



Geological Survey Division

# CIRCULAR 1 MICHIGAN GEOLOGICAL SOURCEBOOK

BY  
R. W. KELLEY AND E. A. KIRKBY

LANSING  
1963

STATE OF MICHIGAN  
George Romney, Governor

DEPARTMENT OF CONSERVATION  
Gerald D. Eddy, Director

COMMISSION OF CONSERVATION  
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Published by Authority of State of Michigan CL '48 s321.6  
Printed by Office Services Section, Department of  
Conservation

Available free from Publications Room, Department of  
Conservation, Lansing 26, Michigan

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## PREFACE

With the growing interest in earth sciences in Michigan, an increasing number of inquiries are directed to this office from individuals and groups seeking geological information. This pamphlet is a guide to the principal sources of information on the geology and mineral resources of Michigan. Brief references are made to the various facilities, services, and published materials generally available in this state. Although not an

exhaustive compilation, it is sufficiently comprehensive to facilitate the initial search for appropriate materials.

Many useful source books, circulars, pamphlets, leaflets and directories pertaining to the geological profession and various geological services and materials, are available from the American Geological Institute, (See page 5).

Lansing  
Dec., 1963

Robert W. Kelley, geologist  
Edward A. Kirkby, geologist

Geological Survey Division

## GOVERNMENT AGENCIES

For many years several governmental agencies have been conducting extensive geological programs in Michigan. One is a state bureau, while the other two are federal. The principal functions of these agencies are summarized below. Information on their published materials appears in subsequent sections entitled "PUBLICATIONS" and "MAPS".

Geological Survey Division, Dept. of Conservation,  
Lansing, Michigan, 48926

Headquarters of the Division are located on the 4th floor of the Stevens T. Mason Bldg., one block west of the Capitol in Lansing. A branch office, serving the Upper Peninsula, is located in Escanaba. District offices for oil and gas regulatory work are also maintained in Mt. Pleasant, Plainwell and Cadillac.

The Survey constitutes a bureau of continuing information and service in the field of earth science, issuing publications and maps, maintaining reference data, and providing consultation—efforts that help delineate potential areas of economic mineral deposits, and achieve understanding of the state's geologic history.

Assisting the Director of Conservation, in enforcing regulatory practices prescribed by the state's oil and gas conservation laws, comprises the greater part of the Division's work. Some assistance is also given the State Public Utilities Commission which regulates the production of natural gas.

Another function is appraisal of iron and copper mining properties for general property tax purposes. Appraisals of other mineral properties are also made for the State Tax Commission. Evaluations of mineral venture securities being promoted in the state are made at the request of the State Securities Commission.

Mineral statistics are compiled, in cooperation with the U. S. Bureau of Mines, and published annually along with information on the progress and development in the mineral industry. Cooperative assistance is also provided in developing public water supplies and in conducting surface and ground water investigations.

Geological Survey, U. S. Department of Interior,  
Washington, D. C., 20242

For many years, the U. S. Geological Survey has pursued a number of geologic, hydrologic, and topographic activities as part of its national program of accumulating basic information on minerals, fuels and water resources needed in an expanding economy.

The Water Resources Division of the U.S.G.S. maintains district offices on the 4th floor of the Capitol Savings & Loan Association Bldg. in Lansing. Both the Ground Water Branch and Surface Water Branch are represented. Field offices are also maintained in Grayling and Escanaba. The Surface Water Branch, staffed primarily with engineering personnel, maintains gauging stations throughout the state and reports on the characteristics and behavior of surface waters, an understanding of which is essential in planning and development activities. The Ground Water Branch, staffed with geological personnel, conducts investigations that aid in developing underground water supplies. Both branches participate in Federal-State cooperative programs with other organizations in this state, including the Dept. of Conservation and the Water Resources Commission.

Currently, the Geologic Division of the U.S.G.S. does not maintain offices in Michigan, although continuing several active geologic mapping projects in the Upper Peninsula.

Bureau of Mines, U. S. Department of Interior,  
Washington, D. C.

The primary mission of the U. S. Bureau of Mines is the conservation and development of the Nation's mineral resources, and the promotion of safe and healthful working conditions in the mining industry. Considerable research is conducted in the search for more efficient mining and production methods. Also, extensive minerals economics surveys are made of domestic and foreign markets to develop information needed in formulating policy and programs in both government and private enterprise.

