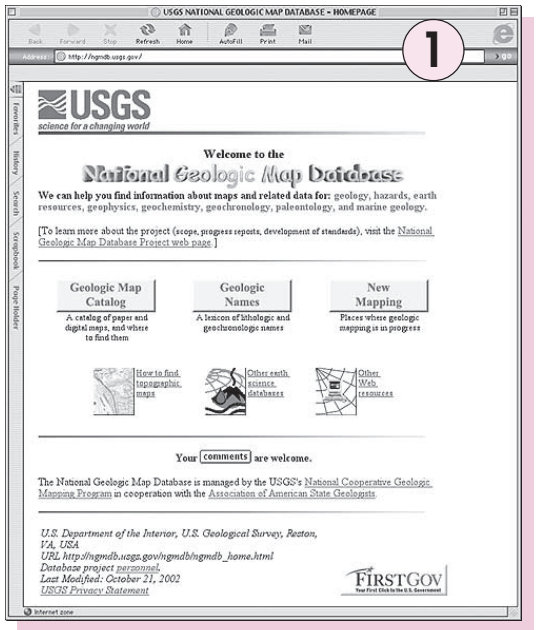
Ohio Geology

A Quarterly Publication of the Ohio Department of Natural Resources, Division of Geological Survey *2002, No. 2*

NEED A GEOLOGIC MAP? LOOK HERE FIRST!

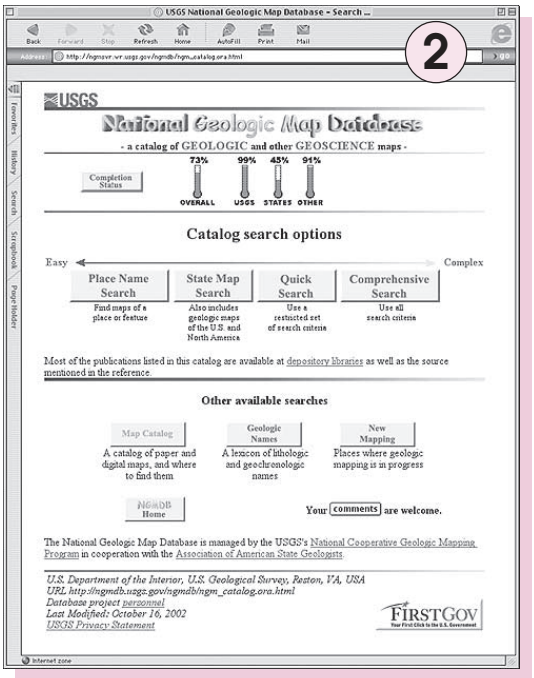
by Merrianne Hackathorn

"I just bought some land near Bergholz in Jefferson County—what can you tell me about the geology there?" This is the type of inquiry received by the Geologic Records Center of the Division of Geological Survey on a daily basis. To find geologic information about the area—from the surface to the deep subsurface—one must begin with maps. But what maps are available and where do you find them? The answer to this question has become a lot easier with the establishment of the National Geologic Map Database Web site by the U.S. Geological Survey (USGS). This Web site, at <http://ngmdb.usgs.gov>, is one of many maintained by the USGS (screen shot 1).



The Geologic Map Catalog portion of the National Geologic Map Database (NGMDB) is a national, electronic listing of available paper and digital geologic maps in the United States. The catalog contains records for more than 51,000 maps and related publications issued by the U.S. Geological Survey, state geological surveys, universities, associations, and other agencies. The catalog is searchable by place name, geographic area, latitude and longitude, title, author, and a number of subject fields ("themes"). All of the published maps, including maps within text publications, and the majority of the open-file maps of the Ohio Division of Geological Survey have been entered into the NGMDB.

Clicking on "Geologic Map Catalog" on the NGMDB Home Page brings you to the "Catalog Search Options" page at <http://ngmdb.usgs.gov/ngmdb/ngm_catalog.ora.html> (screen shot 2). There are several options for searching, ranging from a simple place name search to a more complex comprehensive search. If you have a specific feature or place you're looking for, the "Place Name Search" is the quickest way to find information. If you want a more extensive but still quick search, choose "Quick Search." If you want to search just for the maps of the Ohio Division of Geological Survey, the "Comprehensive Search" gives all the options of the "Quick Search" and also allows you to search for publications of specific publishers. There are also many "Help" options and pull-down boxes to aid your search.



As an example, let's use the "Place Name Search" to find 1:24,000-scale geologic maps of the Bergholz area in Jefferson County, Ohio. The 1:24,000-scale bedrock-geology, bedrock-topography, and structure-contour maps produced by the Ohio Division of Geological Survey for the statewide mapping program are the most up-to-date geologic maps for Ohio.

On the "Place Name Search" page, type in

continued on page 2

Thomas M. Berg, Division Chief and State Geologist

From The State Geologist...

