

GEOLOGICAL SURVEY

**CIRCULAR 5
SOURCES OF GEOLOGICAL INFORMATION IN
MICHIGAN**

BY
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PREFACE

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.

Sourcebooks, circulars, pamphlets, leaflets and directories pertaining to the geological profession and various geological services and materials are available from the American Geological Institute.

A compilation of this nature is subject to a great deal of change and revision, sometimes even before it gets into print. Periodic revisions, therefore, are anticipated. This edition is a revision of Circular 1 "Michigan Geological Sourcebook" issued in 1963.

Lansing
Dec., 1966

Robert W. Kelley, geologist
Edward A. Kirkby, geologist
Geological Survey Division

GOVERNMENT AGENCIES

Several governmental agencies have extensive geological programs in Michigan. One is a state bureau, while the other two are federal. Their principal functions are summarized below.

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

Headquarters of the Division are located at 340 Clare St., one block west of Sexton High School 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 Cadillac, Imlay City, Mt. Pleasant, and Plainwell.

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.

Administering regulatory practices prescribed by the state's oil and gas conservation laws, comprises the greater part of the Division's work. 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 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

The U. S. Geological Survey pursues 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 7th floor of the Capitol Savings & Loan Bldg. in Lansing. Field offices are also maintained in Grayling and Escanaba. This office, staffed primarily with engineers and geologists, maintains gauging stations throughout the state, reports on the characteristics and behavior of surface waters, and conducts investigations that aid in developing underground water supplies. This division also participates in Federal-State cooperative programs with other organizations in Michigan.

Currently, the Geologic Division of the U.S.G.S. maintains an office in Marquette, while continuing several geologic mapping projects in the Upper Peninsula.

Bureau of Mines, U. S. Department of the Interior, Washington, D. C. 20240

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 mineral economic 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 FACILITIES

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 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.

GeoScience Research Institute. Andrews University, Berrien Springs, Mich. 49103. Organic geochemistry, Tertiary paleoecology, stratigraphy.

Glaciological Institute. College of Natural Science, Michigan State University, East Lansing, Mich. 48823. Glacial studies.

Institute of Minerals Research. Michigan Technological University, Houghton, Mich. 49931. 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.

Institute of Science and Technology. University of Michigan, Ann Arbor, Mich. 48104. Consists of 15 specialized research divisions among which are included: 1) Great Lakes Research Division, 2) Glacial Geology and Polar Research Division.

Subsurface Laboratory. Department of Geology and Mineralogy, University of Michigan, Ann Arbor, Mich. 48104. Collecting, preparing, storing and analyzing of oil well cores and mounted cuttings.

Institute of Water Research. Michigan State University, East Lansing, Mich. 48823. 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. 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, Mich. 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. \$1.00

Supplement to Publication 50, 1956-1960. free. Mineral Industry of Michigan. Published annually. free.

Michigan's Oil and Gas Fields. Published annually. free.

Bulletin 1, Our Rock Riches. 50¢

Bulletin 2, Rocks and Minerals of Michigan. 50¢

Guide to Michigan Fossils. free.

Chart 1, Stratigraphic Succession in Michigan. 25¢

Circular 2, Geologic Contributions to Michigan Conservation, 1935-1964. free.

Printed logs of individual oil and gas wells and tests may be purchased 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, U. S. Government Printing Office, Washington D. C. 20402. 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. An annual review 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; No. 1195, 1950-1959.

Abstracts of North American Geology. Published monthly. \$5.00 a year.

Geophysical Abstracts. Published monthly. Worldwide coverage of current geophysical literature. \$4.50 a year.

Bureau of Mines, U. S. Department of the Interior. Most of the 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, Pa. 15213.

SELECTED PUBLICATIONS:

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

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.

List of journal articles by Bureau of Mines authors. 1910-1960. \$1.75

Mineral facts and problems, 1965 edition. \$6.75

Mineral Yearbook. Issued annually, Vol. 1, Metals and Minerals (except fuels), \$4.75; Vol. II, Fuels, \$2.75; Vol. III, Area reports, \$4.50; Vol. IV, International area reports, \$5.00

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

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.