Although the Bureau does not maintain offices in Michigan, the information it solicits from mineral operators in this state is furnished, through a cooperative agreement, to the Geological Survey Division, Michigan Department of Conservation.

## **RESEARCH LABORATORIES AND INSTITUTES**

Much of the basic and applied research in minerals and the geological sciences being conducted in this state is centered at our universities and is sponsored largely, but not entirely, by government funds. Two iron ore companies also maintain research centers in the Upper Peninsula for improving methods of development and production in their own operations.

### Research Facilities

GeoScience Research Institute  
Andrews University  
Berrien Springs, Michigan

Glaciological Institute  
College of Natural Science  
Michigan State University  
East Lansing, Michigan

Institute of Minerals Research  
Michigan Technological  
University  
Houghton, Michigan

Institute of Science and  
Technology  
University of Michigan  
Ann Arbor, Michigan

Subsurface Laboratory  
Department of Geology and  
Mineralogy  
University of Michigan  
Ann Arbor, Michigan

Institute of Water Research  
Michigan State University  
East Lansing, Michigan

### Interests and Projects

Organic geochemistry,  
Tertiary  
paleoecology, stratigraphy.

Glacial studies.

Basic research to develop  
new knowledge about the  
mechanisms of flotation,  
magnetizing, roasting,  
magnetic separation,  
electrostatic separation,  
direct reduction,  
agglomeration, and  
pelletizing of low grade iron  
ores.

Consists of 15 specialized  
research divisions among  
which are included:  
1) Great Lakes Research  
Division,  
2) Glacial Geology and  
Polar Research Division.

Collecting, preparing,  
storing and analyzing of oil  
well cores and mounted  
cuttings.

Identifies water use  
problems and encourages  
their solution by supporting  
research.

## **PUBLICATIONS**

The principal sources of publications relating to the geology and mineral resources of Michigan are listed below. In some instances, specific items, deemed particularly useful for reference purposes, are also listed.

Geological Survey Division, Michigan Dept. of  
Conservation. Requests should be sent to: Publications  
Room, Department of Conservation, Lansing, Michigan  
48926. When ordering, add 4% State Sales Tax to  
remittance.

Selected publications:

Publications list, free (revised periodically).

Publication 50, Index of the Geology of Michigan,  
1823-1955. Includes: publications, maps,  
stratigraphic nomenclature, Paleozoic outcrops,  
bibliography, laws, chart of development of rock  
formations names. \$2.00

Supplement to Publication 50, 1956-1960. free.  
Michigan's Mineral Industries. Published annually,  
free.

Summary of Operations Oil and Gas Fields.

Published annually, free.

Publication 42, Rocks and Minerals of Michigan. 50¢  
Guide to Michigan Fossils. (out of print).

Classified and Annotated List of Geologic

Contributions to Michigan Conservation, 1935-  
1960. free.

Printed logs of individual oil and gas wells and tests  
may be purchased directly from the Geological  
Survey Division. Send for current price list and  
instructions. Orders may be processed sooner  
when the following information is submitted with  
requests: county, township, town and range,  
section number, ¼ ¼ ¼ section, operator, land  
owner, lease name, permit number.

Geological Survey, U. S. Department of Interior. Most of  
the currently available publications may be purchased  
prepaid from the Superintendent of Documents,  
Government Printing Office, Washington D. C. Maps,  
charts, atlases, folios are sold direct by the Geological  
Survey, Washington, D. C., 20242. Circulars and  
publications lists may also be obtained on application to  
the U. S. Geological Survey.

Selected publications:

Catalog of publications (revised every 5 years). free.

Monthly list of new publications. free.

Geologic and water-supply reports and maps -  
Michigan. free.

Water resources investigations in Michigan. free.

Geological Survey research. A review, prepared  
annually, commencing in 1960 of projects being  
conducted by the U.S.G.S. Published as a multi-  
volume Professional Paper, one part devoted to a  
synopsis of results, and the remaining parts to  
collections of short articles. These reports  
achieve immediate dissemination of preliminary  
information needed by other investigators.

