C. Billingsley of the Jet Propulsion Laboratory, are participating as co-investigators. Lucas received a B.A. (1969) in Geography from Mankato State University, and an M.A. in Physical Geography (1973) from the University of Iowa, where he is currently a candidate for a doctoral degree in Geology.

The LANDSAT Satellite collects spectral reflectance data from the earth's surface via its multispectral scanner. This information is radioed back to an earth receiving station where the picture elements for these images are stored on high-density computer tapes. Since these satellite scenes are stored in digital form, they can be manipulated mathematically to produce new scenes, which are geometrically correct, with greater scene contrast.

These enhanced images are being used by the remote-sensing personnel of the Iowa Geological Survey and the planners in the AREA XV Regional Planning Commission, under the direction of Bruce Bullamore, to determine an effective research strategy to utilize satellite imagery for regional planning purposes. The initial land classification maps look promising, with the final results of the investigation due for publication in August.





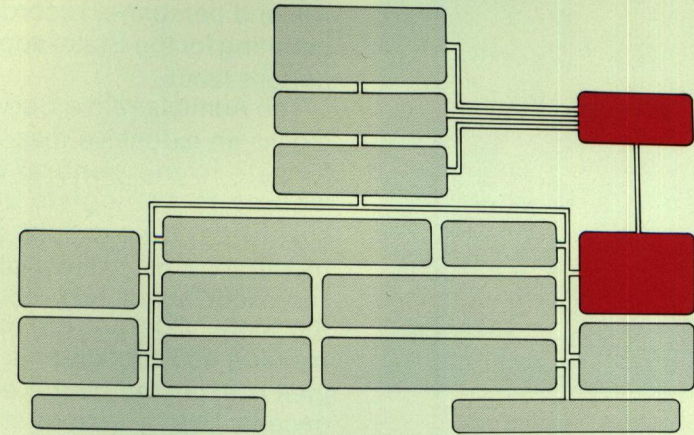
Mr. John L. Knecht, Chief

## Illustrating and Drafting Division

The Drafting Department of the Iowa Geological Survey has the task of taking information given to it from the other divisions and producing a finished map or illustration which can be presented to the public or sent to a printer for publication. This may involve being part of a project from the beginning, drawing work maps and making plans for publication, or simply doing the final drafting on a layout that has already been determined. Sometimes the drafting department is given an assignment all its own, the most recent being the hand-carving in wood of the Survey's logo, which now hangs in the front office. Other projects have included the building of special equipment that was needed in the drafting room.

The specific work produced includes drawings and graphs to be photographed for slide presentations, making color separations for maps scheduled for color printing, or illustrating various landscapes needed to convey an idea—one example being the interior of Cold Water Cave with a proposed walkway.

At the present time the Drafting Department has one person, John Knecht, who has been with the Survey since January, 1974, as a Geological Illustrator. He was graduated from the University of Iowa with a bachelor's degree in painting and for a short time worked as an independent artist until coming to the Survey.



## Administrative Services

The Administrative Services staff of the Iowa Geological Survey consists of four secretaries under the supervision of an administrative assistant. They share a wide variety of clerical duties that formerly were performed by an administrative assistant and a secretary. The increase of Survey personnel since

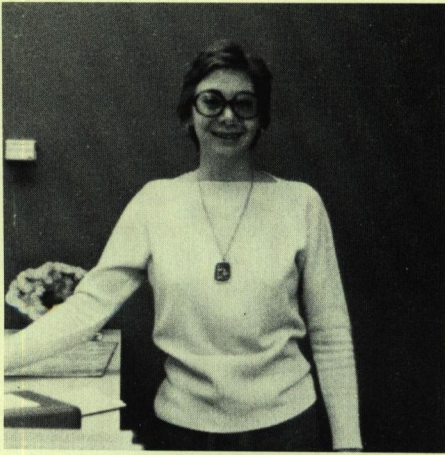
1969 and the added number of research programs in the past five years necessitated a need for a significant increase in secretarial services.

