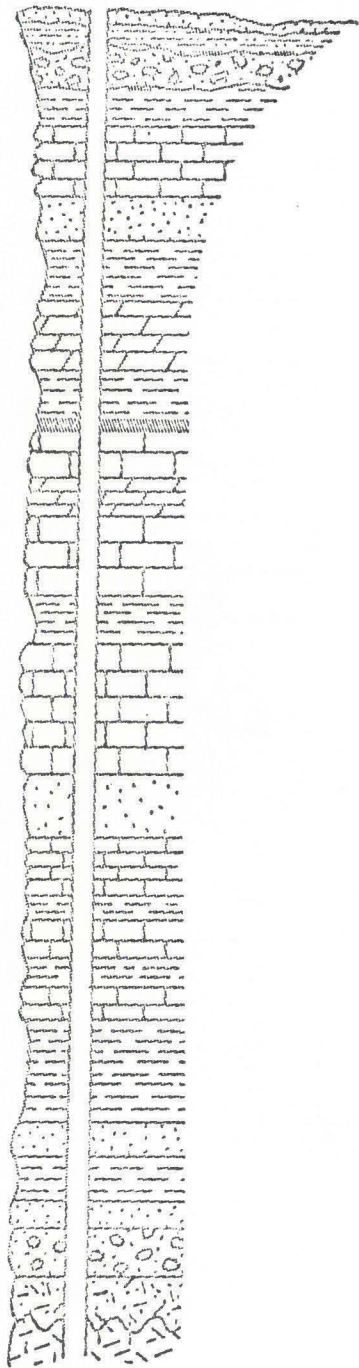


*Jean C. Prior*



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ANNUAL REPORT  
of the  
STATE GEOLOGIST  
to the  
GEOLOGICAL BOARD