Thomas M. Berg

THE NATIONAL GEOLOGIC MAP DATABASE

A historic meeting took place in St. Louis on August 14 and 15, 1996. David R. Soller of the U.S. Geological Survey (USGS) and I organized a meeting to begin a major effort to create standards for the National Geologic Map Database (NGMDB). Dave is the Project Chief for the NGMDB and works at the National Center of the USGS at Reston, Virginia. I chair the Digital Geologic Mapping Committee for the Association of American State Geologists (AASG). Several earlier meetings had identified the urgent need to establish digital standards for the NGMDB. At St. Louis, we brought together geologic-mapping experts from the USGS, several of the state geological surveys, and the Geological Survey of Canada. All of these people were also experts in the digital world and in the development of complex computer databases. Many highly technical issues were discussed, and six working groups were formed to move ahead in the development of standards. What made the St. Louis meeting historic was that it set in motion an effort to standardize the very way that geologic maps are made and the way that rocks are described and classified. Ultimately, the whole effort will change many of the ways that geologists convey their information and interpretations to the rest of the world.

Today, although much has been accomplished in development of the NGMDB and the standards that apply to it, there is a lot of work to be done. An outstanding contribution is the development of the online catalog element of the database, which is described by Merrianne Hackathorn in this issue of *Ohio Geology*. Technical teams are meeting to develop standardized science language to classify rocks and surficial deposits. Work has begun to develop a seamless, online "living" database of digital geologic-map information for the U.S. This task is being accomplished through a series of prototypes, which are being built from edge-matched geologic maps at various scales and will be available to users via Web browsers and common GIS tools.

It has been a pleasure to work with the AASG Digital Geologic Mapping Committee and all the state geological survey employees involved with development of the NGMDB. It has also been a great pleasure to work with Dave Soller in this mammoth undertaking. He is a good friend, a fine geologist, and a real credit to the USGS. I look forward to seeing the NGMDB Project advance.

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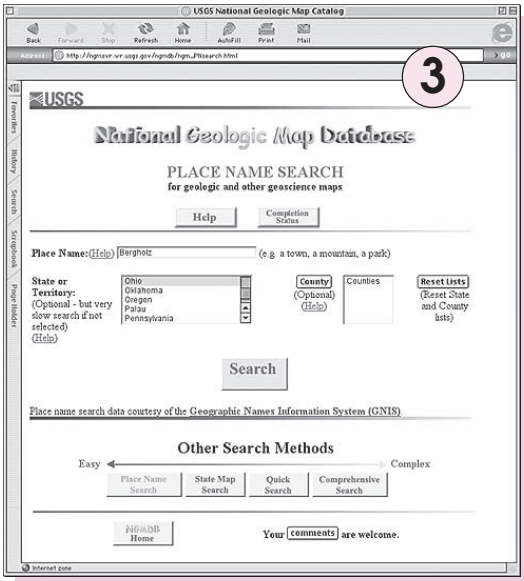
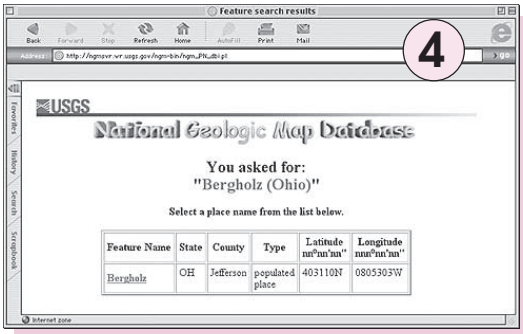
continued from page 1

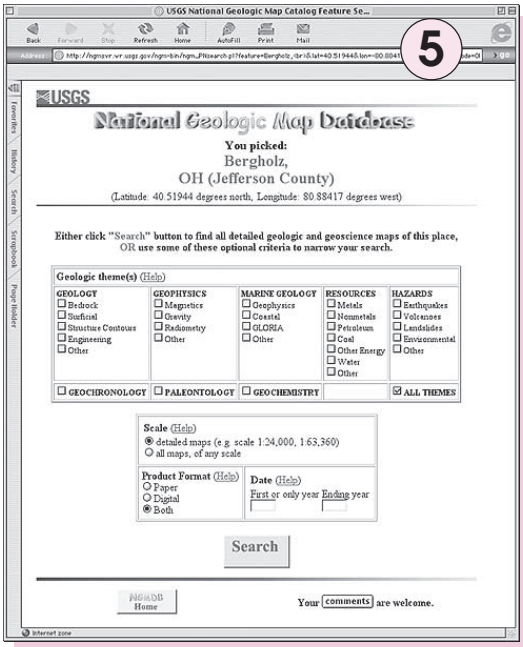
Bergholz for the place name, choose Ohio for the state, and click on "Search" (screen shot 3). The NGMDB search results give you the geographic identification for Bergholz (screen shot 4) (for some place name searches more than one possibility may exist). Click on "Bergholz" to search for the geologic maps (screen shot 5). This screen allows you to narrow your search to specific types of maps. The bedrock-geology and bedrock-topography maps fall in the "GEOLOGY—Bedrock" theme. The structure-contour maps fall in the "GEOLOGY—Structure Contours" theme. The abandoned-underground-mine map series, of great interest to land owners in Jefferson County and all of eastern Ohio, fall in the "HAZARDS—Other" theme, as well as the "RESOURCES—Coal" theme. To find all the maps, simply click "Search" at the bottom of the page. The default search is for "all themes" and for "detailed maps" (scale 1:63,360 or larger).