In addition to routine office and secretarial duties, the Administrative Services staff is responsible for typing technical reports, speeches, and summaries of programs and preparing manuscripts for camera-ready or type-set printing. Excellence in typing and grammatical correctness are a source of pride and considerable effort on the part of the secretarial staff, along with a reputation of courtesy in both telephone and personal contacts. The administration and secretarial staff maintain a strong policy of public service by greeting visitors to the Geological Survey office at 123 North Capitol Street in Iowa City (52242) and by dispensing the published research of the Survey.



Ms. Wilma V. Gould, Chief





Ms. Susan K. Sappington



Ms. Rose R. Shindelar



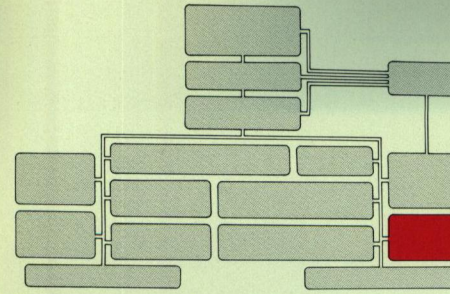
Ms. Renita K. Goodwin

Other administrative services of the Survey include coordinating payroll and personnel records and accounting for the State-appropriated budget funds.

The Administrative Services staff stocks an extensive map inventory for sale to the general public as well as to geologists and other specialists. For example, some 650 topographic maps are available that represent about 60% coverage of the state. Completion of the remaining 430 topographic quadrangles is expected by the end of the decade. Use by various state agencies, engineering and consulting firms, and the general public has resulted in an increase in map sales, ranging from a few hundred dollars several years ago to over \$10,000 a year currently.

Ms. Wilma Gould has served as I.G.S. Administrative Assistant since 1966. She attended Cedar Rapids Business College, the University of Iowa, and Kirkwood Community College, and has over twenty-five years of secretarial and office management experience.

The secretaries are Renita Goodwin, who joined the Survey staff in December, after graduation from Mid Prairie High School, Wellman, Iowa, in May, 1975, and Susan Sappington, who attended Ripon College, majoring in anthropology. As part of her education, she spent four months in Costa Rica, studying and living with a family there. Also, she worked two summers with an archeological field school outside of Flagstaff, Arizona. Rose Shindelar was graduated from Area One Vocational-Technical School of Bookkeeping-Accounting and worked in Spillville, Iowa, before joining the I.G.S. staff.



Mr. Earle E. Scheetz, Chief

## Technical Support

Earle E. Scheetz is the Senior Geological Technician, in charge of collecting samples of drill cuttings from approximately 240 water-well drillers in Iowa. With the help of his assistant, Charles W. Kithcart,

"Bud" Scheetz, as he is known to his friends and fellow-workers, prepares the sample cuttings for microscopic study by the staff geologists. Samples from wells drilled in Iowa are made available to the Survey voluntarily by the drillers.



Mr. Charles W. Kithcart

Scheetz makes personal contact with all well contractors several times a year, to make sample pickups, to collect data and to deliver to the drillers such Survey materials as drillers' log books and sample bags. Such contact serves to encourage the continued cooperation of the drillers.

During his travels, Scheetz also collects water samples for analysis of quality. Occasionally he travels to known sources of Iowa's common rocks and minerals in order to re-supply the educational kits which he assembles.





Resistivity used for subsurface research

In the offices of the Geological Survey, Scheetz directs the work of both Kithcart and a varying number of geology undergraduates employed part-time while pursuing degrees at the University of Iowa. He also supervises the Survey's "library" of rock samples and the equipment-storage warehouse in Iowa City and builds shelving for added storage space. For the con-

venience of staff geologists, he also keeps a card file of unstudied wells. When help is needed in the field to run elevations or for earth resistivity measurements and pumping tests, Scheetz is usually called upon. Finally, he is also responsible for coordinating the weekly maintenance checkups of twelve state-owned motor vehicles.

