

Ohio Geology Newsletter

SUMMER 1982

Division of Geological Survey

OIL AND GAS IN OHIO

HISTORY OF DRILLING IN OHIO

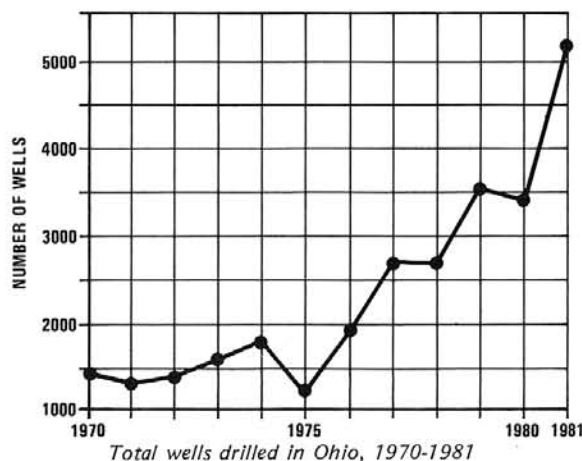
The first record of oil being discovered in Ohio dates from 1814, when two pioneers searching for salt decided to drill a brine well near the village of South Olive in Noble County in southeastern Ohio (see accompanying location map). At a depth of 475 feet, oil instead of brine filled the hole. Dismayed but imaginative, the men attempted to sell the oil as lamp fuel, but its offensive odor made it unattractive for this use. Later they bottled and sold the oil for its "medicinal" properties as "Seneca" oil.

The first recorded gas well in the state was drilled in 1836 near Findlay in northwestern Ohio. Natural gas was used as early as 1838 to heat homes in that community.

Commercial drilling for oil and gas in Ohio began soon after the discovery of oil in the Drake well near Titusville, Pennsylvania, in 1859. Oil fever spread rapidly to surrounding localities and two areas of eastern Ohio became active centers of development. The Mecca Pool in Trumbull County in northeastern Ohio was discovered in the early months of 1860. Oil production was from the Lower Mississippian Berea Sandstone at depths of about 50 feet. Few records remain from this extensive shallow drilling, but it is estimated that 2,500 wells were drilled within the confines of this pool. The Mecca Pool was the first of many Berea Sandstone fields developed in eastern Ohio.



Locations of historical drilling sites in Ohio



Later in the year 1860 oil was discovered at shallow depths near Macksburg in Washington County in southeastern Ohio. Production was from shallow Pennsylvanian sandstones such as the Macksburg and Cow Run. Oil and gas development of shallow sandstones has been extensive over the years and the trend still continues in a small way today.

Development of oil and gas in northwestern Ohio resulted in perhaps the world's largest active field during the late 1800's. The production was from the Middle Ordovician Trenton Limestone in the Lima-Indiana Field. The first commercial well to produce from the field was drilled in 1884 in the town of Findlay. The well struck gas in the Trenton Limestone at a depth of 1,092 feet and produced an estimated 200 MCFGD (thousand cubic feet of gas per day). The Findlay gas discovery was followed in 1885 by the discovery of oil in a nearby well. The success of these wells created a boom era during which an estimated 70,000 wells were drilled in northwestern Ohio. The peak year for oil production in the Ohio portion of the field was 1896, with 20,000,000 barrels. Production declined rapidly after that date. Total estimated production from the field was 375,000,000 barrels of oil.

The success of the Trenton drilling led to a wildcatting spree in southwestern and central Ohio. The town of Lancaster in Fairfield County was one of the localities where a Trenton wildcat was scheduled to be drilled. In February 1887 gas was found in Lower Silurian rocks at a depth of 1,957 feet, with initial production estimated at 75 MCFGD. The new producing unit was incorrectly named the "Clinton" sandstone. Commercial quantities of oil were later discovered in this unit in 1907. Between 1907 and 1930 large "Clinton" oil and gas fields were developed in central Ohio and the "Clinton" sandstone replaced the Trenton Limestone as the principal producing formation in the state.

continued on next page



Ohio Department of Natural Resources

James A. Rhodes, Governor • Robert W. Teater, Director • Horace R. Collins, Chief

by Horace R. Collins

The Ohio coal industry has, no pun intended, been taking its lumps for the past several years. The state set an all-time production record in 1970 when 55.1 million tons of coal were mined. Since 1970 the marketability of Ohio coal has steadily deteriorated. Preliminary figures for 1981 indicate production of only 36.8 million tons. This decline in production can largely be attributed to the fact that Ohio coal is high in sulfur and often cannot meet federal SO₂ emission standards. Ohio is the largest consumer of coal in the nation, and while consumption of coal in the state has not dropped to any significant degree, production of native coal continues to plummet. The 18 million tons of coal lost to the market between 1970 and 1981 is being replaced by more expensive low-sulfur coal from adjoining and western states.