Reports and maps of the Geological Survey released  
only in the open files. Published annually as a  
free circular. The items listed for Michigan may  
be consulted at the Lansing office of the  
Geological Survey Division, Michigan Dept. of  
Conservation.

Bibliography of North American Geology. Published  
as Bulletins. One-year supplements are released  
periodically. In addition, the following  
consolidated editions are available: No. 746 and  
747, 1785-1918; No. 923, 1919-1929; No. 937,  
1929-1939; No. 1049, 1940-1949.

Bureau of Mines, U. S. Department of the Interior. Most  
of the currently available sales publications including  
bulletins, technical papers, report of investigations,  
minerals yearbooks may be purchased prepaid from the  
Superintendent of Documents, U. S. Government  
Printing Office, Washington, D. C., 20402. Publications  
not carrying a charge may be obtained from:  
Publications Distribution Section, U. S. Bureau of Mines,  
4800 Forbes Ave., Pittsburgh, Pennsylvania.

Selected publications:

List of publications, issued by the Bureau of Mines,  
1910-1960. \$4.25

List of Bureau of Mines publications and articles,  
annual supplements. 60¢ each.

New publications of the Bureau of Mines, monthly list.  
Free. May be obtained from Government Printing  
Office.

List of journal articles by Bureau of Mines authors,  
1910-1960. \$1.75 Government Printing Office.

The minerals industry of Michigan. Issued annually.  
Separate pre-print of chapter of same title  
appearing in Vol. III of The Minerals Yearbook.  
15¢

Minerals Yearbook. Issued annually, Vol. 1, Metals  
and Minerals (except fuels), \$4.75; Vol. II, Fuels,  
\$2.50; Vol. III, Area reports. \$4.25

Mineral facts and problems, 1960 edition. \$6.00

American Geological Institute, 1444 N. Street, N. W.,  
Washington, D. C., 20005. A federation of technical  
societies serving both geoscientists and the general  
public through programs of education and scientific  
communication.

Selected publications:

List of publications of A.G.I.

GeoTimes. Professional news magazine which may  
be subscribed to by anyone.

GeoScience Abstracts. Monthly periodical.

Complete coverage of significant geological  
literature published in, or on, North America.

Report II. Directory of geoscience departments in the  
colleges and universities of the U. S. and Canada.  
\$2.00

Glossary of geology and related sciences.

Directory of geological material in North America.  
\$3.00

Directory of geoscience films. \$1.00

Earth for the layman. An annotated listing of more  
than 1400 popular books on geology. \$1.00

Mineral, fossil, and rock exhibits and where to see  
them.

Shall I study geological science. 10¢

Geology and Earth Science Sourcebook for  
Elementary and Secondary Schools. Order from  
Holt, Rinehart and Winston, Inc., 383 Madison  
Avenue, New York. \$2.40

Michigan Academy of Science, Arts, and Letters. An  
organization of professional and lay persons promoting  
research and the diffusion of knowledge. Sponsors  
annual meetings and published papers that are widely  
distributed (Published by the University of Michigan  
Press at Ann Arbor).

Michigan Basin Geological Society. A professional  
geological society which publishes guidebooks for its  
annual field excursions. List available from: The  
Librarian, c/o Dept. of Conservation, Lansing, Michigan  
48926.

University of Michigan, Ann Arbor, Michigan. The Museum of Paleontology published and distributes a continuing series of scientific papers, many of which treat with Michigan fossils.

Michigan Natural Resources Council. (Address communications to the Secretary, Room 432, Stevens T. Mason Bldg., Lansing, Michigan 48926).

A voluntary federation of organizations fostering the presentation and discussion of natural resource problems. Proceedings of conferences and reports of technical committees (including minerals) are issued annually.

Selected publications:

6th Annual Conference, 1961. Iron and copper in Michigan's economy.

Technical committee reports, 1963. Up-to-date information on significant developments, progress, and legislation in the various natural resource fields.

Michigan Manufacturer and Financial Record. Published monthly by the Manufacturer Publishing Co., 8543 Puritan, Detroit 39, Michigan. Each year the May issue is devoted to articles on Michigan industry including oil and gas, iron ore, steel, cement, and the minerals industry in general.