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1 July, 1971

Iowa Geological Survey

ANNUAL REPORT  
Volume 42

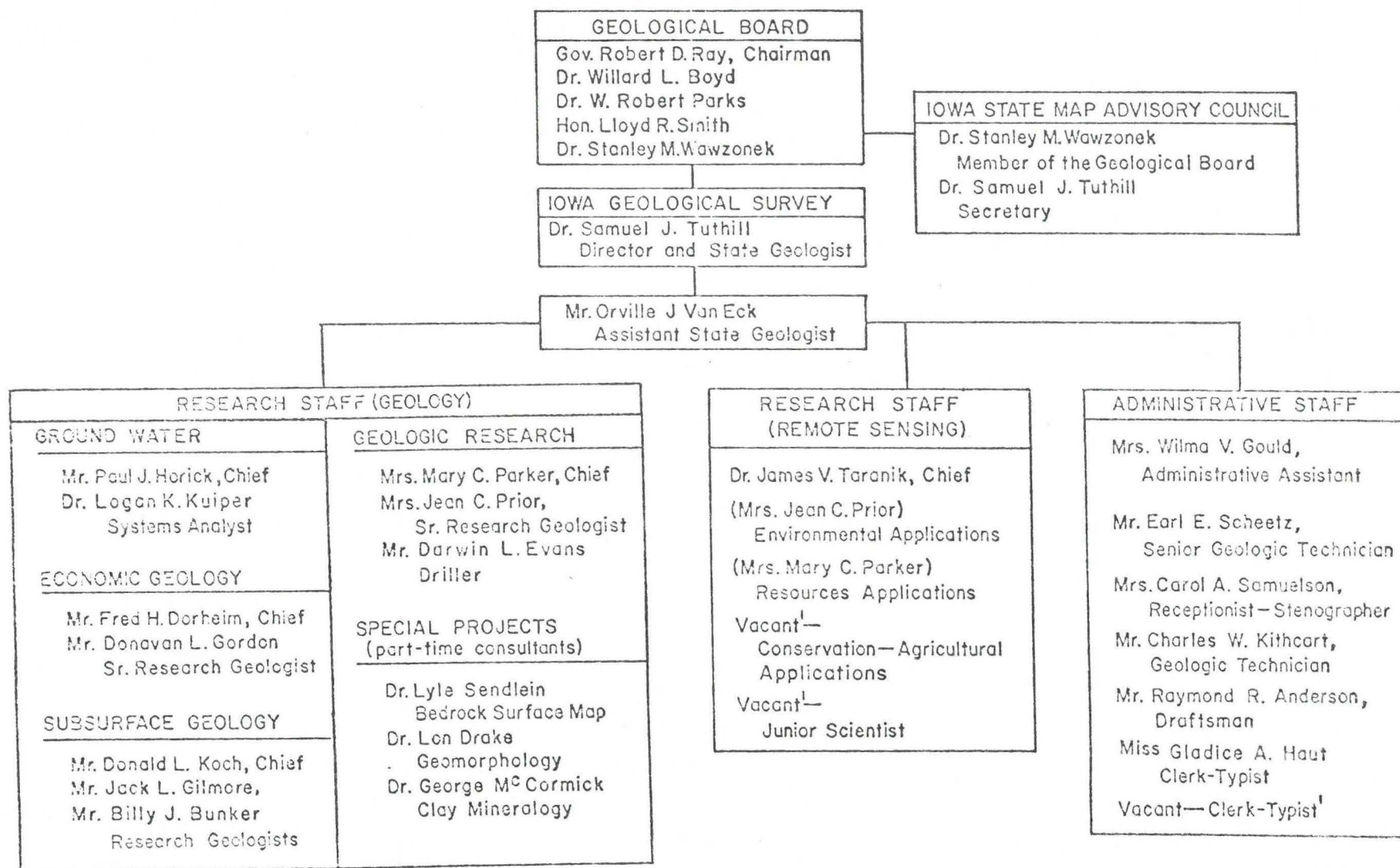
1 July 1971

Figure 1 shows the table of organization for the Iowa Geological Survey for this date. Figure 2 shows the functional relationships of the Survey. During the last year the Survey staff has accomplished the following major tasks:

PUBLICATIONS

1. *List of Publications of the Iowa Geological Survey*, 43 p.
2. *Water resources of Southeast Iowa*, Water Atlas #4, R. W. Coble, (in press).
3. *Geology and Ground-Water Resources of Cerro Gordo County, Iowa*, Water Supply Bull. #9, H. G. Hershey, K. D. Wahl, and W. L. Steinhilber, 75 p., 1 map.
4. *Geology and Ground-Water Resources of Linn County, Iowa*, Water Supply Bull. #10, R. E. Hansen, 66 p., 2 maps, 1 cross section.
5. *Mineral Resources Map of Iowa*, (52 x 36 in), F. H. Dorheim.
6. *Stratigraphy of the Upper Devonian Shell Rock Formation of North-Central Iowa*, Report of Investigations #10, D. L. Koch, 123 p., 1 plate.
7. *Bedrock Topographic Map of East-Central Iowa*, 2 sheets (in press) now on open-file status.

Figure 1. Staff Organization and Responsibility Assignments



<sup>1</sup> To be funded by a grant from NASA

# Iowa Geological Survey

## Research Cooperative Programs

U.S. Geological Survey  
Groundwater (50/50)  
U.S. Geological Survey  
Surface Water (50/50)  
U.S. Geological Survey  
Topographic Mapping (30 IGS/70US.)  
N.A.S.A.  
(40 IGS/60 US)

## Consultation, Advisory, and Data Source Services

Iowa Department of Revenue  
Iowa Water Well Drillers  
Local and Regional Planning Commissions  
Iowa Counties and Municipalities  
Iowa Commerce Commission  
Iowa Development Commission  
Office for Planning and Programming  
Iowa Air Pollution Control Commission  
Iowa Water Pollution Control Commission  
Iowa State Department of Health  
Solid Waste Disposal Division  
Municipal Water Supply  
Iowa Chemical and Technology Review Board  
Iowa State Hygienic Laboratory  
Iowa Department of Justice  
Iowa Natural Resources Council  
Iowa Department of Soil Conservation  
Iowa Agricultural Experiment Station  
State Archaeologist  
Iowa Highway Commission  
Iowa Department of Mines and Minerals  
Iowa Department of Agriculture  
Iowa Preserves Board  
Iowa Conservation Commission  
The University of Iowa  
Iowa State University  
University of Northern Iowa  
Iowa Department of Public Instruction  
U.S. Department of Agriculture SCS  
Iowa Citizens  
Private Industry  
Engineering Consultants

## Participation in Other Agencies

Iowa Natural Resources Council  
S.J. Tuthill — Member and  
Administrator of Oil and Gas  
Iowa State Land Rehabilitation  
Advisory Council  
S.J. Tuthill — Member  
Iowa State Map Advisory Council  
S.M. Wawzonek — Chairman  
S.J. Tuthill — Secretary  
Iowa Conservation Education Council  
M.C. Parker — Member  
F. H. Dorheim — Member  
Iowa City Chamber of Commerce  
Environmental Concerns Committee  
J.C. Prior — Member

Fig. 2. Function Relationships of Iowa Geological Survey



8. *Bedrock Topographic Map of Southeast Iowa*, 2 sheets (in press) now on open-file status.
9. *Report of Preliminary Interpretation of Aeromagnetic Survey of Southern Iowa*, O. J Van Eck, 19 p., 2 maps.
10. *The Maquoketa Formation (Upper Ordovician) in Iowa*, Miscellaneous Map Series #1, M. C. Parker, 6 maps with text.