The seriousness of this decline in the use of Ohio coal should not be taken lightly. For each million-ton decline in production 300 to 400 miners become unemployed. Many other people in supporting industries also are forced into the ranks of the unemployed. Schools and local governments that look to coal as a source of tax dollars similarly feel the impact of a loss of revenues.

There is a very great danger in assuming that somehow this segment of the economy will suddenly snap back and things will be better once the general economy turns up. Under present business, economic, and environmental conditions much of Ohio's coal industry has been severely damaged, the end of the decline is not yet in sight, and recovery will be long term at best. For example, most coal contracts are on a long-term basis to provide the minimum price per Btu received. For this reason coal contracts tend to stabilize into long-term business relationships. Once a market is lost it is extremely difficult to regain.

Even with new coal-burning technology it will take years to recover from the present slump. There is little, however, in the area of technology to give much optimism for an early breakthrough. Coal washing will help but only to a degree, totally new technology such as fluidized-bed combustion is essentially untested, stack-gas scrubbers are extremely expensive and not very reliable, and coal exporting holds little hope because high-sulfur coal is just as difficult to sell overseas as it is in the United States. So what is the answer for Ohio coal? Frankly there is no easy answer. Research into improved coal utilization, coal desulfurization, more efficient combustion methods, and new uses for coal will help but these are, unfortunately, long-term solutions. The fact is that unless there is some change in standards to allow the burning of these coals the depression in the Ohio coal industry will be with us for many many years.

continued from page 1

The successes of the Berea, Trenton, and "Clinton" wells led to intensive exploration in all parts of Ohio, but the most important producing zones had already been discovered by 1887, the year of the Lancaster well. Since the early 1900's the Ohio oil and gas industry has been based primarily upon the ongoing development of "Clinton" and Berea fields in eastern Ohio.

OHIO GEOLOGY

A newsletter published quarterly by the Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Columbus, Ohio 43224.

Editor: Michael C. Hansen
Assistant editor: Karen J. Van Buskirk
Secretary: Donna M. Swartz
Layout and design: Philip J. Celnar
Phototypist: Jean M. Leshner

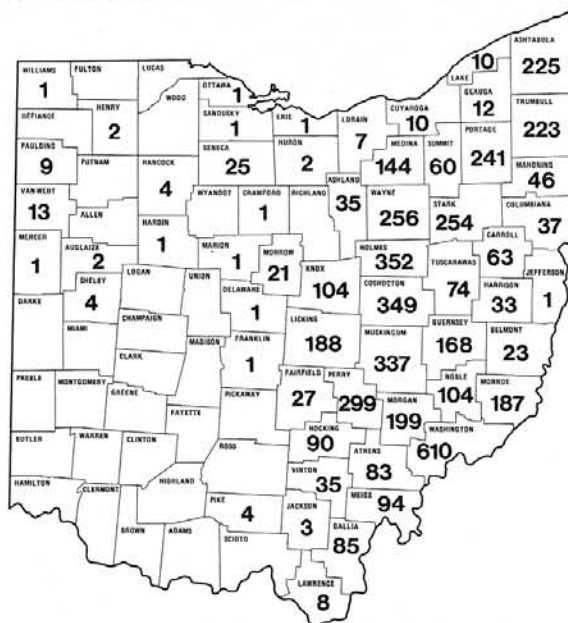
News items, notices of meetings, etc. should be addressed to the attention of the editor. Change of address and new subscriptions should be addressed to the attention of the secretary.

There have been a few exceptions to this trend. The most significant of these was the "central Ohio boom" from 1961 to 1965. A wildcat venture drilled in Morrow County resulted in a major discovery in the Cambrian-Ordovician "Trempealeau" dolomite. The well was completed in porous dolomite and produced 400 BOPD (barrels of oil per day). The discovery well set off a drilling spree in central Ohio during which Cambrian wells were drilled in 37 other counties. With rare exception production outside the original Morrow County field has been small.

Since 1860 oil or gas has been discovered in 69 of Ohio's 88 counties. More than 200,000 wells have been drilled and approximately 43,000 are still active. Production has been obtained from 33 different formations at depths ranging from 50 feet to 8,500 feet. Ohio has produced more than 870 million barrels of oil and in excess of 4.6 billion MCF (thousand cubic feet) of natural gas.

SUMMARY OF 1981 DRILLING

A total of 5,172 well completions were processed by the



Number of completions in Ohio in 1981, by county.

Division of Geological Survey in 1981, establishing a modern-day record. This is a 50 percent increase over the 1980 total and represents the continuation of a drilling boom which started with the natural gas shortages of 1976 (see accompanying graph). Only 416 of the 5,172 completions were reported as dry holes, making the success ratio 92 percent.

New wells were drilled in 58 of Ohio's 88 counties, with the bulk of the activity in the eastern half of the state (see completions map). Ten counties had more than 200 completions each during 1981. Washington County in southeastern Ohio had the highest total, with 610 completions, or nearly 12 percent of wells drilled in Ohio.