Petroleum Publishers, Inc., Mt. Pleasant, Michigan. Publishes "Oil and Gas News," the weekly voice of petroleum activities in this state. (\$10.00 year).

Michigan Iron Ore Industry Association. The origin and evolution of iron ore and the iron mining industry in Michigan is the topic of a publication entitled "Michigan's Upper Peninsula iron ore industry." Copies may be obtained from the following Michigan companies: The Cleveland-Cliffs Iron Company, Ishpeming; M. A. Hanna Company, Iron River; Inland Steel Company, Ishpeming; Jones & Laughlin Steel Corporation, Negaunee; Pickands Mather and Company, Ironwood; and Republic Steel Corporation, Crystal Falls.

Associated Petroleum Industries of Michigan, 119½ West Ottawa, Lansing 7, Michigan. Distributes many excellent free materials prepared by the American Petroleum Institute. Materials covering all phases of the industry including exploration, drilling, production, refining, distribution, and uses of petroleum, are available.

## LIBRARIES

The local library is always an appropriate place to initiate the search for information on a specific topic. If the desired information is not available there, the librarian can enlist the assistance of other libraries including the State Library in Lansing which is the official depository for all state and government documents, as well as many technical periodicals.

Libraries in most of the larger towns and at all colleges in this state receive copies of the publications issued by the State Geological Survey.

Publications of the U. S. Geological Survey and the U. S. Bureau of Mines may be found at many of the following libraries designated as depositories of federal documents:

Benton Harbor Public Library, Benton Harbor  
Central Michigan University, Mt. Pleasant  
Cranbrook Institute of Science, Bloomfield Hills  
Detroit Public Library, Detroit  
Flint Junior College, Flint  
Grand Rapids Public Library, Grand Rapids  
Hackley Public Library, Muskegon  
Henry Ford Community College, Dearborn  
Hoyt Public Library, Saginaw  
Kalamazoo Public Library, Kalamazoo  
Michigan Technological University, Houghton  
Michigan State Libraries, Lansing  
Michigan State University, East Lansing  
North Central Michigan College, Petoskey  
Port Huron Public Library, Port Huron  
University of Detroit, Detroit  
University of Michigan, Ann Arbor  
Wayne County Public Library, Wayne  
Wayne State University, Detroit  
Western Michigan University, Kalamazoo  
Willard Library, Battle Creek

Professional and trade journals in the earth sciences are generally carried by only the larger municipal and University libraries and, therefore, are not as readily accessible as government documents.

The Geological Survey Division, Michigan Department of Conservation, maintains a small reference room in its Lansing office primarily for staff research. Visitors are welcome to use this limited facility although materials cannot be borrowed. Accessions consist primarily of publications exchanged with other geological surveys, especially those of neighboring states. Some manuscript materials and "open file" reports of the U. S. Geological Survey are also available.

## MAPS

Accurate maps are prerequisites for detailed planning and development. Topographic and geologic maps are among the most fundamental in this regard. Principal sources follow:

### Topographic Maps

Standard series U.S.G.S. topographic sheets. Available in 15' quadrangles (covering both 15' of latitude and 15' of longitude, on a scale of 1:62,500). Some areas also covered by 7½ quadrangles on a scale of 1:24,000. The Geological Survey Division, Michigan Dept. of Conservation, Lansing, Michigan 48926, is an officially designated sales agent for these maps. Index and price list are available free upon request. Maps may also be

purchased direct from the Map Information Office, U. S. Geological Survey, Washington 25, D. C. Total coverage of the land surface area of Michigan by these maps, either published or in progress, is about 90%.

1:250,000 National topographic series. Michigan is now completely covered by this relatively new series. Commenced originally by the Army Map Service, the program was taken over by the U.S.G.S. Quadrangles cover 1° Latitude x 2° Longitude, and may be purchased from Map Information Office, U. S. Geological Survey, Washington, D. C.

Aeronautical Charts. A chart on the scale of 1:500,000 covering approximately 2° Latitude and 6° Longitude, and showing topographic contours on an interval of 500 feet is available from the U. S. Coast and Geodetic Survey, Dept. of Commerce, Washington 25, D. C.