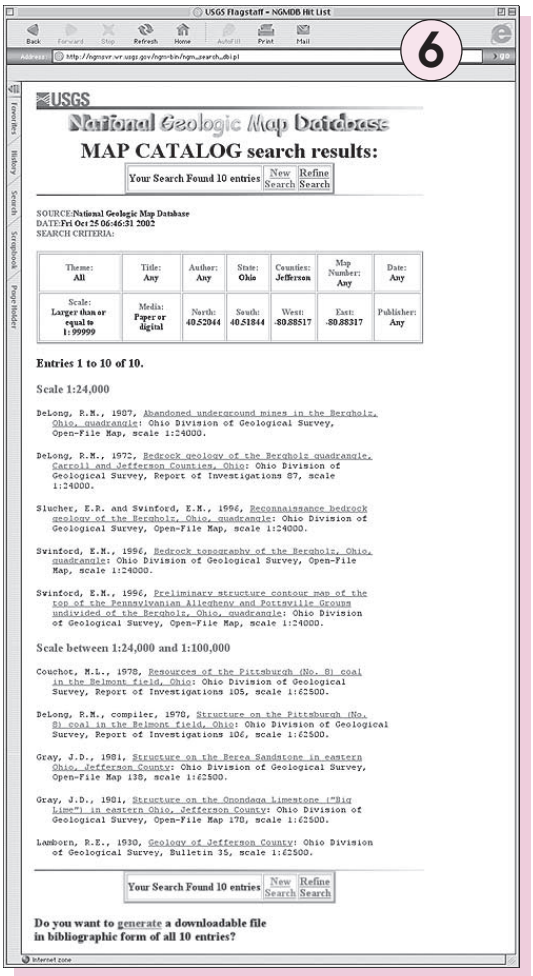
This search for detailed maps of Bergholz, Ohio, results in 10 entries (screen shot 6). The five 1:24,000-scale maps in the list include four open-file maps (bedrock geology, bedrock topography, one structure-contour map, and the abandoned-underground-mine map) and one published quadrangle map. The other five maps are the 1930 bedrock-geology map for Jefferson

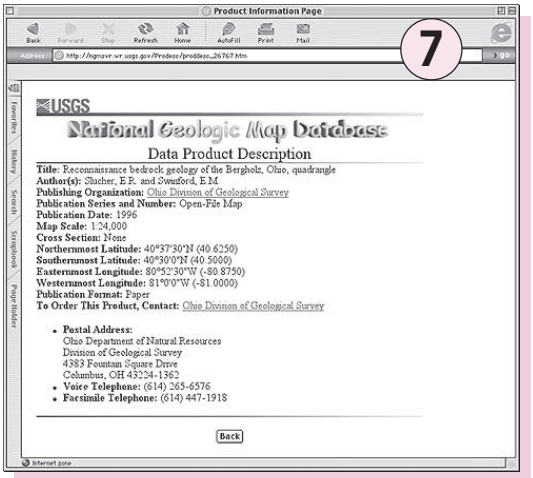


County, two regional coal-study maps, and two open-file structure maps for Jefferson County. Each underlined map title leads to a detailed Data Product Description. For example, clicking









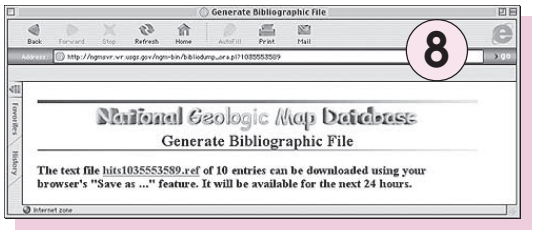
on the bedrock-geology map title brings up the data for that map (screen shot 7).