The tables below list oil and gas production and values for 1979, 1980, and 1981, and 1981 drilling by producing zone. The production figures were compiled by Theodore A. DeBrosse of the ODNR, Division of Oil and Gas.

OIL AND GAS PRODUCTION IN OHIO, 1979-1981

	barrels	thousand cubic feet	dollar value	average price/ barrel or thousand cubic feet
Oil production 1981	13,551,354		\$489,048,852	\$36.09
Oil production 1980	12,927,837		\$468,315,913	\$36.23
Oil production 1979	11,952,595		\$269,129,084	\$22.51
Gas production 1981		141,134,310	\$302,398,508	\$2.14
Gas production 1980		138,856,176	\$269,102,307	\$1.94
Gas production 1979		124,665,234	\$222,824,090	\$1.79

SUMMARY OF NEW WELLS IN 1981, BY PRODUCING ZONE

	number of wells	percentage of total
"Clinton" sandstone (Silurian)	3,632	70
Ohio Shale-"Gordon" sandstone (Devonian)	748	15
Berea Sandstone (Mississippian)	599	12
Trenton Limestone (Ordovician)	60	1
Knox Dolomite (Cambrian-Ordovician)	51	1
Others	82	1
Total	5,172	100

SUMMARY OF PRODUCING ZONES

"Clinton" sandstone

The primary objective of 1981 drilling was the "Clinton" sandstone, with a total of 3,632 wells. These wells account for 70 percent of all new wells drilled in Ohio, making the "Clinton" by far the most important source of oil and gas in Ohio, as it has been for almost 80 years.

The term "Clinton" sandstone is a drillers' name referring to a sequence of lower Silurian rocks. The term is a misnomer and these rocks actually correlate with the Medina Group of New York and Pennsylvania. However, the name "Clinton" sandstone has been used in Ohio for nearly 100 years and it is not likely to be corrected.

The "Clinton" interval consists of a series of interbedded sandstones, siltstones, and shales which were deposited under shallow marine and deltaic conditions. This sequence is generally found in eastern Ohio at depths ranging from 3,000 to 5,000 feet. These rocks increase in thickness from about 100 feet in central Ohio to 200 feet in eastern Ohio and are

characterized by considerable lateral variation in rock type.

Initial development of "Clinton" fields was along the western sandstone boundary, where producing zones were shallowest and porosities were highest. Since the early 1900's the "Clinton" drilling activity has moved progressively eastward with deeper searching for porous zones. The search has been aided greatly by the advent of hydrofracture stimulation techniques, which have extended the areas of producing potential in many places. The approximate eastern boundary of "Clinton" drilling is shown on the map of the most active drilling areas. The few wells that have been drilled east of this line have been uneconomical.



Areas of most active drilling, 1981

On May 30, 1981, the Federal Energy Regulatory Commission approved a tight gas sand (a sand of low porosity and permeability) designation for the "Clinton" in most of eastern Ohio (see tight-sand map). The higher ceiling prices



Areas where "Clinton" and "Second Berea" are designated as tight-sand formations.

allowed under Natural Gas Policy Act Section 107 were the main incentive for the dramatic increase in drilling last year. The drilling was centered in east-central Ohio in a band extending from Perry County on the south to Ashtabula and Trumbull Counties on the north. Most of the counties in this band had more than 200 completions during 1981. "Clinton" drilling was mainly developmental and extensional in nature with the general trend moving eastward and downdip from known production. New fields were opened in eastern Trumbull and Ashtabula Counties.

Ohio Shale-"Gordon" sandstone

The second most actively drilled zone in 1981 was the Ohio Shale, which includes the "Gordon" sandstone. A total of 748 Ohio Shale-"Gordon" sandstone wells were drilled, accounting for about 15 percent of the new completions. This is a 170 percent increase over the number reported in 1980. This large increase is due mainly to deregulation of Devonian shale gas in April 1980 and the establishment of a good pipeline system in southeastern Ohio to gather the gas.

The Devonian Ohio Shale underlies all of eastern Ohio and increases in thickness from about 400 feet along the outcrop in central Ohio to over 4,000 feet in southeastern Ohio. Major gas accumulations within the Ohio Shale are thought to occur within closely spaced fracture systems and in scattered siltstone lenses. These siltstone lenses occur in the upper part of the Devonian shale sequence and are referred to as the "Gordon" sandstone by Ohio drillers. These siltstone lenses may reach 50 feet in thickness. Production is believed to be greatly enhanced by the natural fractures within the siltstone and surrounding shales. It is likely that in many "Gordon" wells production is actually coming from fractured shale.

Almost all the Ohio Shale-"Gordon" drilling activity was concentrated in Washington, Monroe, Noble, and Belmont Counties in southeastern Ohio. Since 1979 this has been the hottest drilling area in the state because of this shallow (less than 4,000 feet) production from Devonian rocks.

