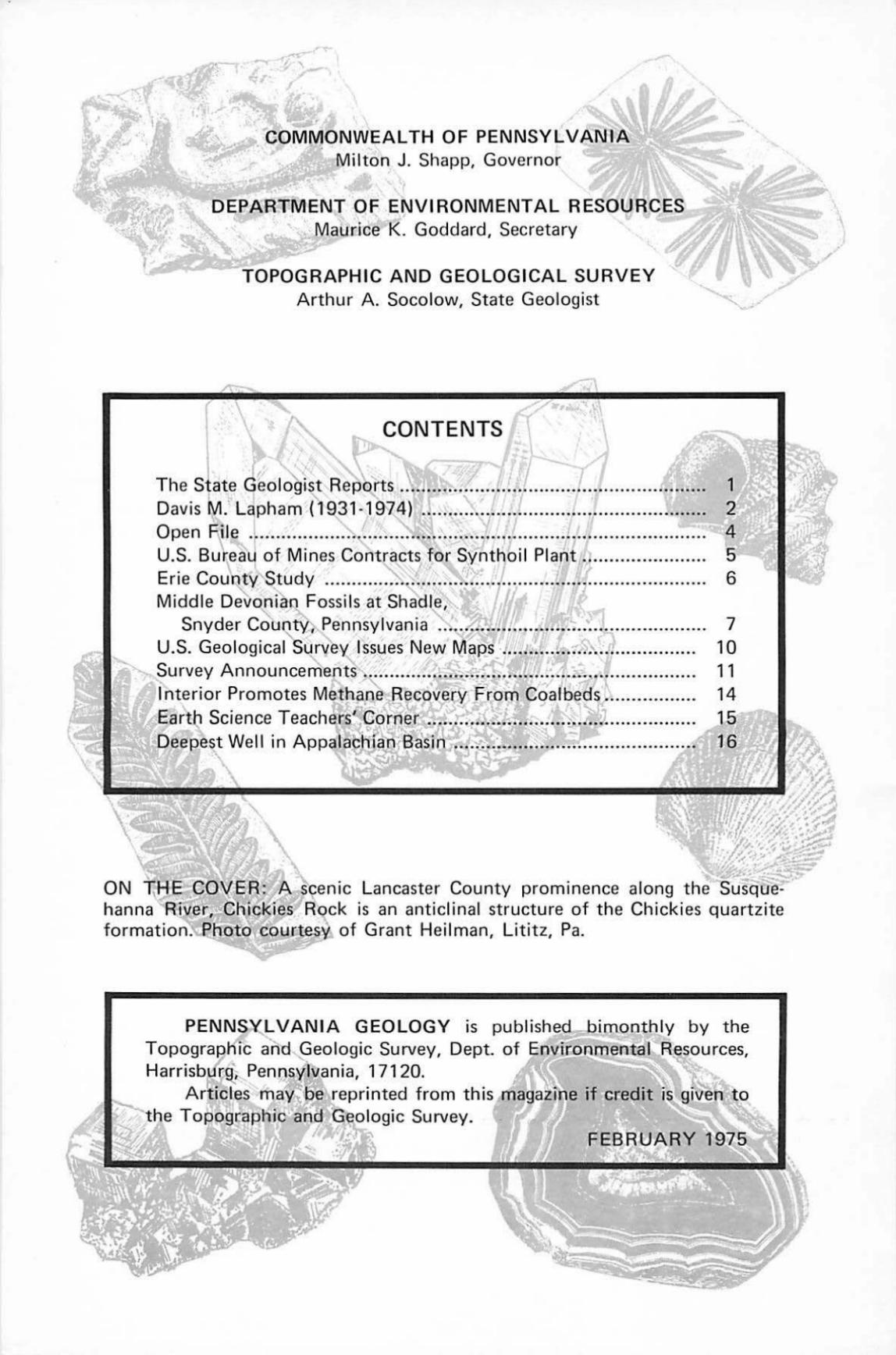


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THE PENNSYLVANIA GEOLOGICAL SURVEY

VOL. 6/1



COMMONWEALTH OF PENNSYLVANIA

Milton J. Shapp, Governor

DEPARTMENT OF ENVIRONMENTAL RESOURCES

Maurice K. Goddard, Secretary

TOPOGRAPHIC AND GEOLOGICAL SURVEY

Arthur A. Socolow, State Geologist

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ON THE COVER: A scenic Lancaster County prominence along the Susquehanna River. Chickies Rock is an anticlinal structure of the Chickies quartzite formation. Photo courtesy of Grant Heilman, Lititz, Pa.

