IOWA GEOLOGICAL SURVEY

Annual Report 1966

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The duty of the Geological Survey is to collect, interpret, and report information on basic geologic features and products of the state. This includes information concerning the quality and quantity of surface and underground water supplies, coal, gypsum, sand and gravel, ceramic clay and shale (chiefly for brick and tile), limestone and dolomite, raw materials for the manufacture of cement, ore deposits, and other mineral resources. Continuous studies are being carried on in an effort to discover areas of possible oil and gas entrapment in Iowa. Geological studies of dam sites are made on some of the flood control and recreational projects of federal, state and county agencies and reports on the mineral resources of the proposed reservoir areas are commonly prepared.

The Geological Survey is the repository for all basic geologic data obtained in the state. As of January 1, 1967, there were more than 19,000 sets of well cutting samples and cores in the Survey's sample library. These samples, from wells in all counties in the state represent millions of feet of drilling. They, and the systematic measurements that accompany them, along with similar information gained from naturally exposed rocks at the surface, form the foundation of the geologic and ground-water studies in the state. These data are now being prepared for computer use on cards and tapes.

Collection and dissemination of data on water wells, water levels, stream flow and sediment loads, lake levels, and other hydrologic data are accomplished in cooperation with the Water Resources Division of the U. S. Geological Survey. The statewide basic data network consists of stream-flow measurements of 124 streams and water-level measurements of 11 lakes, ground-water level measurements of

124 wells, and suspended sediment measurements of 11 selected streams. These are continuous records or regularly spaced measurements that are made as a part of the nationwide network.

The Geological Survey is responsible for topographic mapping of the state and this is being done by 7-1/2 minute quadrangles (approximately 55 square miles) and 15-minute quadrangles (approximately 220 square miles) in cooperation with Topographic Division of the U. S. Geological Survey. During 1966 fifty-five new 7-1/2 minute quadrangles were published. A new base map of the state was also published during 1966.

Since 1949 the State Geologist by appointment has been a member of the Iowa Natural Resources Council and during that time, by election, has served as Chairman of the Resources Council. The State Geologist also acts as the Oil and Gas Administrator with duties and responsibilities contained in Chapter 84, Code of Iowa 1962.

As a part of the result of its work, the Survey has published 38 volumes of annual reports and accompanying scientific papers. These publications include special reports and maps covering the geology and mineral resources of all but six of the 99 counties, as well as special reports on mineral production. There are also four technical papers on Iowa coal, eight water-supply bulletins, and one water atlas. During 1966 the second paper of a new series of publications entitled "Report of Investigations" was released. Geological and mineral resources maps of the state have been printed. Other summaries of specialized geological studies have been published in geological periodicals. These published reports, together with the large file of unpublished data obtained during almost three-quarters of a

century of continuous study, serve as a reliable unbiased basis for up-to-the-minute reports to federal, state, and municipal agencies and to private concerns and individuals who request and need the available information on the geology, water supply, and other mineral resources of Iowa. Information, advice, and direct assistance in the increasing development of large water supplies are freely given to the limit of funds and personnel. The Survey is ever alert to and working toward the finding of new mineral and ground-water resources and the economic utilization of geological features in the state. The geophysical surveys to be discussed later, and the underground gas-storage projects at Redfield, Keota, Cairo, Vincent, West Branch, Iowa City, and Des Moines are a part of this phase of the work. With the additional collection and refinement of basic data, the possibilities of new discoveries are enhanced.

In recent years the Survey has become involved in the area of education. Many of the staff have been invited to talk to science classes, Scouts, rock and mineral societies, service clubs, extension and conservation groups. Rock sample sets and mimeographed resumés of various aspects of Geological Survey work serve to tell the story of Geology in Iowa in reply to requests from interested teachers, students and rock, mineral, and fossil collectors in Iowa and other states.

In addition to the day-to-day collection, interpretation, and reporting on the routine program outlined in the foregoing paragraphs, the Survey has always had special projects in execution. These, like the continuing program, are elastic, depending upon the need and demand, funds at hand, and the availability of specifically trained personnel. At present the following projects are in progress:

Aeromagnetic Survey: This project covers about 8,100 square miles in northeastern Iowa. The flying was completed in the summer of 1966. Geologic maps of the basement

rocks, magnetic maps, and other illustrations are being prepared to accompany the preliminary text. The flying was completed in the summer of 1966, and the report will be ready for release in early 1967.

This report will complement similar work already done in northcentral, central, southwestern and northwestern Iowa for which preliminary reports are now available (see attached map).

Some iron-bearing rock has already been found, but the titanium content was considered to be too high for use with present-day technologies.