Berea Sandstone

The third most actively drilled formation in 1981 was the Berea Sandstone. A total of 599 Berea wells were drilled, accounting for 12 percent of the new well completions.

The Lower Mississippian Berea Sandstone has two major modes of development. A lower "channel" sandstone cuts into underlying Bedford shales and locally may reach more than 200 feet in thickness. An upper "blanket" sandstone is thinner (20-40 feet) but more widespread, covering nearly all of eastern Ohio.

The Berea generally ranges from fine- to coarse-grained sandstone but may also be quite silty in places. Thickness ranges widely, from 5 to 235 feet depending upon the presence or absence of the thick, massive lower unit.

During 1981 the most active drilling for the Berea was in southeastern Ohio in Washington, Morgan, Meigs, Gallia, and Athens Counties. More than 60 completions were recorded in each of these counties.

On May 7, 1982, an application for tight sand classification was approved by the Federal Energy Regulatory Commission for that area of southeastern Ohio (see tight-sand map) underlain by the so-called "Second Berea" sandstone, which lies beneath the true or "First Berea" sandstone. The "Second Berea" sand body is about 95 miles long and 3 to 15 miles wide. Thickness of the sand averages about 20 feet.

Trenton Limestone

A total of 60 wells were drilled to the Trenton Limestone during 1981 and almost all of these were in northwestern Ohio near the old Lima-Indiana Field.

The Middle Ordovician Trenton is composed primarily of fossiliferous limestone. The upper part of the formation has been locally dolomitized, creating the porosity necessary for a hydrocarbon reservoir. Thickness of the formation ranges from 60 to 300 feet, but virtually all of the production has come from the upper 50 feet. Depth to the pay zone is generally less than 1,300 feet. The boundaries of the productive zone are determined largely by the change from porous dolomite to dense limestone.

The Trenton producing area in Ohio was outlined for the most part before 1900 and has expanded very little since. However, drilling continues in northwestern Ohio with the hope of extending this once prolific field. Most of the Trenton wells drilled during 1981 were dry holes.

Knox Dolomite

During 1981, 51 wells were drilled to the Cambrian-Ordovician Knox Dolomite. Sandstone is present at several stratigraphic positions in the dolomite, but only the Rose Run sandstone is widespread. In eastern Ohio the Rose Run divides the Knox into two dolomite units; the informal usage in Ohio is to call the lower one the "Trempealeau" or "Copper Ridge" dolomite, and the upper one the "Beekmantown" dolomite. If the Rose Run sandstone is not present, the Knox Dolomite cannot be subdivided with certainty.

There were two centers of Knox drilling in 1981. One was in Morrow County, where 20 wells were drilled to the "Trempealeau" dolomite. Two "Trempealeau" discovery wells were also completed in Knox County just east of the established Morrow County fields. The "Trempealeau" dolomite in Ohio has produced an estimated 36,000,000 barrels of oil and almost all of it has been from the pools in Morrow County.

The other center of Knox production was in eastern Coshocton County, where 17 Rose Run wells were drilled. The pay zone is a poorly consolidated, fine-grained sandstone with a thickness of about 70 feet. The production status of most of the Rose Run wells was not reported, but some of the better wells in this area average 700 MCFGD.

FUTURE OUTLOOK

The drilling boom that Ohio has experienced for the last six years has started to level off during 1982. Permitting activity for the first few months of 1982 is still brisk but is below the pace of 1981, when the ODNR, Division of Oil and Gas issued 12,683 permits. Another sign of the slowdown is the drop in the rotary rig count. The number of rotary rigs operating in Ohio reached a high of 108 during the summer of 1981 but has dropped to as low as 22 in April 1982. This can be partly attributed to seasonal factors, but the magnitude of the drop undoubtedly points to a leveling off or a decline in drilling activity.

Weak market conditions which have created excess supplies of oil and gas are obviously responsible for the reduced drilling activity. Early in 1982 the major gas purchaser in Ohio, Columbia Gas Transmission Corporation, announced a curtailment of their Appalachian purchases for the equivalent of 90 days between April 1 and November 1, 1982. This was necessary to reduce an excess supply of 230 billion cubic feet of gas. Columbia indicated that they may

have a deliverability surplus possibly through 1986 and that summer reductions of gas purchases may be necessary for the next few years. Pennzoil Products Company also announced recently that they would stop purchasing crude from new wells in the Ohio Oil Gathering System until further notice. This excess supply situation will hold down drilling through the rest of 1982.

Drilling to the "Clinton" sandstone will again dominate the oil and gas picture. The higher prices resulting from the tight sand classifications for the formation provide the incentive for continued drilling. Most of the "Clinton" activity will be developmental, but some deeper exploratory tests are scheduled in eastern Ohio.