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

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 1,400 popular books on geology. \$1.00

Geology, science and profession. 25¢

Glossary of geology and related sciences.

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

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

Earth Science Curriculum Project, P. O. Box 1559, Boulder, Colo. 80301. An interdisciplinary earth science program for secondary schools.

SELECTED PUBLICATIONS:

Investigating the earth.

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: Librarian, Michigan Basin Geological Society, c/o Dept. of Conservation, Lansing, Mich. 48926.

University of Michigan, Ann Arbor, Mich. 48104. The Museum of Paleontology publishes and distributes a continuing series of scientific papers, many of which treat with Michigan fossils.

Michigan Natural Resources Council. Address communications to the Secretary, Michigan Natural Resources Council, Stevens T. Mason Bldg., Lansing, Mich. 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, 1966. Up-to-date information on significant developments, progress, and legislation in various natural resource fields.

Associated Petroleum Industries of Michigan, 119½ West Ottawa, Lansing, Mich. 48933. 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.

Michigan Iron Ore Industry Association. The origin and evolution of iron ore and 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.

Michigan Earth Scientist, c/o K. Rodney Cranson, Dept. of Natural Science, Lansing Community College, 419 N. Capitol, Lansing, Mich. 48914. A bimonthly periodical containing news and ideas of interest to secondary teachers teaching earth science.

Michigan Manufacturer and Financial Record. Published monthly by the Manufacturer Publishing Co., 8543 Puritan, Detroit, Mich. 48238. 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, Mich. 48858. Publishes "Oil and Gas News," the weekly voice of petroleum activities in this state.

Skills' Mining Review, 210 Sellwood Bldg., Duluth, Minn. 55802. A weekly periodical containing highlights of mining and mineral resource developments.

LIBRARIES

The nearest library is usually the best place to begin searching for information on a specific topic. The local librarian can also 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 usually be found at the following libraries designated as depositories of federal documents:

Albion College, Albion
Alma College, Alma
Benton Harbor Public Library, Benton Harbor
Central Michigan University, Mt. Pleasant
Cranbrook Institute of Science, Bloomfield Hills
Delta College, University Center
Detroit Public Library, Detroit
Eastern Michigan University, Ypsilanti
Grand Rapids Public Library, Grand Rapids
Grand Valley State College, Allendale
Hackley Public Library, Muskegon
Henry Ford Community College, Dearborn
Hoyt Public Library, Saginaw
Jackson Public Library, Jackson
Kalamazoo Public Library, Kalamazoo
Marygrove College, Detroit
Mercy College, Detroit
Michigan State Library, Lansing
Michigan State Library, Upper Peninsula Branch, Escanaba
Michigan State University, East Lansing
Michigan Technological University, Houghton
Mott Library, Flint
North Central Michigan College, Petoskey
Northern Michigan University, Marquette
Northwestern Michigan College, Traverse City
Oakland University, Rochester
Port Huron Public Library, Port Huron
Schoolcraft College, Livonia
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 absolutely essential in land use projects. Topographic and geologic maps are especially useful. 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 D.C. 20242. Most of the land surface area of Michigan is covered by these maps, either published or in progress.

1:250,000 National topographic series. Michigan is now completely covered by these maps. Originated by the Army Map Service, the program is now administered 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. 20242.

Aeronautical Charts. A chart on the scale of 1:500,000 covering approximately 2° Latitude and 6° Longitude and having topographic contours on an interval of 500 feet is available from the U. S. Coast and Geodetic Survey, Dept. of Commerce, Washington, D. C. 20852.

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 Aeronautics Commission, Michigan Department of Commerce, Terminal Building, Capital City Airport, Lansing, Mich. 48906 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 Division
U. S. Lake Survey, Corps of Engineers
U. S. Geological Survey

U. S. Coast and Geodetic Survey
Michigan Dept. of State Highways, Engineering
Michigan Elevation Service, 5838 South Mission St.,
Mt. Pleasant
"Spirit Leveling in Michigan," Bull. 919, U. S.
Geological Survey.
"Boundaries of the United States and the Several
States," Bull. 1212, 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, Department of Conservation, Lansing, Mich. 48926.