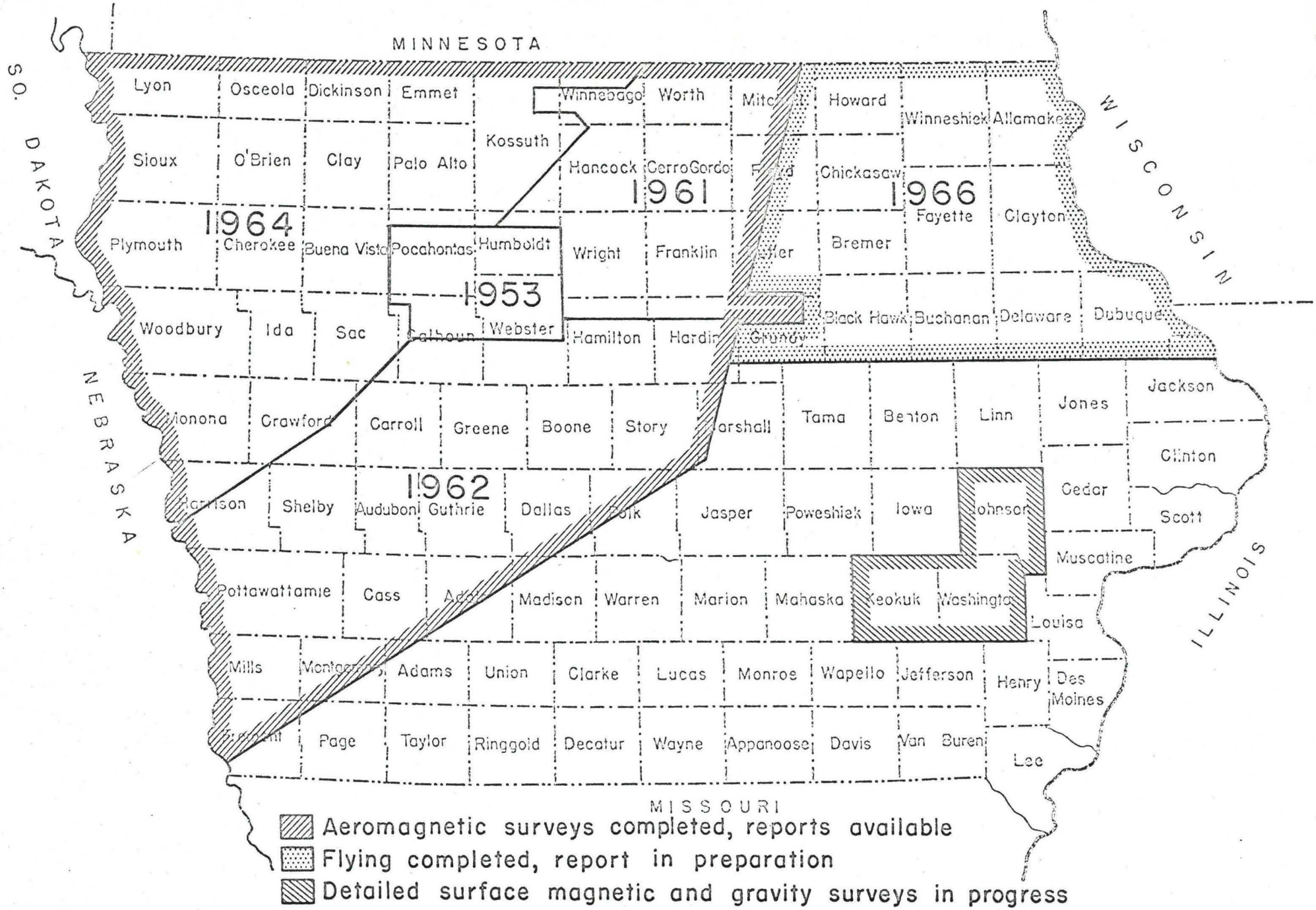
Preparation of New Geologic Map of Iowa: This colored map will show the consolidated rock that occurs at the surface or immediately beneath the glacial drift and alluvium. The earlier Geologic Map of Iowa, published in 1937, is not only badly outdated, but is completely out of print. The new map is in the final stage of preparation before transmittal to the printer.

Preparation of a Glacial Map of Iowa: Although the glacial deposits of Iowa are internationally known, a detailed state map of these deposits has never been published. There have been many requests for such a map. Target date for printing is the fall of 1967.

Ground Geophysical Work: Detailed magnetometer and gravimeter studies in Washington, Keokuk, Iowa and Johnson Counties are being conducted in an attempt to correlate the occurrences of oil in the Keota dome with other subsurface structural features and the relationships of magnetic and gravity anomalies to less precisely known subsurface Paleozoic structures. It is hoped that this will aid in locating other oil traps.

Fossils and Rocks: A short generalized discussion is being prepared on the fossils and rock strata in eastern Iowa for distribution to the ever-expanding group of laymen interested in geology.

STATUS OF GEOPHYSICAL SURVEYING



Reports in Preparation: At the close of 1966 two reports were nearing the final stages of preparation. The first of these will be entitled "Preliminary Report On Basement Complex Rocks of Iowa" and will include a petrologic description of the crystalline rocks encountered in drilling in Iowa. The second report will be entitled "LaPorte City Chert" and will formally recognize a rock unit that is known only from the subsurface in Iowa. Both of these reports will be published in early 1967.