Drilling to the Ohio Shale—"Gordon" sandstone also will continue to be significant during 1982. The shallowness of the pay zones combined with the price incentive provided by deregulation of Devonian shale gas makes them very attractive targets. Similarly, the price incentives resulting from the Federal Energy Regulatory Commission's designation of the "Second Berea" sandstone as a tight sand and its shallow depth will spark heavy drilling in southeastern Ohio.

Exploratory drilling to the Cambrian and Ordovician zones was disappointing in 1981, with most tests being dry holes. However, these zones remain largely unexplored and they still hold the highest potential for undiscovered oil and gas reserves in Ohio. If the economic climate is favorable, Cambrian and Ordovician zones will continue to be tested in 1982.

—John D. Gray
Head, Subsurface Geology Section

VIBRATORY CORING RIG FOR LAKE ERIE

One of the newest pieces of equipment acquired by the Lake Erie Section is a vibratory coring rig, which was built for us locally. This simple, lightweight, inexpensive pneumatic coring device is capable of taking 10-foot cores and was jointly developed and tested in Lake Erie by the U.S. Army Corps of Engineers, Coastal Engineering Research Center and the Survey. The rig drives into the lake bottom a core tube which can be retrieved with the enclosed sediment. There are several advantages to this particular vibratory corer: (1) it can be deployed easily by three people from our 48-foot research vessel, the *GS-1*, (2) it uses inexpensive 2-inch PVC pipe as a core tube and liner, and (3) it can be used in a variety of water depths with limits being defined by the support equipment rather than the corer.



Vibratory coring rig being recovered over the stern of the *GS-1*

The 150-pound coring apparatus is designed around a commercial piston vibrator, has a custom-made aluminum frame which is 4 feet square and 10 feet tall, and requires the support of a 25-cfm air compressor. Because the corer is connected to the boat only by flexible air hoses and a lifting cable, absolute stability of the *GS-1* is not required.

In operation the frame is lowered to the lake bottom by cable. After the frame is on the bottom the vibrator is started by turning on the air supply from the compressor, and the core tube is driven by vibration into the sediment. Coring is completed in about 15 minutes, after which the frame is retrieved and the sediment-filled core tube is removed, labeled, capped, and readied for storage.

In the laboratory the core tubes are split to expose a continuous sediment record from the cored interval. The exposed sediments are described and photographed and samples are collected for future analysis. The cores provide information on the nature, distribution, and geometry of the lake deposits. This information is used to map Lake Erie's subbottom sediments, increase our knowledge of the post-glacial history of the lake basin, provide background data for studies of lakeshore processes, and help evaluate the commercial sand and gravel deposits on the lake bottom.

The coring rig was used in the summer of 1981 in two projects: (1) an investigation of the quantity and character of the sand trapped by the major harbor structures along the Ohio shore, and (2) mapping of the subbottom sediment distribution between Marblehead and Lorain from the Ohio shore to the international boundary. Cores were taken on a 4-mile sampling grid.

The maximum length of sediment core which has been taken with the present system is 10 feet, although with planned future modifications longer cores may be retrievable. Even with the present 10-foot limitation, these continuous sediment cores give a much more complete picture of past events and a more accurate representation of materials than the jetting technique in use before the vibratory coring rig was available.

More specific information on the coring frame will be published in the June 1982 *Journal of Sedimentary Petrology*, and detailed construction plans can be obtained from the Lake Erie Section office in Sandusky.

—Jonathan Fuller
Lake Erie Section

EFFECTS OF SHORE-PROTECTION STRUCTURES ON RESSION RATES OF THE LAKE ERIE SHORE

A recent paper in *Environmental Geology* (1981, v. 3, p. 353-362) by Survey geologists Charles H. Carter, D. Joe Benson (now at the University of Alabama), and Donald E. Guy, Jr. summarized nearly a century of data collection on shoreline recession rates, lake levels, beach widths, and shore-protection structures on the Ohio shore of Lake Erie. They found that significant decreases in recession rates in the period 1876-1973 are directly related to a marked increase in shore-protection structures—60 structures covering 2 percent of the shoreline in 1876 to about 3,600 structures covering 25 percent of the shoreline in the early 1970's. The decrease in recession rates occurred despite higher lake levels in the 1950's and early 1970's, a factor that is correlated with accelerated shoreline recession.

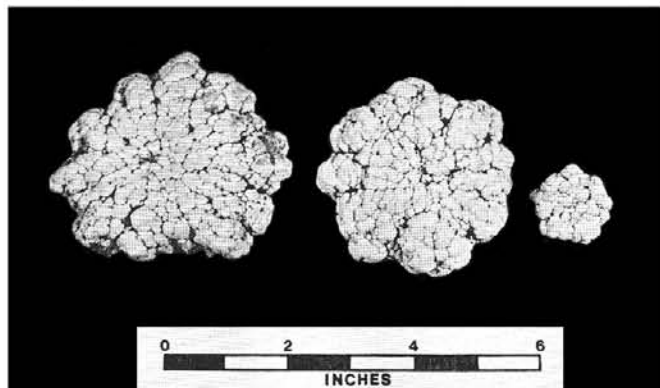
Beaches, which are natural shore-protection structures, have decreased in both width and length throughout the

study years. The length of shoreline occupied by wide (greater than 50 feet) beaches decreased by about 17 miles from 1876 to 1968. This decrease in both width and length of the beaches is related to the decrease in the rate of recession of the shore. Decreased shore erosion limits the amount of sand fed into the system, and, to some degree, the trapping of sand by groins and other protective structures further decreases the amount of available sand for natural beach construction.