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FEBRUARY 1975

FROM THE DESK
OF THE
STATE GEOLOGIST . . .



OUR STAKE IN THE ATLANTIC

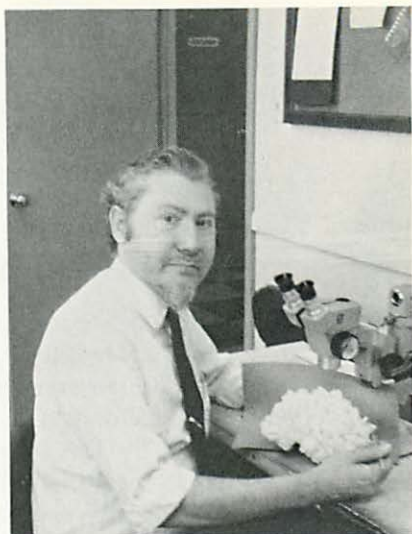
Pennsylvania has been participating in deliberations on the technical and environmental feasibility of developing oil and gas resources off the Atlantic Coast, an area referred to as the Outer Continental Shelf (called OCS for short). The Commonwealth has participated in public hearings held by the Interior Department and by the President's Council on Environmental Quality (CEQ) and this writer has served on the CEQ's Advisory Committee on drilling the OCS. The meetings have been open and all sides have been heard. The CEQ has conducted comprehensive studies of environmental impacts, including not only concerns over protecting the quality of the ocean, but also raising the question of economic and social impacts on the land if offshore production were to occur. It is in these latter categories that Pennsylvania has a direct stake in potential offshore production.

Should there be commercial quantities of oil and gas discovered and produced off the Atlantic Coast, (and this is still a big if, since there has been no drilling yet off the U.S. Atlantic Coast) any oil or gas which might be forthcoming would have to find a site on land where it could be processed. Inasmuch as the states directly along the seashore do not want to affect their resort environment, Pennsylvania, with its existing port and refinery capabilities along the Delaware River, could well be a recipient of much of any new offshore yields. With proper advance planning, such a development could be an economic asset to Pennsylvania and could raise the level of available energy resources.

It should be noted that in recognizing the potential benefits to Pennsylvania of offshore production, the Commonwealth has continually stressed that environmental protection and safeguards come first. Furthermore, I would note, that while preliminary geophysical data and geological interpretations suggest the existence of offshore conditions favorable to the existence of oil and gas accumulations, the actual occurrence of commercial quantities out there is at present a complete unknown; it is conceivable that it could be a flop. But it is also proper that there be exhaustive advance planning so as to be able to cope with all contingencies. To this, Pennsylvania is dedicated.

Arthur G. Locolor

DAVIS M.
LAPHAM
(1931-1974)



Mineralogy has lost an outstanding scientist, the Pennsylvania Survey has lost an esteemed colleague, and mineral amateurs have lost a guiding spirit, in the death of Davis M. Lapham on December 20, 1974.

Davis became interested in minerals in 1949 as a high school student in Glens Falls, New York. While attending an adult education course in geology and mineralogy, he became fascinated with minerals. His teacher was the well-known collector, Elmer B. Rowley, whose personality sketch was written by Davis for the *Mineralogical Record* (Vol. 2, No. 1). After majoring in geology at Middlebury College, he went on to graduate work in mineralogy at Columbia University. There, working under Professors Paul Kerr and Ralph Holmes, he received his M.A. in 1955 and Ph.D. in 1957. In 1955 he was awarded the Kunz Memorial Prize by the New York Mineralogical Club for his paper, "Epidote from Hawleyville, Connecticut," later published in the *American Mineralogist* (Vol. 42, p. 62-72). This paper, based on his Master's studies, reveals the touch of a creative scientist. Not only were the descriptive data, geology, and mineral paragenesis given exhaustive treatment, but epidote itself was investigated in depth, using optical and X-ray techniques. As an outgrowth of his doctoral thesis on chromium chlorites, Davis developed his special interest in the chlorite and serpentine minerals. He came to be regarded as a top expert in their research; cores were sent to him from the Mohole deep-sea drilling project for the study of their serpentine minerals.