Michigan Aeronautical Chart. A chart on the scale of 1:2,000,000, covering the entire state, and showing topographic contours on an interval of 500 feet is available postpaid from the Michigan Department of Aeronautics, Terminal Building, Capital City Airport, Lansing, Michigan for \$1.00 a copy.

#### Horizontal and Vertical Control

In addition to the topographic maps listed above, more precise data on both horizontal and vertical control is available from the following sources:

Michigan Dept. of Conservation, Engineering &  
Architecture Section  
U. S. Lake Survey, Corps of Engineers  
U. S. Geological Survey  
U. S. Coast and Geodetic Survey  
Michigan State Highway Dept.  
Michigan Elevation Service, 5838 South Mission  
St., Mt. Pleasant  
"Spirit Leveling in Michigan," Bull. 919, U. S.  
Geological Survey

#### Geologic Maps

U. S. Geological Survey. "Geologic Map Index of Michigan" -- a map compiled on a 1:750,000 scale. Coverage of most of the published maps is outlined in colors. For sale by the U.S.G.S. 60¢

Geological Survey Division, Michigan Department Conservation. Order from the Publications Room, Michigan Department of Conservation, Lansing, Michigan 48926.

Selected publications:

"Geologic Map Index of Michigan, 1843-1962," 62 p. free.

Pub. 39, "Centennial Geologic Map of Michigan," 1936, in color. Lower Peninsula sheet available, Upper Peninsula sheet out of print, on a scale of 1:500,000. 25¢

Pub. 49, "Surface Formations of Michigan," in color, on a scale of 1:500,000. Lower (1955) and Upper (1957) Peninsula sheets. 50¢ a sheet.

"Outline Geologic Map of Michigan," 11 x 17, free.

"Price List of Miscellaneous Maps." The following maps, with prices, appear on this list. Order from Geological Survey Division.

Surface Elevations  
Bedrock Surface Elevations  
Drift Thickness  
Geological Cross Section  
Sand Dunes  
Rivers  
Drainage  
Base  
Blank Township Grids

"Price List of Oil and Gas Maps," both by counties and fields. Shows locations of producing wells and dry holes. Order from Geological Survey Division.

#### Other Maps

Hydrographic Charts. Large scale coastal and lake charts covering the entire U. S. area of the Great Lakes are published by the U. S. Lake Survey, 630 Federal Building, Detroit, Michigan. Catalog is available.

Soil Surveys. The county soil survey maps executed by the U. S. Department of Agriculture in cooperation with the Michigan Agricultural Experiment Station, East Lansing, Michigan, and the Michigan Department of Conservation, are generally on a scale of 1 inch to the mile but the degree and uniformity of detail varies from county to county. A list of soil survey reports, with maps included, may be obtained from the Soil Science Department, Michigan State University, East Lansing, Michigan.

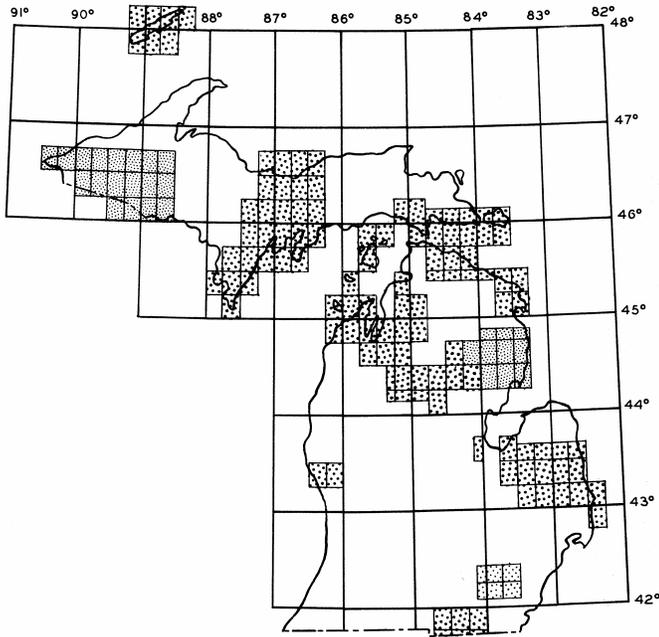
County Maps. A complete new series of Michigan Department of Conservation county maps will be available for all Michigan counties by 1964. These maps are on a scale of 3/8 inch to the mile and show roads, section lines, township names, streams, state owned lands, and public recreation sites. They may be ordered from the Publications Room, Michigan Department of Conservation, Lansing, Michigan 48926.