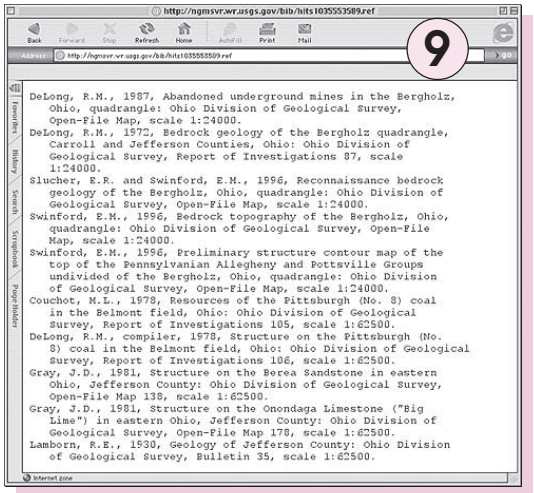
Clicking on the "Ohio Division of Geological Survey" link on the "Publishing Organization" line of the" Data Product Description" takes you to the Ohio Division of Geological Survey Web site. Clicking on the link on the "To order this product" line takes you to the "How to Obtain Publications" page on the Ohio Survey's Web site. Online ordering is not yet available.

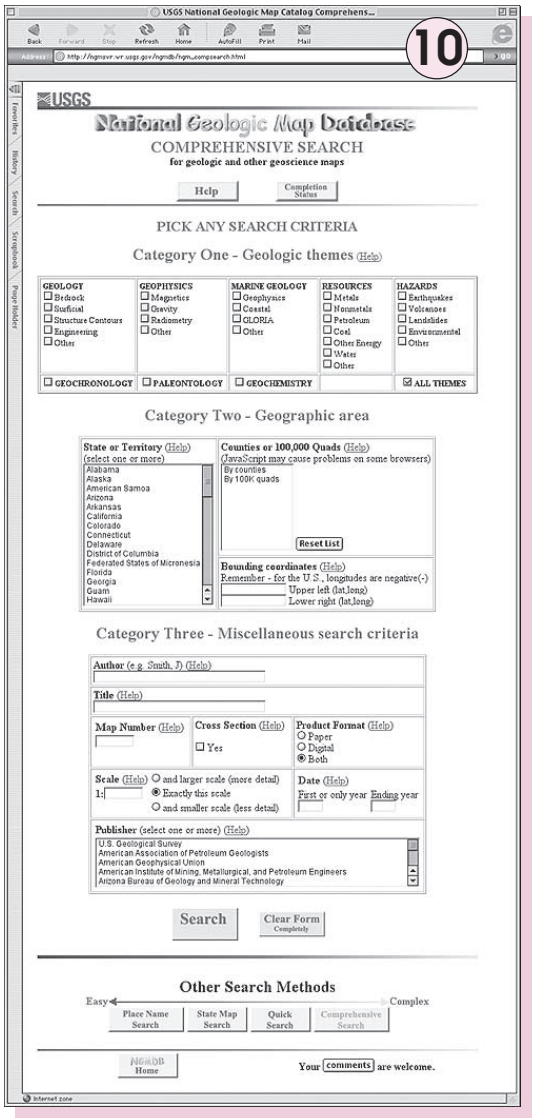
Note the statement on the bottom of the "MAP CATALOG search results" page (screen shot 6)—"Do you want to generate a downloadable file in bibliographic form . . . ?" The NGMDB will create a bibliographic list of the map titles generated by a search. Click on the word "generate" in the statement and the NGMDB creates a file notice (screen shot 8). The downloaded list looks like screen shot 9 and can be saved to your computer.

If you choose to do a "Comprehensive Search," here are a few tips. You can fill out as many or as few fields as you wish to narrow your search (screen shot 10). The "Author" field can be tricky because you need to enter the author's name exactly as it was entered into the NGMDB. If you are searching the NGMDB for a specific title, you don't need to type in the entire title—just enough of the title to identify the map; any words that you do type must be exactly as they are in the map title. Also, a word of caution in title searches: if you search on a word that is a place name as well as a stratigraphic name, such as Berea (Berea Sandstone) or Waynesburg (Waynesburg coal), the list will include all maps that have that geologic unit in the title.

In regard to "Product Format," the database default is "Both," which would result in a list of paper as well as digital maps. Currently, the







1:24,000-scale Ohio Survey maps are available only as paper copies, so you could also choose "Paper"; choosing "Digital" would show no results. However, in the near future the Survey hopes to have digital versions available, so stayed tuned!

The National Geologic Map Database has many other search possibilities. If you're interested in a geologic map of an entire state, try the "State Map Search." If you want to know where geologic mapping is currently underway, check out "New Mapping." An added bonus to the NGMDB Web site is the online lexicon of "Geologic Names," which has descriptions of more than 50,000 geologic units (groups, formations, members, etc.), including information on the type locality and the history of the unit name.

So, next time you're looking to see what geologic maps are available for an area, give the National Geologic Map Database a try!

BRIEF BACKGROUND ON THE NATIONAL GEOLOGIC MAP DATABASE

The National Geologic Mapping Act of 1992 authorized the U.S. Geological Survey to develop a National Geologic Map Database (NGMDB) as a national archive containing geologic maps and related databases. The NGMDB was to contain geologic, geophysical, geochemical, geochronologic, and paleontologic information. The U.S. Geological Survey, working closely with the Association of American State Geologists, began to build the NGMDB in 1995 under the direction of David R. Soller.