In 1957 he joined the Pennsylvania Geological Survey in Harrisburg to set up a mineral research division. From these laboratories came reports on the minerals of Pennsylvania, their occurrences, geochemistry and economic geology. Mineral amateurs and mineralogical education were not forgotten. Davis made many contributions through layman-oriented publications and through services provided to individual collectors. Perhaps recalling his days with Elmer Rowley, he particularly enjoyed aiding young, aspiring collectors. He did much to effect closer ties between professional and non-professional groups. Survey Bulletin G-33, "Mineral Collecting in Pennsylvania," co-authored with Alan R. Geyer, is a model of its kind, has gone through three editions, and continues undiminished in popularity.

Davis was the author or co-author of about fifty publications. Some of his most important scientific contributions have been: investigation of Pennsylvania's minerals and their occurrences; research on chlorites, serpentines and associated minerals and rocks of Lancaster County; geology and mineralogy of the Cornwall, Pennsylvania magnetite deposit; research elucidating the structural evolution and age of serpentinites in southeastern Pennsylvania. A recent major work, co-authored with Carlyle Gray, was Bulletin M-56 (1973) of the Pennsylvania Geological Survey, "Geology and Origin of the Triassic Magnetite Deposit and Diabase at Cornwall, Pennsylvania."

Davis was dedicated to the groups and goals of amateur mineralogy. He was a founding member of Friends of Mineralogy and was extremely active in its growth and organizational development. He was chiefly responsible for FM's locality-preservation program, and he was a guiding force in the vigorous, educationally-oriented activities carried on in Pennsylvania by FM Region 3. Davis was a fellow collector and friend of many in this group. But even more, his encouragement and aid reached out to mineral amateurs and their clubs everywhere.

None of this fully pictures the man. He was slight of build, modest, a courteous gentleman of highest intellectual and moral standards; with a keen wit and twinkle in his eye, he showed a warmth and regard for others that made him the friend of all. His interest in minerals was matched only by his love of music. He remained always a deeply-dedicated scientist, a perfectionist in every job he undertook, undeviating in his search for knowledge, understanding and truth. For many years he fought a quiet, valiant fight against diabetes, which sapped his strength and finally took his life. He never gave in to it, in work or outlook. To his wife, Nancy, his daughter, Heather and his parents, we express our sympathy and sorrow.

To mineralogy, the loss of his talents and creativity is great; to us who knew him personally as a co-worker and friend it is an even greater loss.

ARTHUR MONTGOMERY

NEW PROCEDURES FOR ACCESS TO SURVEY MATERIAL

OPEN FILE

The Bureau of Topographic and Geologic Survey produces a great variety of geological information. In some instances the procedures of formal publication involve the passage of considerable time; in other cases the nature of the data does not lend itself to publication. To make this information speedily available to the public, we have occasionally announced access to the information by classifying it

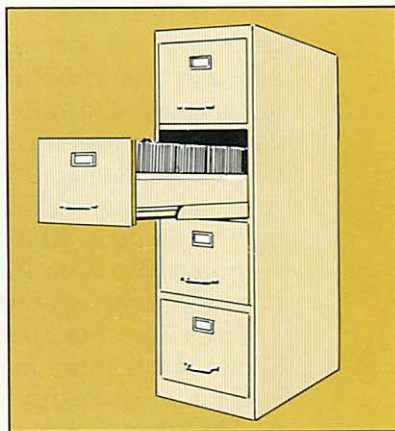
"Open File" and have announced it in our bulletin, *Pennsylvania Geology*. We have had a great deal of call on this Open File information recently, taxing our staff's capability in handling these requests. We are therefore led to the necessity of establishing a more formal procedure of defining, releasing and handling Open File information.

Open File information will henceforth be publicly announced and will consist of two major categories: (1) reports and maps received or prepared by the Bureau and intended for eventual publication but which are delayed in publication due to lack of funds, backlog of manuscripts or partial completion of a project, and (2) files of information not intended for publication, such as water well, drilling or oil and gas well records and logs, oversize cross sections, detailed stratigraphic sections, and some manuscripts. Reports intended for publication will be reviewed and edited by the Bureau to conform to our current standards before being placed on Open File.