#### Government Township Land Grid

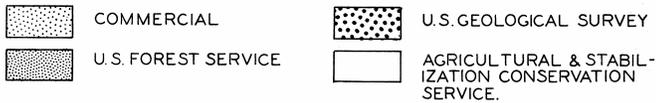
The rectangular survey system of describing parcels of land by section, town, and range as laid out by the original General Land Office (U. S. Government) is set forth briefly in a pamphlet "Real Property Description," available from the Publications Room, Michigan Department of Conservation, Lansing 26, Michigan.

## STATUS OF AERIAL PHOTOGRAPHY IN MICHIGAN

1962



### AGENCY HOLDING PRIMARY PHOTOGRAPHY



## AERIAL PHOTOGRAPHS

Aerial photographs, particularly stereoscopic pairs, are helpful in finding and studying geologic features. In a given area, several different sets may be available. The set most suitable for average needs is classified as primary coverage in accordance with such considerations as type of camera, date of flight, and scale of reproduction.

Orders for reproduction of photography and the specific technical information incident to the work should be directed to the agency holding primary coverage as indicated on the accompanying map (page 10).

Inquiries for general information should be addressed to the Map Information Office, U. S. Geological Survey, Washington 25, D. C. which maintains records of all reported photographic coverage.

Contact prints are generally about 10" x 10" and cost about 50¢ to 70¢, or more, each, depending on size. Enlargements are more. Scale is usually about 1:20,000. Pictures are taken with an overlap of 60% north-south and 30% east-west. The N-S overlap permits stereoscopic study. Distortion at the margins is slight. Unless highly accurate maps are needed, a selection of every other photo will give adequate coverage for most non-stereoscopic uses.

A Michigan firm conducting aerial surveys is Abrams Aerial Survey Corp., 124 North Larch, Lansing, Michigan.

## FILMS AND SLIDES

### Film Strips

Geological film strips may be rented from the Audio-Visual Utilization Center, Wayne State University, Detroit, Michigan.

A film strip and an accompanying manual entitled "Iron ore mining in Michigan, past and present," prepared by the Michigan Historical Commission, is available at \$3.00 a set from the Audio-Visual Education Center, University of Michigan, Ann Arbor.

Film strips showing various phases of the petroleum industry are available free to teachers from Associated Petroleum Industries of Michigan, 118½ West Ottawa, Lansing 7, Michigan.

### Motion Pictures

Films treating geological subjects are available from a variety of sources. Film loan libraries are maintained at audio-visual centers at the University of Michigan, Michigan State University, and Wayne State University. Services are detailed in their published catalogs. Other school systems also maintain limited audio-visual services.

Some of Michigan's mineral resources are shown in 16 mm, black and white, sound television films produced by the Michigan Department of Conservation. These films are available for the cost of return postage. Requests should be submitted at least two weeks in advance of showing. Catalog is available free from the Film Loan Service, Department of Conservation, Lansing 26, Michigan.

The U. S. Bureau of Mines maintains an extensive film loan service. Many numbers are industry-sponsored and available for cost of return postage. Requests should be arranged well in advance of showing date. Film list is available from: Graphic Services, U. S. Bureau of Mines, Central Experiment Station, 4800 Forbes Ave., Pittsburgh 13, Pennsylvania. Distribution centers listed for Michigan should be consulted.

The petroleum industry sponsors many motion pictures on the exploration, production, and use of its products. Most of these films may be borrowed free. A directory of sources "Movies About Oil" is available from: American Petroleum Institute, 50 West 50th St., New York 20, New York.

The most comprehensive classified and annotated listing of geological motion pictures is the "Directory of Geoscience Films" available for \$1.00 from the American Geological Institute. Films are reviewed and evaluated critically for audience suitability, making this listing particularly useful for earth science instruction.

## Slides

Geological color slides, some about Michigan, may be ordered from Ward's Natural Science Establishment Inc., Rochester, New York. Catalog is available.