A prime component of the NGMDB is the catalog of metadata (publication data for and descriptions of each map), searchable over the Internet. The long-term goal of the NGMDB is to provide online links to digital maps and data sets. However, because of the enormous number of geologic maps that are available only in paper format, the catalog of metadata describes all available map information and the sources for digital and paper maps.

In addition to geologic-map information, the NGMDB Home Page (see p. 1 of this issue) includes a searchable catalog of geologic names and information on mapping in progress. The NGMDB Home Page also includes links to information on topographic maps, other Earth science databases, and other Web resources.

Cincinnati proclaims its Official Fossil

Thousands of votes from schoolchildren, local collectors, and interested citizens have elected *Isorophus cincinnatiensis* as the Official Cincinnati Fossil, so designated by mayoral proclamation on April 25, 2002. This designation makes Cincinnati one of only a few cities in North America to have its own city fossil.

Isorophus is an edrioasteroid (e-dri-o-AS-teroid) echinoderm and a distant relative of starfish. It lived in the Cincinnati area during the Ordovician Period, approximately 450 million years ago, when a warm, shallow subtropical sea covered the region. In life, these quarter-sized creatures attached to shells and other hard surfaces in the same manner as a barnacle. To feed, they used their five curved arms to capture food suspended in the sea water. The circular body was covered with shinglelike armor plates. Edrioasteroids are now entirely extinct.

The city-fossil election was proposed and candidates were nominated by Cincinnati Museum Center paleontologists Glenn Storrs and Colin Sumrall and by the Cincinnati Dry Dredgers, a group of amateur paleontologists and geologists celebrating their 60th year as an organization. Ballots were sent to local schools, and polling stations were set up at the Cincinnati Museum Center and the 2002 Cincinnati Gem, Mineral and Fossil Show at the Cincinnati Convention Center; 4,306 ballots were cast. Cincinnati Mayor Charlie Luken proclaimed the winner of the election the Official Cincinnati Fossil.

Isorophus cincinnatiensis beat out four other local fossils, garnering 35.2 percent of the vote. The other four were *Flexicalymene meeki*, Cincinnati's best-known trilobite; *Grewingkia canadensis*, a horn coral; *Cincinnaticrinus pentagonus*, a crinoid; and *Hebertella occidentalis*, a brachiopod.

Isorophus cincinnatiensis is a fitting choice for many reasons: it's named after the city of Cincinnati, it's attractive and highly prized by collectors, edrioasteroids are more common and diverse in the Cincinnati region than anywhere else on Earth, and most of the landmark scientific studies on edrioasteroids have been based on fossils from the Cincinnati area.

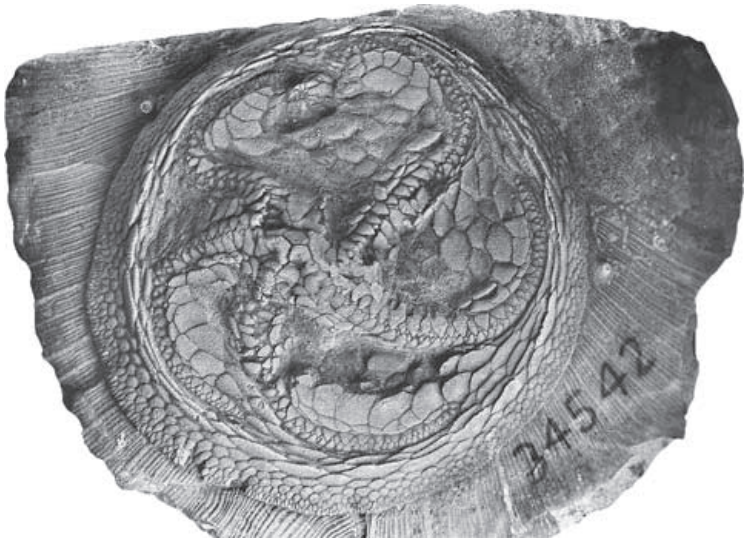
Cincinnati's new official fossil will be used by the Cincinnati Museum Center and the Dry Dredgers to promote paleontology as a gateway to science education and to increase awareness of southwestern Ohio's unique fossil heritage.

Some edrioasteroid facts:

- *Isorophus cincinnatiensis* was originally described by German paleontologist F. Roemer in 1851.
- The name "edrioasteroid" is Greek for "seated star."
- Approximately 10 species of edrioasteroids occur in the Ordovician rocks of Cincinnati.
- Edrioasteroids, like most echinoderms, have five arms.
- Most edrioasteroids are small, but the largest is 11 cm (4 inches) across.