Carter, Benson, and Guy predict that increased structural protection, with consequent reduction of recession rates, will result in beaches becoming both narrower and less continuous. Because beaches have considerable esthetic and recreational value and act as natural protective structures, it will be necessary to augment decreased sand supplies by artificial beach nourishment. Adequate deposits of sand for this purpose are located offshore from Fairport Harbor and the Lorain-Vermilion area. The principal constraint to artificial beach nourishment will probably be economic.

NEW OHIO MINERAL FOUND IN COSHOCTON COUNTY

Ohio is not known as a state with a great variety of native minerals and the discovery of a new mineral for the state, especially in hand-specimen-size nodules, is cause for some excitement. Such a discovery occurred last fall when Rick Ruegsegger, ODNR, Division of Reclamation, brought to the Survey offices some unusual green, chalky nodules he collected from a strip mine in Jackson Township, Coshocton County.



Nodules of diadochite.

X-ray diffraction analysis revealed the nodules to be composed entirely of the mineral diadochite [$\text{Fe}_2(\text{PO}_4)(\text{SO}_4)(\text{OH}) \cdot 5\text{H}_2\text{O}$], a mineral never reported from Ohio. Previously reported occurrences of diadochite have generally been from the western United States and Europe.

The diadochite occurs as very fine grained, disc-shaped, pale-greenish-yellow nodules with diameters ranging in size from 0.6 to 4.7 inches (1.5 to 10.5 cm). The diadochite is believed to have formed as a secondary mineral in the Columbiana shale, which directly overlies the stripped coal (Lower Kittanning No. 5) at this locality. This speculative origin is based on the abundance of nodules in the shale spoil, the presence of identical shale in crevices of the nodules, and the occurrence of other secondary hydrated sulfate minerals within individual shale-spoil fragments.

The geologic conditions which existed in Coshocton County during the development of the diadochite nodules are not believed to be unique, and other diadochite occurrences



Diadochite occurrence in Jackson Township, Coshocton Co.

in the coal fields of eastern Ohio will probably be found. A report on the diadochite occurrence was given by Survey geologists Dennis N. Hull and Michael C. Hansen in April at the Ohio Academy of Science meeting.

—Dennis N. Hull
Regional Geology Section

KELLEYS ISLAND NATURAL HISTORY WORKSHOP

The ODNR Division of Parks and Recreation is sponsoring a workshop on the natural history of the Lake Erie islands on September 18 and 19, 1982. The workshop will be held on Kelleys Island, where the geology of the famous glacial grooves will be one focus of the weekend. Among the leaders will be Dr. Jane Forsyth, an expert on the glacial history of Ohio. Other topics will include the flora and fauna of the island. The registration fee of \$10.00 includes one round-trip ferry fare from Marblehead. Contact the Division of Parks and Recreation, Bldg. C, Fountain Square, Columbus, Ohio 43224 for more information and registration forms.

SURVEY STAFF CHANGES

COMINGS

Leo Gentile, Environmental Technician, Subsurface Geology Section.

AND GOINGS

Charles H. Carter, Head, Lake Erie Section, to Associate Professor, University of Akron.

Leo Gentile, Environmental Technician, Subsurface Geology Section, to graduate student, Oklahoma State University, Stillwater.

Mary P. Lee, Cartographer, Technical Publications Section, to Mt. Zion, Illinois.