## **DISPLAYS OPEN TO THE PUBLIC**

A. E. Seaman Mineralogical Museum. Michigan Technological University, Houghton. Exhibits: 81 cases of minerals, including many Lake Superior minerals and ores; 1 case of fossils.

Calcite Quarry View. Michigan Limestone Division, U. S. Steel Corp., Rogers City. Exhibits: Processing and uses of limestone; 1 case of fossils.

Con Foster Museum. Clinch Park (Municipal), Traverse City. Exhibits: 39 cases of minerals; 1 case of fossils.

Cranbrook Institute of Science. Bloomfield Hills. Dioramas depicting life during various geologic times. Exhibits: 115 cases of minerals; 6 cases of fossils.

Exhibit Museum. University of Michigan, Ann Arbor. Exhibits: Several cases with minerals; 200 cases of fossils.

Fort Wilkins Museum. Fort Wilkins State Park, Copper Harbor. Exhibits: Several cases of Lake Superior minerals and ores.

Geology Department Exhibit. Natural Science Building, Michigan State University, East Lansing. Exhibits: 12 cases of minerals; 5 cases of fossils.

Grand Rapids Public Museum. 54 Jefferson Ave., S.E., Grand Rapids. Exhibits: 17 cases of minerals; 2 cases of fossils.

Jenison Trailside Museum. Bay City State Park, 5 miles north of Bay City. Exhibits: 2 cases of minerals; 1 case of fossils.

Kensington Metropolitan Park. Nature Center, Milford. Exhibits: Several cases of minerals.

Kingman Museum of Natural History. Leila Arboretum, Battle Creek. Exhibits: 6 cases of minerals; 8 cases of fossils.

Michigan Historical Museum. 505 N. Washington, Lansing. Exhibits: 2 cases of minerals and fossils.

Mineralogy Museum. Department of Geology and Mineralogy, University of Michigan, Ann Arbor. Exhibits: Many cases of minerals.

National Ski Hall of Fame. Ishpeming. Exhibits: 2 cases of minerals.

Port Huron Public Library Museum. 1115 Sixth St., Port Huron. Exhibits: 3 cases of minerals and fossils.

Saginaw Museum. Bristol and N. Michigan, Saginaw. Exhibits: 3 cases of minerals.

The Museum. Michigan State University, East Lansing. Exhibits: 5 cases of minerals; 17 cases of fossils.

## **SPECIMENS AND EQUIPMENT**

Lapidary specimens, supplies, and equipment may be purchased at local mineral and lapidary shops. The Geological Survey Division, Michigan Department of Conservation, Lansing 26, Michigan, distributes upon request, a list of all known shops.

A set of 18 identified "Common rocks and minerals of Michigan" and a guide, is available for 50¢ from the Publication Room, Michigan Department of Conservation, Lansing 26, Michigan.

Scientific geological equipment and supplies for the laboratory and classroom may be ordered from Ward's Natural Science Establishment, Inc., Rochester, New York. Catalog is available.

## **ASSAYS AND SPECIMEN IDENTIFICATION**

Assays of ores and chemical tests of minerals for private purposes are not performed by governmental agencies. Such services can be rather costly. A good list of firms in this line of work is U. S. Bureau of Mines Information Circular 7695 "Laboratories that make fire assays, analyses, and tests of ores, minerals, metals, and other inorganic substances." The single firm listed in Michigan is the Detroit Testing Laboratory, 554 Bagley Ave., Detroit 26, Michigan.

Hand identification of rock and mineral specimens, though much less exact, may be made with the assistance of a local mineral society, museum, gem dealer, rock shop, or school geology staff. Generally, these are the most convenient sources. The Geological Survey Division, Michigan Department of Conservation also make hand identifications of specimens sent by citizens within the state. Frequently, however, it is possible to merely suggest a tentative identity.

## **CONSULTING SERVICES**

Development of potential mineral resource sites often depends upon making and interpreting the results of highly detailed studies and investigations. Persons requiring this type of service should employ a private consultant. Personnel employed under State Civil Service are not permitted to engage in any outside activity for monetary gain when it is allied with their official duties.