SELECTED PUBLICATIONS:

- "Geologic Map Index of Michigan, 1843-1962," 62 p. free.
- Pub. 39, "Centennial Geologic Map of Michigan," 1936, in color, on a scale of 1:500,000. Lower Peninsula sheet 25¢. Upper Peninsula sheet out-of-print.
- 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, Mich. 48226. Catalog is available.

Soil Surveys. The county soil survey maps prepared by the U. S. Department of Agriculture in cooperation with the Michigan Agricultural Experiment Station, East Lansing, Michigan, and the Michigan Department of

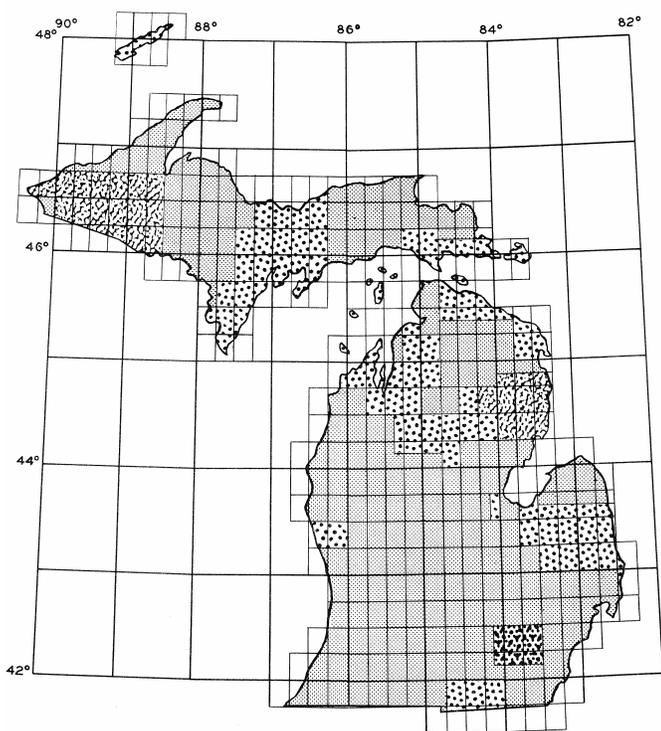
Conservation, are generally on a scale of 1 inch-to-the-mile but the degree and uniformity of detail varies from county to county. A list of soil survey reports, with maps included, may be obtained from the Soil Science Department, Michigan State University, East Lansing, Mich. 48823.

County Maps. Maps on a scale of 3/8 inch-to-the-mile showing roads, section lines, township names, streams, public land and recreation sites may be ordered from the Publications Room, Department of Conservation, Lansing, Mich. 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 U.S. General Land Office is set forth briefly in a pamphlet "Real Property Description," available from the Publications Room, Department of Conservation, Lansing, Mich. 48926.

AERIAL PHOTOGRAPH COVERAGE



CUSTODY OF PHOTOGRAPHY, 1962

	AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE, U. S. D. A.
	U. S. GEOLOGICAL SURVEY
	FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
	COMMERCIAL

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 judged most suitable for average needs is classified

as primary coverage according to 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 map opposite. Primary coverage is defined as that photography deemed most suitable for average needs.

Inquiries for general information on aerial photograph coverage should be addressed to the Map Information Office, U. S. Geological Survey, Washington, D. C. 20242 which maintains records of all reported 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 north-south 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 nonstereoscopic uses.

A Michigan firm conducting aerial surveys is Abrams Aerial Survey Corp., 124 North Larch, Lansing, Mich. 48933.

FILMS AND SLIDES

Film Strips

Geological film strips may be rented from the Audio-Visual Utilization Center, Wayne State University, Detroit, Mich. 48202.

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, Mich. 48104.