To learn more about the Cincinnati Museum Center and the Dry Dredgers, visit their Web sites:
http:// www.cincymuseum.org
http://drydredgers.org

—Glenn W. Storrs
Cincinnati Museum Center



Isorophus cincinnatiensis

The official proclamation

Be it Proclaimed:

Whereas, Cincinnati has the most classic exposures of Upper Ordovician rocks in North America; and

Whereas, Upper Ordovician rocks are called "Cincinnatian age" by scientists throughout the world; and

Whereas, the quality and quantity of fossils preserved in Cincinnati's rocks are unparalleled; and

Whereas, the natural dissected topography of Cincinnati has laid bare these rich fossil resources; and

Whereas, Cincinnati has produced some of the most influential paleontological scholars of the late 19th and 20th centuries; and

Whereas, Cincinnati is seen as a natural laboratory for studying processes in paleontology; and

Whereas, a group of citizens within Cincinnati has organized the longest continuous fossil club in the nation; and

Whereas, the citizens of Cincinnati have selected a fossil to represent their rich paleontological heritage;

Now, therefore, I, Charlie Luken, Mayor of Cincinnati, do hereby proclaim on April 25, 2002

Isorophus cincinnatiensis
The Official Cincinnati Fossil

Bob Stewart retires

Robert L. Stewart

Long-time Survey cartographer Robert L. Stewart, Sr., retired in March 2002. Bob is a Columbus native and served in the Army in Vietnam, receiving the Purple Heart. Bob attended The Ohio State University, Chicago Technical College, the Columbus Drafting Academy, and Columbus Technical Institute. He joined the Survey in 1978 after working as a draftsman in the private sector.

Bob spent most of his career at the Survey as a traditional cartographer doing lay out, inking, scribing, or lab work for base maps and for diagrams and illustrations for Survey reports and maps. He was the lead cartographer for several county shore erosion reports and a number of stand-alone maps and the popular *Guide to the geology along Interstate 70*. Bob also worked on projects for other ODNR Divisions. He produced a series of methane potential maps for the Division of Forestry to alert fire fighters to potential methane pockets in areas where there are abandoned underground mines. He helped the Division of Water produce a series of pollution potential maps.

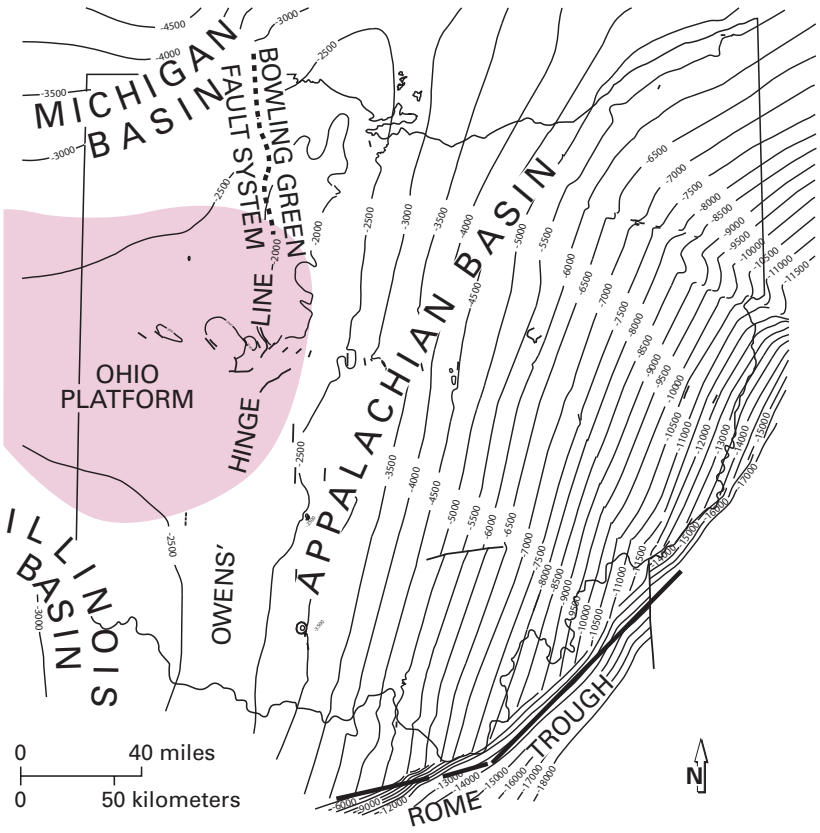
Bob's time spent in the photo lab at the Survey is legendary. He diligently spent long hours in the lab producing halftones and master negatives for publications such as *Ohio Geology*, file mylars of coal-mine maps, and the majority of the 788 mylar base maps needed for the statewide mapping program.

Over the past few years Bob made the transition from traditional cartography to electronic publication. He used a Macintosh desktop-publishing system to produce publications such as the page-size map of *Ohio karst areas*, the *Generalized column of bedrock units in Ohio*, and the annual *Mineral industries of Ohio* map.