## COLLEGES OFFERING GEOSCIENCE COURSES

In 1962 this Division canvassed Michigan colleges by questionnaire to determine which colleges may be offering geoscience courses that would be of benefit to teachers who lack geology backgrounds. Many of these courses may also be of interest to rock collectors and lapidaries. Prospective enrollees should consult current school catalogs for further information.

Degree granting departments of geology:

- Michigan Technological University
- Michigan State University
- University of Michigan
- Wayne State University
- Western Michigan University

Institutions offering some course in the geological sciences but not a major in geology:

- Alpena Community College (2 yr.)
- Bay City Junior College (2 yr.)
  - Department of Geology
- Bay De Noc Community College (2 yr.), Escanaba
- Central Michigan University, Mount Pleasant
  - Department of Geography Delta College (2 yr.),  
University Center
  - Department of Geology
- Detroit Institute of Technology
- Eastern Michigan University, Ypsilanti
  - Geography Department
- Ferris State College, Big Rapids
  - School of General Science
- Flint Community Junior College (2 yr.)
  - Department of Science
- Henry Ford Community College (2 yr.), Dearborn
- Highland Park College
  - Department of Physical Sciences
- Jackson County Community College (2 yr.), Jackson
  - Department of Geography
- Lansing Community College (2 yr.)
  - Natural Science Department
- Mercy College, Detroit
- Muskegon Community College (2 yr.)
- Northern Michigan University, Marquette
  - Department of Geography, Earth Science, and  
Conservation
- Northwestern Michigan College (2 yr.), Traverse City
- Port Huron Junior College (2 yr.)
- South Macomb Community College (2 yr.), Warren
- University of Detroit
  - Geography Department



Michigan Geological Survey  
FULL TIME TECHNICAL STAFF

DIVISION CHIEF and STATE GEOLOGIST  
(appointment pending)

OIL AND GAS

L. W. Price, Geologist and Asst. Chief

REGULATORY SUPERVISION

R. M. Acker, geologist and head

Lansing District

F. W. Terwilliger, geologist in charge

R. M. Lorenz, geologist

D. R. Brackenbury, geologist

S. L. Alguire, geologist

Mt. Pleasant District

V. F. Sargent, geologist in charge

S. A. Dyer, geologist

B. N. Gunning, geologist

Plainwell District

B. C. Ackerman, geologist in charge

R. L. Breed, geologist

Cadillac District

R. F. Wiles, geologist in charge

J. M. Snider, geologist

PRORATION ENGINEERING

W. G. Smiley, geologist and head

J. L. Lorenz, geologist

T. L. Culver, geologist

R. Dixon, geologist

PETROLEUM GEOLOGY

R. E. Ives, geologist and head

G. D. Ells, geologist

B. L. Champion, geologist

W. E. Mantek, geologist

L. D. Taylor, cartographic draftsman

MINES & PRECAMBRIAN GEOLOGY

H. J. Hardenberg, Geologist and Asst. Chief

R. C. Reed, geologist

ECONOMIC GEOLOGY

H. O. Sorensen, geologist and head

E. T. Carlson, geologist

WATER

J. G. Rulison, geologist and head

L. D. Johnson, geologist

J. R. Byerlay, geologist

GENERAL GEOLOGY

R. W. Kelley, geologist and head

E. A. Kirkby, geologist

J. M. Campbell, graphic presentation

UPPER PENINSULA OFFICE -- ESCANABA

A. E. Slaughter, geologist in charge

J. H. Kent, geologist

THE STATE GEOLOGISTS OF MICHIGAN

<u>Tenure</u>		<u>Headquarters</u>
1837-1845	Douglass Houghton	Detroit
1859-1862	Alexander Winchell	Ann Arbor
1869-1871	" "	"
1871-1885	Carl Rominger	"
1885-1888	Charles E. Wright	Houghton
1888-1893	M. E. Wadsworth	"
1893-1899	Lucius L. Hubbard	"
1899-1909	Alfred C. Lane	Houghton & Lansing
1909-1919	Rollan C. Allen	Lansing
1919-1946	Richard A. Smith	"
1946-1951	Gerald E. Eddy	"
1951-1952	Franklin G. Pardee	"
1952-1963	William L. Daoust	"