#### CONSULTATIVE, ADVISORY, AND DATA-SOURCE SERVICES

##### Well Predictions

Predictions for groundwater resources are made on request for groups or individuals in Iowa. These include replies to requests for information from 48 citizens, 29 municipalities, four industries and four other governmental agencies.

##### Subsurface Data Collection

The Survey collected 813 sets of well cuttings from 123 cooperating drillers. These samples represent 196,246 feet of drilling and an approximate cost of acquisition, if we contracted the drilling, of about \$1,178,000 (based on \$6.00/ft). These data were obtained for only the cost of the sample bags (\$1,244) and travel expenses of our senior geological technician who collects the samples from the drillers (\$422).

Neither of these last two expenses would be obviated if we contracted the drilling ourselves. The only significant defect in this form of sample acquisition is that

the drilling sites are at a location and extended to depths determined by the needs of the drillers' client. This program must be augmented by drilling done by the Survey for specific research needs.

### Well Logging

Five hundred and ten (510) detailed descriptive logs of well-cutting samples have been made during the past year (1 July 1970-30 June 1971). The footage represented is 126,980 feet. A formal set of priorities was established in March by which well samples will be analyzed. The criteria for this priority system are:

- (1) unusually deep wells,
- (2) municipal wells,
- (3) areas in which there are other research projects active,
- (4) areas in which we have little spacial control, and
- (5) gas storage projects. Where drillers indicate anomalies or that problems have been encountered, well logs are prepared for the driller's use.

### Microfilming

The program of microfilming our well logs has been completed. These are stored in the State Archives. During the coming biennium our technical files will be organized into a microfilm-automatic data processing retrieval system. This should protect our data bank by affording both a working set and an archive set that will be stored in the State Archives. At present the vast bulk of our data is in paper files and is highly susceptible to loss by fire or water.

The data are not now readily usable without the direct participation by staff members by those seeking information. The microfilm-ADP system should free staff from curatorial duties and make their time more available for research.

#### Oil and Gas Administrator

Seventy-four drilling permits were issued during the year. Four of these were oil tests, 10 were gas storage wells, and 60 were stratigraphic tests.

#### Requests for Information From the General Public

The Survey received about 3,350 requests for geologic and hydrologic information from the general public.

<u>Category</u>	<u>No 1970</u>
General Information (largely for school children)	1,420
Technical Information (other than well predictions)	115
Requests for U. S. Geological Survey Topographic Maps	985
Requests for Iowa Geological Survey Maps and Publications	830

#### Lectures to Groups by IGS Staff:

Local	28
State	16
National	0

#### Field Conferences Conducted by IGS Staff:

Local	8
State	7
National	2

Governor's Conference on Environmental Systems  
 9-12 December 1970, Des Moines, Iowa

A comprehensive discussion of the interrelationships between environmental systems was conducted under the leadership of the Geological Board. Fifteen state agencies, eight federal agencies, five institutions of higher education, 26 industries, and 35 citizens groups were represented. The conference was attended by 198 individuals all of whom were specifically invited by the governor.

Formal Conferences Attended or Conducted by IGS Staff:

Local	11
State	19
National	18

<u>Consultative Contacts</u>	<u>Required Data Analysis Only</u>	<u>Required Data Acquisition and Analysis</u>
Iowa Natural Resources Council	51	3
Iowa Commerce Commission	20	--
Iowa State Department of Health	20	2
Iowa Conservation Commission	31	7
Iowa State Highway Commission	28	--
Office for Planning and Programming	2	--
Iowa Development Commission	4	--
Iowa Department of Justice	11	2
Iowa State Hygienic Laboratory	26	2
State Archaeologist	5	3
Iowa Dept. of Mines & Minerals	6	--
Iowa Dept. of Soil Conservation	15	--
State University & Public Schools	30	2
Iowa Preserves Board	4	--
Counties and Cities	75	17
Federal Agencies (FHA, etc.)	12	--
Engineering Consultants	35	--
Water Well Drillers	270	14
Industry	75	--
Individual Citizens	397	28
	<u>1,117</u>	<u>80</u>