Bob was a very dedicated and team-oriented employee. For many years, he coordinated Survey employees' contributions to the Christmastime Adopt-A-Family program sponsored by a local newspaper. Bob was very proud of the fact that he worked for the Ohio Geological Survey and was happy to be able to retire from the Survey with 25+ years of service. He plans to spend his retirement enjoying his grandchildren.

NEW PRECAMBRIAN STRUCTURE MAP

A new map and report, "*Structure contour map on the Precambrian unconformity surface in Ohio and related basement features*," is now available from the Division of Geological Survey. The map and report, designated Map PG-23, were compiled by Mark T. Baranoski, senior geologist in the Petroleum Geology Group of the Survey.

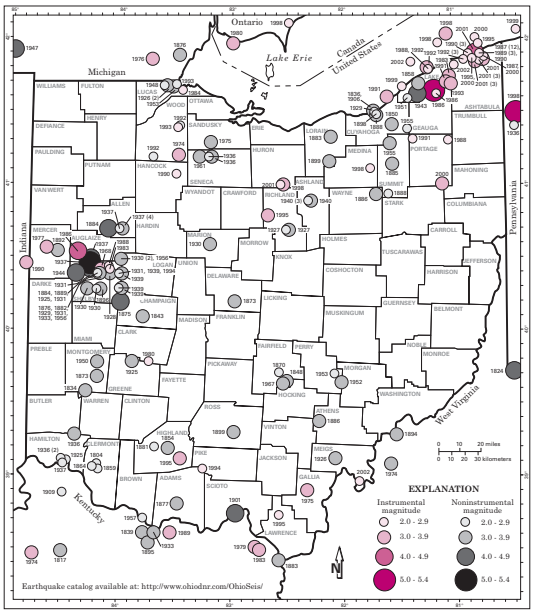


More than 30 years have elapsed since the Ohio Division of Geological Survey last published a statewide interpretation of the Precambrian unconformity surface. A large number of wells have been drilled to the Precambrian since that time, and revolutionary discoveries have changed geologists' understanding of this ancient terrain. Data sources for this report and 1:500,000-scale map include 207 wells from Ohio, 47 wells outside Ohio, and approximately 600 miles of public-domain and proprietary seismic-reflection data. The map also depicts structural features reported in published and unpublished sources and replaces the Survey's "*Map of basement structures in Ohio*" (DCMS-7; also note that the DCMS series is now the Petroleum Geology—PG—series).

The 1:500,000-scale (about 8 miles to the inch) color map and 18-page report are available digitally in Adobe's Portable Document Format (PDF) from the Division's Web site (http://www.ohiodnr.com/geosurvey/). The PDF files are also available on CD-ROM for $10.00 plus applicable tax and handling. Plot-on-demand paper copies may be ordered for $10.00 plus applicable tax and handling. To order Map PG-23, contact the Geologic Records Center, 4383 Fountain Square Drive, Columbus, OH 43224-1362, telephone: 614-265-6576, fax: 614-447-1918, e-mail: geo.survey@dnr.state.oh.us. For more information on Map PG-23, contact Mark Baranoski at 614-265-6586, e-mail: mark.baranoski@dnr.state.oh.us.

New earthquake maps available

A new page-size color map showing *Earthquake epicenters in Ohio and adjacent areas* is now available in Adobe's Portable Document Format (PDF) on the Survey Web site at <http://www.ohiodnr.com/geosurvey/pdf/mapeg2.pdf>. This map, compiled by Michael C. Hansen, shows the locations of known earthquakes of magnitude 2.0 or greater that have occurred in Ohio from the early 1800's to the present. A printed version of the page-size map is included in the newly revised Educational Leaflet 9, *Earthquakes in Ohio*, also by Dr. Hansen. Also available is a wall-size, 1:500,000-scale, plot-on-demand version of the *Earthquake epicenters in Ohio and adjacent areas* map. The wall-size map, designated Map EG-2, is plotted on a shaded elevation base and shows the basement structure from Survey Map PG-23 (described on p. 6 of this issue). The map sheet includes a table of data for the earthquakes shown on the map. Single copies of Educational Leaflet 9 are free; plot-on-demand paper copies of the 1:500,000-scale map are $10.00 plus tax and handling.



To order contact the Geologic Records Center, 4383 Fountain Square Drive, Columbus, OH 43224-1362, telephone: 614-265-6576, fax: 614-447-1918, e-mail: geo.survey@dnr.state.oh.us.

Two small earthquakes strike Ohio during first half of 2002

Two small earthquakes that barely received public notice occurred in Ohio, at opposite ends of the state, during the first half of 2002. In addition, two 5.0-magnitude earthquakes, one each in New York and Indiana, were felt in Ohio.