Open File information will be announced in our bulletin, *Pennsylvania Geology*, and an up-to-date listing of open file information will be available upon written request to our offices. This listing will give a brief title, where the information is repositied, whether it is reproducible, available on microfilm, or is available for in-office inspection only, and if reproducible or microfilmed, the cost.

Copies of a report or map that can be readily copied by our staff through Xerox or whiteprinting will be made available following the policy established by the Governor's Office and Department of Environmental Resources listed below:

Ten (10) (or less) 8½ x 11 pages (including microfilm aperture cards) are to be provided the public *free of charge*. More than the ten (10) pages or cards are to be charged for at the rate of



twenty-five cents (25¢) each, including the first ten (10) copies.
For example:

10 copies of an original = no charge
11 copies of an original = \$2.75

A fifty cent (50¢) charge per copy is to be made for maps (including any diagram larger than 8½ x 14) copied on Bureau equipment.

Some charts or maps, because of their size, must be reproduced by commercial copiers and their cost and mailing will be billed directly to the purchaser by the commercial firm.

Time for searching files exceeding one-half hour is to be charged for at the rate of \$3.50 per hour.

U.S. Bureau of Mines Contracts for Synthoil Plant

(reprinted from Dec. 12, 1974 issue of COAL NEWS)

The Bureau of Mines has announced the signing of a contract with Foster-Wheeler Corp. to design a pilot plant to convert 8 tons of coal a day to about 1,000 gallons of low-sulfur oil, using the Bureau's Synthoil technology. The plant is to be erected at the Bureau's Energy Research Center in Bruceton, Pa., a suburb of Pittsburgh.

Under the \$6,928,416 contract, Foster-Wheeler will also provide engineering services for the plant and be responsible for procuring about \$4.5 million worth of equipment, which could cut as much as five months from the plant's lead time, the Bureau said.

The government expects to spend about \$14 million on the Synthoil plant, \$13 million of it coming from the Bureau and \$1 million from the Office of Coal Research. By overlapping the design and construction phases of the plant, the Bureau hopes to start shakedown runs sometime in 1976.

In the Bureau's Synthoil process, hot pulverized coal is mixed with a "carrier" oil and brought into contact with a catalyst, under pressure and turbulent flow conditions, to produce more oil.

The Bureau said the pilot plant will be tested under a variety of operating conditions to obtain design data for demonstration plants and, ultimately, a commercial plant that might convert 20,000 to 30,000 tons of coal daily to 3 or 4 million gallons of Synthoil.

Erie County Study

The Water Resources Division of the U.S. Geological Survey in cooperation with the Pennsylvania Topographic and Geologic Survey, DER, is initiating a comprehensive hydrogeologic study of Erie County, Pennsylvania. The four-year project was initiated in January 1975 by G. R. Schiner and J. T. Gallaher whose office is in Meadville, Pa.



Competition for water is increasing in Erie County because of rapid industrial and population growth. The availability of fresh ground water is severely limited in much of the area because of the occurrence of saline water at relatively shallow depths. Accurate and up-to-date geologic and hydrologic information is needed to answer immediate ground-water problems and to supply data for long-range decisions on a county-wide basis.

Some of the expected products of the investigation are listed below:

1. Maps and a text that will indicate the areal extent, thickness, water-bearing and water-quality characteristics of the bedrock units and of the glacial deposits making up beach ridges, lake plain and valley fill.
2. Maps showing the locations of fracture traces, and an explanation of their relationship to well yields.
3. A map showing the depth to the salt water.
4. A study of wells near the shoreline of Lake Erie to determine if water from the lake is entering the wells.
5. Little geologic mapping has been done in the area since the 1880's; therefore, detailed geologic maps will be compiled. The maps will aid in the search for economic deposits such as gas and oil, glass sand, and aggregate material.

The results of the Erie County study will be made available to the public through publication by the Pennsylvania Topographic and Geologic Survey, DER.

Middle Devonian Fossils

AT SHADLE, SNYDER COUNTY, PENNSYLVANIA

Shales of the Mahantango Formation (Middle Devonian) in central and eastern Pennsylvania are well known for their abundant and diverse invertebrate faunas. Several excellent localities have previously been reported by Hoskins (1969), and other sites are undoubtedly familiar to "rockhounds" and professional geologists alike. The collecting locality described here is especially noteworthy in being one of the few places in Pennsylvania where relatively complete specimens of Devonian crinoids are known to occur. Other invertebrate fossils are also extremely abundant, particularly pelecypods and brachiopods. Most of the specimens occur as external and internal molds, although original shell material is preserved in hard, unweathered portions of the rock.