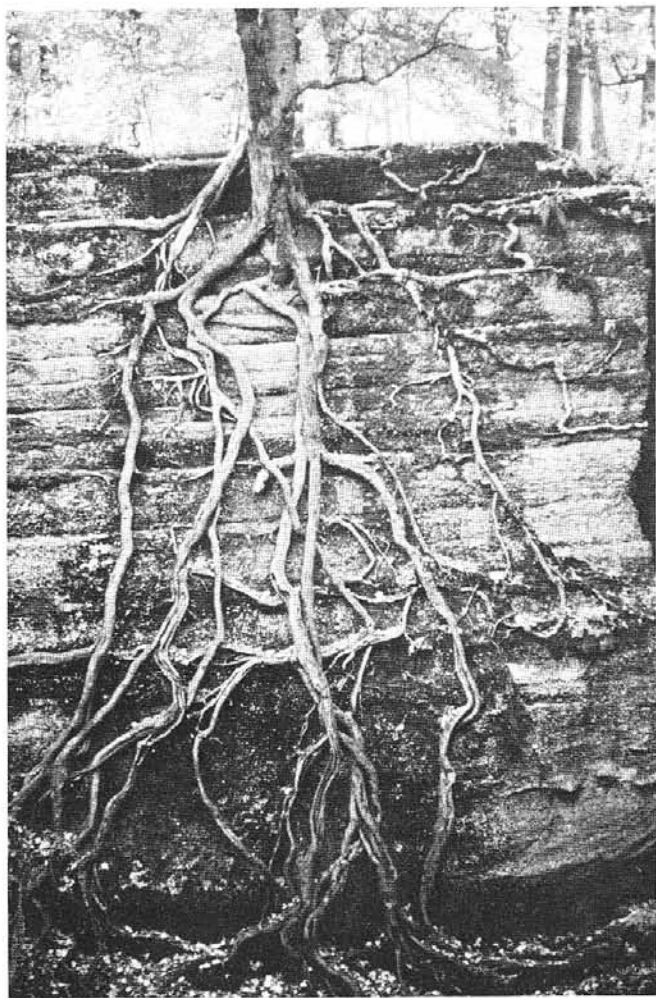
Adam Turk, Cartographer, Technical Publications Section, to photogrammetry instructor, Khartoum, Sudan.

Karen Van Buskirk, Publications Specialist, Technical Publications Section, to missionary, Lae, Papua New Guinea.

THE 1982 OHIO GEOLOGY SLIDE CONTEST

The winners of the 1982 Ohio Geology Slide Contest are

- 1st Place—George A. Bell of Zanesville,
- 2nd Place—Patrick Pringle of Akron,
- 3rd Place—Daniel Province of Columbus,
- 4th Place—John L. Lamb of Columbus,
- 5th Place—David H. Hickcox of Delaware.



Winning entry. Sharon Sandstone, Nelson-Kennedy Ledges.

Four other contestants received Honorable Mention for their entries. They are Sam Leber of South Euclid, Robert Fridenstine of Columbus, Janet Province of Columbus, and Horton H. Hobbs III of Springfield.

A panel of three judges selected the winning entries based on the geological interest and the artistic merit of the slides. The judges were Dr. Stig Bergström, geology professor at Ohio State University, Al Staffan, noted nature photographer and artist for ODNR, and Phil Celnar, Head of the Technical Publications Section for the Division of Geological Survey.

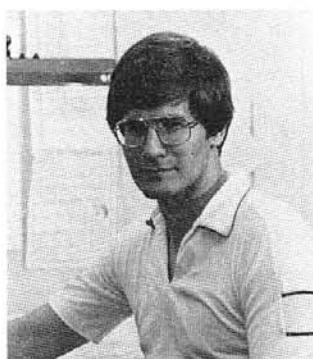
Enlargements of the slides will be displayed at the 1982 Ohio State Fair and awards will be presented there on August 14, 1982. The winning slides include such diverse subjects as microminerals, reclaimed strip mines, erosion patterns, glacial grooves, and Ohio caves. We heartily thank all the contestants for their participation.

Historical vignettes



Bremen field, Rush Creek Township, Fairfield County, Ohio. This was the first important "Clinton" field in Ohio. Photo by J. A. Bownocker, 1909.

SURVEY STAFF NOTES



Garry Yates



Karen Van Buskirk

Garry Yates is an Environmental Technician in the Subsurface Geology Section. A native of New Zealand, Garry grew up in the resort town of Taupo on the North Island. Following studies in geology at the New Zealand Technical Institute and work as a geological technician at the University of Waikato, Garry played with a New Zealand rugby team on a tour in Hawaii. He stayed on in the U.S., where he met and married his wife, Myra. Garry started work at the Division of Geological Survey in 1976, helping with public inquiries and updating maps of oil and gas development in Ohio. A special interest of his is reconstructing the paleogeography of Ohio from subsurface geologic information. Garry, his wife, and their children, Kristen (11), and Sean (4), recently moved into a new house in Gahanna. Garry reports that he likes to spend his spare time there, getting the new house in order.

Karen Van Buskirk is a Publications Specialist in the Technical Publications Section of the Survey. Karen is responsible for researching and writing news releases and articles on Survey publications, activities, and services to the public. Karen also assists in writing and organizing the Survey's newsletter, *Ohio Geology*. She is a native of Michigan, where she earned a B.A. degree in Geography from the University of Michigan, and has completed course work for an M.A. degree in Geography at the University of Minnesota. Karen is an avid rock hound, and she and her husband, Christian, enjoy rock and fossil hunting, hiking, backpacking, and camping. In August 1982 Karen and her husband, who is a Lutheran seminary student, will travel to Papua New Guinea to serve a year's internship as missionaries.