The following projects are being carried on in cooperation with the U. S. Geological Survey:

Occurrence of Water in Glacial Deposits of South-Central Iowa: This is a continuous drilling program to locate water-bearing sands and gravels in the glacial deposits in an 8-county area of Iowa that is chronically short of water.

The first of several reports is scheduled for publication in early 1967. Four others will be published in late 1967 or early 1968.

Water Atlas of Southeastern Iowa: This report will depict the utilization and availability of water for an 11-county area in south eastern Iowa. The report is scheduled for completion in early 1968.

Cretaceous Aquifer Appraisal: The purpose of this project is to bring together on several maps all available information on quantity, quality, and use of water in the Cretaceous aquifer of western Iowa. These maps will form the ground-water basis for comprehensive water planning in Western Iowa.

Mississippian Aquifer Appraisal: The report will show the character and distribution of rocks of Mississippian age within the state in addition to the quantity, quality and utilization of the water contained in them. Publication is anticipated in 1967.

Geology and Ground-Water Resources of Linn County:

Geology and Ground-Water Resources of Cerro Gordo County:

These reports will present in detail all that is presently known about the geology and ground-water resources of these two counties, including the major cities of Mason City and Cedar Rapids. Both reports are completed and are undergoing review with publication anticipated in 1967.

Muscatine Island Project: This current project, which is in cooperation with the City of Muscatine, will be a comprehensive appraisal (quality and quantity) of the ground water available in an area that is heavily pumped at present and has considerable future development potential.

An electric analog model of the project area was constructed and presently is being analyzed. The model analysis will be incorporated in the final report on the project, which will be published in late 1967.

Automatic Data Processing: The objective of this project is the rapid retrieval of geologic and hydrologic data by use of a high-speed computer. Accomplishments to date include the coding and key-punching of data that covers about one-third of the state, and the writing of several operational programs for computer processing of the data. All geologic data in the state is expected to be processed and key-punched during the 1968-69 biennium so that statewide data retrieval for project work and comprehensive basin planning will be operational.

APPENDIX 1

The following projects on stream flow in Iowa are being conducted by the U. S. Geological Survey in cooperation with the Iowa Highway Research Board, the Iowa Natural Resources Council, and others:

Flood Profiles: Flood profiles have been obtained and tied to mean sea level for many hundreds of miles, principally on major river basins. Interim open-file reports have been prepared for the Iowa and lower Des Moines River basins. The Cedar River basin flood profile report was published in 1963 by the Iowa Highway Research Board. A report on Little Sioux River is in Washington for review. A report on Rock River floods is in the final stages of preparation in the District office, Iowa City.

Low-flow Characteristics of Iowa Streams: The initial project was completed and the results published in 1958 by the Iowa Natural Resources Council in Bulletin No. 9. This study is currently being updated with field completion of the report scheduled for July, 1968.

Low-flow Partial-record Stations: In order to supplement the low-flow information collected in the regular gaging-station program, more than 400 low-flow partial record stations on the small drainage areas were established and measurements made at these sites correlated with the baseflow records at the regular gaging stations. Special requests for information have been and are continuing to be answered with these data. A special report was prepared on low-flow characteristics of English River, Old Man's Creek and Clear Creek and was released by the U. S. Geological Survey as an open-file report in October, 1964. Open-file report "Summer basin-flow recession curves for Iowa streams" was completed and distributed in July, 1966.

Flood-profile and Flood-frequency Studies for Cedar Rapids, Linn County, and Iowa City: These projects consist of the collection and analysis of flood profiles and flood-frequency data on Indian, Otter, and Prairie Creeks in Cedar Rapids and Linn

County, and Ralston Creek in Iowa City for use in floodplain planning studies. These projects are conducted in cooperation with Linn County and the cities of Cedar Rapids and Iowa City.

Flood Information at Selected Bridge Sites in Iowa: Establishment of about 70 additional crest-stage gages on small basins in Iowa was accomplished by June, 1966. The sites were selected to provide good areal sampling. The information obtained will provide a better understanding of the flood hydrology of small basins and data useful for the design of structures on small waterways.

The 1965 Flood in the Upper Mississippi River Basin: A comprehensive report on the 1965 flood, covering the entire upper Mississippi Basin, is in review in Washington prior to publication as a U. S. Geological Survey Water-Supply Paper.

Water Surface Profile, Raccoon River at Des Moines: An open-file report on flood profiles for Raccoon River at Des Moines was distributed in December, 1966.

Time of Travel Studies on the Missouri River: Two time-of-travel studies using Rhodamin BA dye as a tracer, in cooperation with a number of state and federal agencies, were conducted on the Missouri River between Yankton, South Dakota, and the mouth. The data have been analyzed with respect to the time of travel and discharge within several reaches of the river. A report is in preparation.

State cooperators in this project were the Iowa Geological Survey, Natural Resources Council, State Department of Public Health, State Conservation Commission, and the Water Department, City of Council Bluffs.