## RESEARCH IN PROGRESS

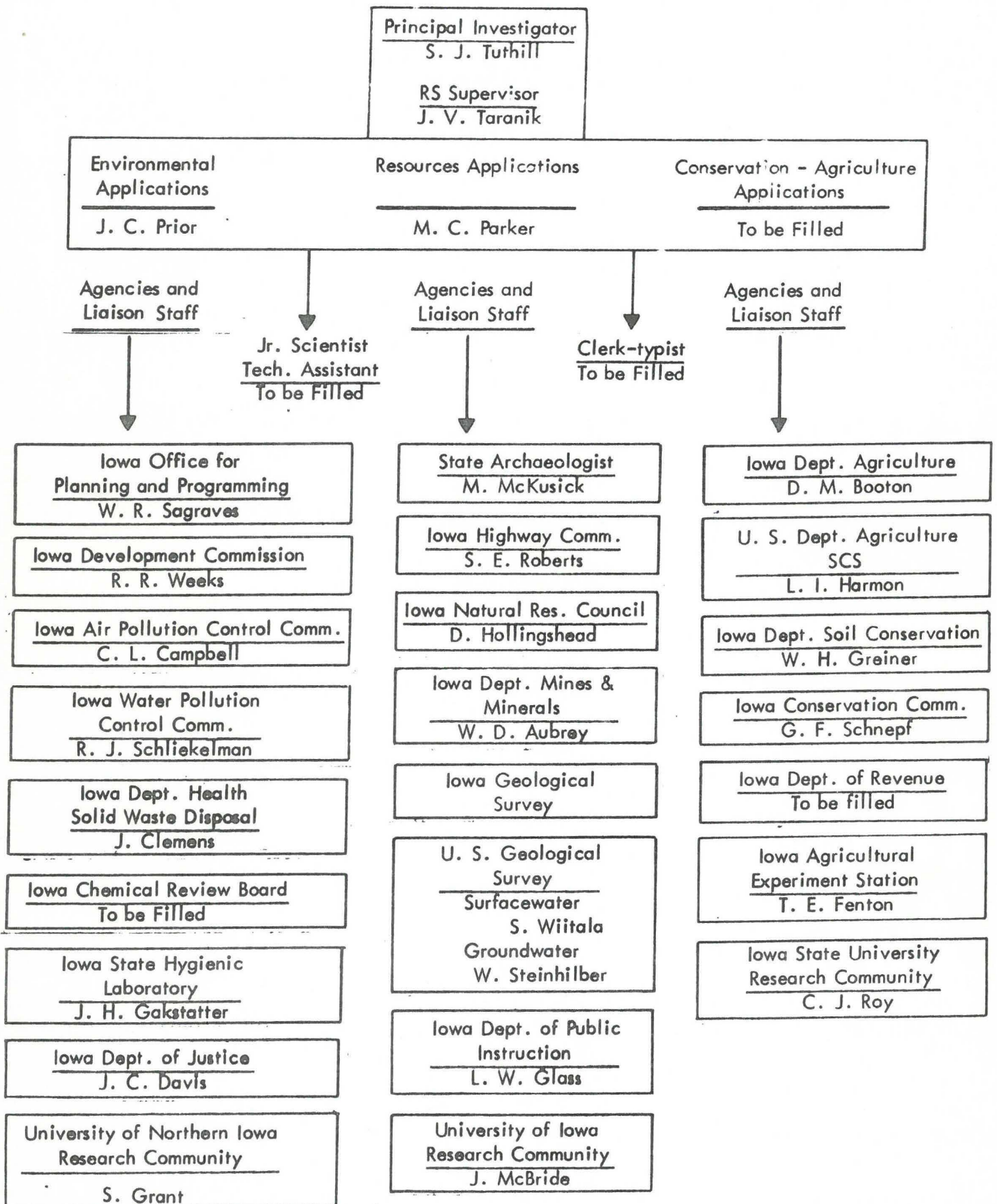
1. Environmental Geology Plymouth-Woodbury Counties (Dorheim and Koch). Field and laboratory analysis complete. Preparation of atlas of maps in preparation for printer. Estimated publication date: September 1971.