1981 THESES ON OHIO GEOLOGY

- Anderson, John R., 1981. The gastropod genera *Donaldina*, *Ortho-nema*, and *Streptacis* in the Pennsylvanian System of the Appalachian Basin. M.S. thesis, Bowling Green State University.
- Atha, Thomas M., 1981. A subsurface study of the Cambrian-Ordovician Rose Run Sandstone in eastern Ohio. M.S. thesis, Ohio University.
- Bartman, R. C., 1981. A paleomagnetic study of Pennsylvanian coals in eastern and southern Ohio. M.S. thesis, Ohio State University.
- Bebel, Dennis, 1981. Depositional environments of the Lower Pottsville Group (Pennsylvanian) in Jackson County, Ohio. M.S. thesis, Ohio University.
- Dice, Mark A., 1981. Computer analysis and synthesis of the stratigraphy and petroleum geology of the Upper Cambrian strata of Morrow County, Ohio. M.S. thesis, Kent State University.
- Dunkin, Joyce S., 1981. Autofluorescence of liptinite macerals from selected Ohio coals. M.S. thesis, University of Toledo.
- Eddy, G. E., 1981. Paleontology and paleoecology of the Ames limestone in western Pennsylvania, northern West Virginia, and eastern Ohio. M.S. thesis, Waynesburg College, Waynesburg, Pennsylvania.
- Hay, Helen B., 1981. Lithofacies and formations of the Cincinnati Series (Upper Ordovician), southeastern Indiana and southwestern Ohio. Ph.D. dissertation, Miami University.
- Herringshaw, Dennis C., 1981. Occurrence of germanium in the Lower Kittanning No. 5 coal of Ohio. M.S. thesis, University of Toledo.
- Hinterlong, Gregory Dale, 1981. Paleogeologic succession in the Corryville Member (McMillan Formation, Upper Ordovician), Stonelick Creek, Clermont County, Ohio. M.S. thesis, Miami University.
- King, James M., 1981. Ground water resources of Williams County, Ohio. M.S. thesis, University of Toledo.
- Klotz, Jack, 1981. Nature and origin of the Maumee River terraces, northwestern Ohio. M.S. thesis, Bowling Green State University.
- Marrs, Thomas, 1981. Lithologic characteristics and depositional environments of the nonmarine Benwood limestone (Upper Pennsylvanian) in the Dunkard Basin, Ohio, Pennsylvania, West Virginia. M.S. thesis, University of Pittsburgh.
- Mavris, George, 1981. Petrology of the lithofacies of an upper deltaic plain (Allegheny Group, Middle Pennsylvanian) near Ironton, Ohio and Ashland, Kentucky. M.S. thesis, Miami University.
- Mele, Thomas, 1981. The occurrence of hydrocarbons in the Berea Sandstone in southeastern Ohio. M.S. thesis, Ohio University.
- Obot, V. E. D., 1981. Ground-level magnetic study of Greene County, Ohio. M.S. thesis, Wright State University.
- Parks, Sandra M., 1981. Effects of high water stages of the Miami River on the groundwater levels of the Dayton aquifer. M.S. thesis, Wright State University.
- Paska, Michael A., 1981. Petroleum geology of the Early Silurian Albion Group in Morgan, Athens, Hocking and Vinton Counties, Ohio. M.S. thesis, Ohio University.
- Paulson, James D., 1981. Groundwater resources of Wood County, Ohio. M.S. thesis, University of Toledo.
- Peterson, Joseph D., 1981. Depositional systems associated with the Pittsburgh No. 8 coal seam in the Upper Pennsylvanian of southeastern Ohio. M.S. thesis, Ohio University.
- Riggle, Mark R., 1981. An environmental geologic study of Wright State University. M.S. thesis, Wright State University.
- Santini, Ronald J., 1981. Stratigraphy and petroleum geology of the "Newburg" porous carbonate zone of the Lockport Group (Middle Silurian) in the subsurface of Summit County, northeast Ohio. M.S. thesis, Kent State University.
- Staursky, Geoffrey N., 1981. The petrology of selected limestone beds of the Bull Fork Formation (Cincinnati Series), Caesar Creek Lake spillway, Warren County, Ohio. M.S. thesis, Miami University.
- Stump, Dennis G., 1981. The characterization and identification of sodium compounds in coal ash from a catalytic gasification process. M.S. thesis, University of Toledo.
- Whitacre, Timothy P., 1981. Characterization of selected Ohio coals to predict their conversion behavior relative to 104 North American coals. M.S. thesis, University of Toledo.
- Zaef, Gene D., 1981. The occurrence and distribution of minerals within the Pittsburgh No. 8 coal in southeastern Ohio. M.S. thesis, University of Toledo.
- Tomassetti, John A., 1981. Geology of Lockport (Silurian) rocks at the Ohio Lime Company quarry, Woodville, Ohio: M.S. thesis, Bowling Green State University.

Ohio Department of Natural Resources
Division of Geological Survey
Fountain Square, Building B
Columbus, Ohio 43224



BULK RATE
U.S. POSTAGE
PAID
Columbus, OH
Permit No. 537