Film strips showing various phases of the petroleum industry are available free to teachers from Associated Petroleum Industries of Michigan, 118½ West Ottawa, Lansing, Mich. 48933.

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 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, Mich. 48926.

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, Pa. 15213. 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, 1271 Avenue of the Americas, New York, N. Y. 10020.

The most comprehensive classified and annotated list 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 list particularly useful for earth science instruction.

Slides

Geological color slides, some about Michigan, may be ordered from Ward's Natural Science Establishment Inc., Rochester, N. Y. 14603. Catalog is available.

COLLEGES

Universities with geology departments granting degrees in geology:

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

Colleges offering instruction in geological science but not a major in geology:

- Albion College
 - Department of Geology
- Alma College
 - Department of Geology
- Alpena Community (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
- Ferris State College, Big Rapids
 - School of General Science

- Flint Community Junior College (2 yr.)
 - Department of Science
- Grand Rapids Junior College (2 yr.), Grand Rapids
- Grand Valley State College, Allendale
- Henry Ford Community College (2 yr.), Dearborn
- Highland Park College
 - Department of Physical Sciences
- Jackson County Community College (2 yr.), Jackson
 - Department of Geography
- Lake Michigan College (2 yr.), Benton Harbor
- Lansing Community College (2 yr.), Lansing
 - Natural Science Department
- Macomb County Community College (2 yr.), Warren
- Mercy College, Detroit
- Montcalm Community College (2 yr.), Stanton
- Muskegon Community College (2 yr.)
- Northern Michigan University, Marquette
 - Department of Geography, Earth Science, and Conservation
- Northwestern Michigan College (2 yr.), Traverse City
 - Department of Natural Science
- Port Huron Junior College (2 yr.)
 - Geology Department
- Schoolcraft College (2 yr.), Livonia
- Southwestern Michigan College (2 yr.), Dowagiac
- University of Detroit
 - Geography Department

MUSEUMS AND EXHIBITS

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.

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.

Museum. Alma College, Alma. Exhibits: 200 mineral specimens.

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

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

Port Huron Public Library Museum. 115 Sixth St., Port Huron. Exhibits: 3 cases of minerals and fossils.

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

EQUIPMENT AND SUPPLIES

Lapidary specimens, supplies, and equipment may be purchased at local mineral and lapidary shops. A list of reported shops is available from the Geological Survey Division.

A set of 18 identified "Common rocks and minerals of Michigan" and a guide, is available for 50¢ from the Publication Room, Department of Conservation, Lansing, Michigan 48926.

Scientific geological equipment and supplies for the laboratory and classroom may be ordered from Ward's Natural Science Establishment, Inc., Rochester, New York 14603. Catalog is available.

IDENTIFICATION OF ROCKS

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, Michigan 48226.

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 also makes hand identification of specimens sent by citizens within the state. Frequently, however, it is possible to merely suggest a tentative identity.

A simplified key for identifying common rocks and minerals of Michigan is included in Geological Survey Division Bulletin 2 "Rocks and Minerals of Michigan."

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.



STATE OF MICHIGAN
George Romney, Governor

DEPARTMENT OF CONSERVATION
Ralph A. MacMullan, Director

GEOLOGICAL SURVEY DIVISION
Gerald E. Eddy, State Geologist and Chief

COMMISSION OF CONSERVATION

Robert C. McLaughlin, Chairman, Detroit, 1963-68

Carl T. Johnson, Grand Rapids, 1963-67 August Scholle, Royal Oak, 1966

E. M. Laitala, Hancock, 1961-66 Harry H. Whiteley, Rogers City, 1961-69

Robert J. Furlong, Executive Assistant & Secretary

Published by Authority of State of Michigan CL'48 s. 321.6
Printed by Office Services Section, Department of Conservation, Jan. 1967

Available from Publications Room, Dept. of Conservation, Lansing, Mich. 48926

The STATE GEOLOGICAL SURVEY

collects, interprets, and disseminates basic geologic information for understanding and developing our mineral and water resources.

administers the oil and gas conservation laws, evaluates all metallic mining properties, and maintains statistics on mineral production.