Linn County (Prior and Tuthill, formerly included Karsten). Airphoto analysis completed, but inadequate. Re-design of research method was required by the specific stratigraphic conditions discovered within the surficial sediments of the region. Exclusion of this research program from the Governor's budget recommendations and prohibitions against replacing Karsten (who resigned from the staff to continue his education) imposed by SF 179 have slowed the work and made its completion date somewhat indefinite. Field work will be continued this summer and the program will be targeted for completion by 30 June 1972.

2. Earth Resources Technical Satellite A close interface with the NASA program has been established. A grant proposal for \$92,826 has been submitted to NASA. Staff training and the addition of Dr. James V. Taranik as Remote Sensing Supervisor has been accomplished. Acquisition of equipment has been initiated. A liaison relationship with 20 state and 2 federal agencies has been established. Training of these liaison personnel is in progress. Figure 3 shows the organizational structure of the ERTS Remote-Sensing Program in Iowa.

A multispectral photographic and thermal infrared scanning mission was flown on the 180-mile stretch of the Mississippi River between Clinton and Keokuk on 4 June 1971. The purpose

Figure 3. IGS Remote-Sensing Program Organization



of the mission was to acquire the remotely sensed imagery necessary for the development of an isothermal map of the surface temperature of the river. Commonwealth-Edison Company of Chicago, Illinois, agreed to fund the data-acquisition mission and supply the Survey with one copy of all imagery for unrestricted public use. The Survey organized thirteen teams that included Iowa State Conservation Commission (29), Iowa State Hygienic Laboratory (1), University of Iowa Department of Engineering (3), U. S. Geological Survey (4), and Iowa Geological Survey (8) personnel. These teams took surface temperature, ground atmospheric humidity, and water samples during the period of the overflight (10:00 a.m. to 4:00 p.m.). This "ground truth" data was acquired in order to give absolute values to the remotely sensed imagery. The Conservation Commission supplied boats and boat operators for the entire project.

The Attorney General's office flew an underflight mission in a light aircraft to take low altitude oblique color-infrared photographs of installations along the river. Rental of the plane was provided by Commonwealth-Edison Company.

This research constitutes the most complete synchronous thermal evaluation of this portion of the Mississippi River to date and should provide an extremely useful body of data for the consideration of the Iowa Water Pollution Control Commission in its establishment of thermal standards.

Analysis of the imagery will await Dr. Taranik's arrival



and our acquisition of electronic equipment provided for in our 1971-73 budget. Publication of a report of this work will be accomplished by Tuthill and Taranik early in 1972.

3. Automatic Data Processing and Microfilm Records Storage A cost estimate for converting our present paper file system to microfilm was made at no cost to the Survey by Eastman Kodak Company. This study was the basis of our budget request that was approved by the General Assembly. It will be implemented in the period 1971-73.

4. Cold Water Cave A grant proposal was prepared to conduct 16 basic-research programs in and around Cold Water Cave, Winneshiek County, in May 1970. Preliminary conferences with the National Science Foundation were accomplished in June 1970, but actual submittal was held until the Conservation Commission had obtained a license for us to conduct research. The Commission experienced great difficulty in obtaining a license and all activity on our part was held in abeyance except for four trips to the Cresco area by me to meet with the landowners and to explain the scientific research we hoped to do.

The delay in obtaining a license was not due to any lack of diligence on the part of the Conservation Commission staff, but rather to an excessive caution on the part of the landowners. The owners attributed their caution to early unofficial negotiations by private individuals and members of the Iowa Preserves Board.

Plans for drilling an access shaft are in preparation.



5. Barite Deposit in Fayette County All field data has been collected and reduced. The manuscript is being prepared and will be submitted for publication by 31 August 1971, (Koch and Gilmore).
6. Well Survey Preparation to Carbonate Hydrology Study All unlogged well-cutting sample sets from the Cedar Rapids-Charles City corridor are being processed preparatory to initiation of the carbonate hydrology research project. Completion of this work is anticipated by 30 November 1971. Acquisition of well-head elevation data for these wells is in progress. Completion of this phase of work is expected by 31 August 1971, (Koch and Gilmore).
7. Iowa - The Land This public information report describes the nature and origin of the land surfaces of Iowa. It is in manuscript and is expected to be submitted for publication by 30 September 1971. (Prior and Tuthill)
8. Iowa - Minerals of Iowa This is also a public information report. It is a descriptive survey of the minerals reported from the state and also describes the localities from which they can be collected. Manuscript preparation is in progress. The completion data estimated at December 1971. (Horick)
9. Résumé of Oil Exploration and Potential The text of this technical report is complete and will be submitted for publication in July 1971. (Parker)
10. The Galena Formation All data reduction for four maps has been completed. Two of the maps have been constructed. Completion of the project is expected by September 1971. (Parker)