The first Ohio event was a 2.7-magnitude earthquake on April 27 at 8:07 p.m. Eastern Daylight Time (April 28, 00:07 Universal Coordinated Time) beneath Lake Erie about 11 miles (18 km) directly north of Mentor-on-the-Lake, Lake County. The earthquake was detected and located by stations of the Ohio Seismic Network and Ontario stations of the Geological Survey of Canada and the Southern Ontario Seismic Network. No felt reports were received initially. However, a newspaper article resulted in a few citizen reports of a quick vibration and a booming sound. Small earthquakes in this general location were recorded in 1983, 1988, and 1992 (2).

On May 6, a 2.8-magnitude earthquake occurred at 6:27 p.m. Eastern Daylight Time (22:27 Universal Coordinated Time) in southern Ohio, near Racine, in Meigs County. This earthquake was recorded by stations of the Ohio Seismic Network, the Virginia Tech Seismic Network, and the Kentucky Seismic Network. No felt reports were received from this earthquake. However, inquiries to the Ohio Department of Transportation about road-construction blasting in the area indicated that the District 10 office received three citizen reports about a possible blast on May 6. No blasting was done on that day. These citizens may have felt

Epicentral locations of a 2.7-magnitude earthquake on April 27, 2002, beneath Lake Erie, and a 2.8-magnitude earthquake on May 6, 2002 in Meigs County.

or heard this small earthquake. No earthquakes have been previously reported from this area of Ohio or adjacent West Virginia.

A 5.0-magnitude earthquake on April 20 in northern New York, near Plattsburg, was felt throughout a large area of the eastern United States and caused damage in the epicentral area. Uncon-

firmed felt reports were received from the Cleveland and Magnolia (Carroll-Stark Counties) areas.

On June 18, a 5.0-magnitude earthquake near Evansville, Indiana, resulted in a number of felt reports from Cincinnati and other areas of southwestern Ohio and one report from an individual in a tall building in Columbus. Damage in the epicentral area was reported as being light.

The Ohio Seismic Network receives reports of possible earthquakes from citizens on a regular basis. Each inquiry is investigated and the respondent receives a reply by e-mail or telephone. Commonly, many reports are attributable to nonseismic vibrations, the origin of which is usually unknown. However, such reports are sometimes the first indication that a small earthquake has occurred and contribute to the understanding of the effects of local bedrock and surficial deposits on shaking. E-mail reports can be submitted to the U.S. Geological Survey's Community Internet Intensity Maps at <http://pasadena.wr.usgs.gov/shake/cus/>; there is a link to this site on the Ohio Seismic Network Web site, <http://www.ohiodnr.com/OhioSeis>. Telephone reports may be made to the Ohio Earthquake Information Center at 740-548-5979.

—Michael C. Hansen

Ohio Geology Advisory Council

The Ohio Geology Advisory Council is composed of seven individuals who have expertise in diverse areas of geology and mineral resources. The primary role of the Council is to provide guidance to the Division Chief in matters of legislation, programs, and policies that promote the wise use and protection of the state's mineral resources, proper assessment of geologic hazards, and fundamental mapping and research that will benefit the health, safety, and welfare of Ohio's citizens. The Council also promotes cooperation among governmental agencies having an interest in Ohio geology. In regard to federal cooperation, the Council functions as the Geologic Mapping Advisory Committee, reviewing the Division's proposals under the STATEMAP component of the National Cooperative Geologic Mapping Program, which is managed by the U.S. Geological Survey.

The Ohio Geology Advisory Council was established by legislation in 1990 and meets quarterly. Each member of the Council serves a three-year term and is appointed by the Governor. Not more than four members of the Council may be from the same political party. Members must have a demonstrated interest in and represent one of the following areas: oil and gas, industrial minerals, coal, hydrogeology, environmental geology, and higher education. One additional member of the Council serves in an at-large capacity, representing citizens in general. The chairperson of the Ohio Geology Advisory Council also serves as a member of the Recreation and Resources Commission of the Ohio Department of Natural Resources.

The current members of the Advisory Council are:

Dr. Mark R. Boardman, Professor of Geology, Department of Geology, Miami University, Oxford, representing higher education;

Mr. Garry L. Getz, Geologist, Shelly Materials, Inc., Springfield, representing industrial minerals;

Ms. F. Lynn Kantner, Geologist, Groveport, representing at-large citizens;

Mr. C. Robert Lennertz, Professional Engineer and Senior Engineering Consultant, H. C. Nutting Co., Cincinnati, representing Environmental Geology;

Mr. William M. Rike, Consulting Geologist, Galloway, representing oil and gas (Mr. Rike is Council chairman);

Dr. Robert W. Ritzi, Jr., Associate Professor of Geology, Department of Geological Sciences, Wright State University, Dayton, representing hydrogeology; and

Mr. David Wilder, Geologist, Coal Procurement, American Electric Power, Lancaster, representing coal.

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