11. Cambro-Ordovician Wells in Iowa This publication will consist of a series of maps and tables plus a short text that will serve as a guide to engineers, well drillers, and others involved in planning the wells drilled to utilize the deep aquifers of the state. With this publication a municipality or industry will be able to determine the depth necessary to drill to reach the deep aquifers at a specific site, the amount of casing required in construction of the well, the depth at which the water will stand in the well, and the quality of the water that will be produced. It will also enable users to estimate the specific capacity of a given well. The estimated date for submitting this report for publication is November 1971.

(Van Eck)

#### LONG-RANGE PLAN

It has not been possible to formulate a long-range plan as yet. So much of what we can do depended on the action of the Sixty-Fourth General Assembly that we have concentrated our planning efforts on short-range problems and open-ended programs that redefine the functions of the Survey in a more modern way. Examples of the last mentioned above have been the formulating of, exposition of, and initial implementation of the four new programs.

1. Remote Sensing
2. Carbonate Hydrology
3. Open Files System
4. Cold Water Cave Research

These programs have required considerable planning that has an impact on the long-range program of the Survey. The following outline indicates the general plan framework under which we are currently operating and from which I expect to complete the Survey long-range plan.

<u>Time</u>	<u>Staff Size</u>	<u>Development of Functions</u>
1971-73	21	Subsurface research reduced. Remote sensing established. Hydrologic research responsibility more fully shared with U.S.G.S. Modernization of data-retrieval capabilities. Topographic program defined. More active interface with state planning. Surficial geologic research increased. Public information function enlarged. Public involvement in defining the needs for groundwater plans and management.
1973-75	30	Remote Sensing Program refined and enlarged. Hydrologic research regionalized. Evolution of groundwater plans by districts. Topographic program strongly supported (with U.S.G.S.). Environmental Geology Program enlarged. Data dissemination system enlarged. Development of research related to coal reserves of Iowa and desulphurization of Iowa coal.
1975-77	36	Geological Engineering Service established. Hydrologic planning branch established. Establishment of one regional office (Sioux City). Remote Sensing Information and Education function enlarged. Establishment of second regional office (Mason City).
1977-79	40	Integration of the Public Information, Geological Engineering and Hydrologic Planning functions (refined and enlarged as a single research and advisement unit).

<u>Time</u>	<u>Staff Size</u>	<u>Development of Functions</u>
1977-79 (Cont'd.)		Integration of the Remote Sensing, Subsurface geologic, Surface geologic, and Economic geologic research functions (into a single research and advisement unit). Establishment of third regional office (Dubuque).
1979-81	40-43	Completion of the Topographic Mapping Program. Completion of Regional Water Resources Plans. Completion of Regional Environmental Geology Map Atlases.

This outline is very general in nature, but gives the trends of programs to which we are now committed.



STAFF CHANGES 1970-1971 and PROJECTED STAFF for 1971-1973

The following table summarizes the staff structure for the Survey:

<u>Position</u>	Ending 30 June 70			Ending 30 June 71			Proj. 30-6-72	Proj. 30-6-73
	<u>T.O.</u>	<u>Vacant</u>	<u>Employed</u>	<u>T.O.</u>	<u>Vacant</u>	<u>Employed</u>	<u>T.O.</u>	<u>T.O.</u>
State Geologist	1	0	1	1	0	1	1	1
Ass't. St. Geol.	1	0	1	1	0	1	1	1
<u>Geologist III</u>	0	0	0	0	0	0	1	1
Geologist II	6	1	5	6	2	4	6	6
Geologist I	3	0	3	3	1	2	2	2
<u>Systems Analyst</u>	0	0	0	0	0	0	1	1
Senior Technician	1	0	1	1	0	1	1	1
Driller	0	0	0	0	0	0	1	1
Technician	1	0	1	1	0	1	1	1
Admin. Ass't.	1	0	1	1	0	1	1	1
Clerk-Typist III	1	0	1	1	0	1	1	1
Clerk-Typist I	1	0	1	1	1	0	1	1
Draftsman	<u>1</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>
Totals:	17	1	16	17	4	13	19	19

NOTE: One Geologist II, one Geologist I, and one Clerk-Typist I will be hired with monies from the IGS-NASA grant for Remote Sensing evaluations of the ERTS program.