The locality is situated on the east side of the Mahantango Creek Valley northeast of the junction of Pa. Route 104 and L.R. 54010 in the village of Shadle, Snyder Co. (Fig. 1) (Lat. $40^{\circ}42'15''N$, Long. $76^{\circ}59'24''W$, Dalmatia $7\frac{1}{2}$ -minute Quad., Millersburg 15-minute Quad.). For the past several years, the landowner has been actively

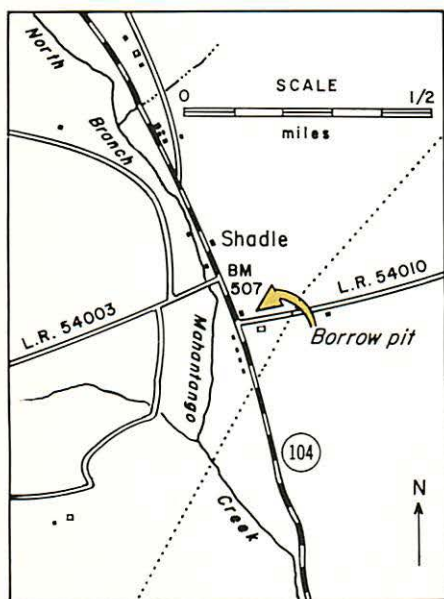


Figure 1. Location Map.

working a low ridge for borrow material and much fresh shale is continually being exposed. The best collecting is from the several large piles of rock that have been scraped up preparatory to shipment. Good material can also be found in outcropping ledges. Permission to collect should be obtained from the landowner, Mr. Marvin Haines, who resides on the property.

The beds exposed in the borrow area belong to the upper shaly unit of the Sherman Ridge Member, the uppermost member of the Mahantango Formation in central Pennsylvania. (Faill and Wells, in press; Faill and others, 1973). The predominant lithology is medium bedded, olive gray, intensely bioturbated, silty claystone that is dark gray and calcareous when unweathered. A few thin beds of fine-grained, planar bedded sandstone crop out in the upper part of the exposed section, but these are apparently barren of fossils. The most fossiliferous layers are siltstones that occur at two horizons separated by about 20 feet of less fossiliferous claystone. The lower horizon abounds in numerous species of pelecypods, brachiopods, and gastropods, whereas the upper is characterized by crinoids (both fragmented and complete) and a single brachiopod species, *Tropidoleptus carinatus* (Conrad).

The fauna of the Mahantango Formation at Shadle is extremely varied and includes bryozoans, brachiopods, gastropods, pelecypods, cephalopods, trilobites, crinoids (Fig. 2), and cricoconarids. The forms which have been identified and their relative abundance are listed below (a = abundant; c = common; unc = uncommon; r = rare):

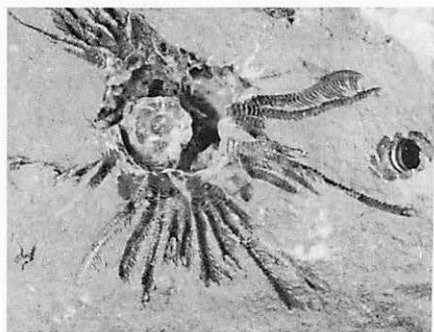


Figure 2. Crinoid calyx from upper horizon at Shadle.

Bryozoans

Unclassified (c)

Brachiopods

Tropidoleptus carinatus (Conrad) (a)

Rhipidomella penelope (Hall) (unc)

Protileptostrophia perplana (Conrad) (c)

Devonochonetes scitulus (Hall) (a)
Mucrospirifer mucronatus (Conrad) (a)
Mediospirifer audaculus (Conrad) (unc)

Gastropods

Ptomatis patulus (Hall) (r)
Bembexia sulcomarginata (Conrad) (r)

Pelecypods

Nuculites triqueter (Conrad) (c)
Palaeoneilo constricta (Conrad) (c)
Leiopteria sp. (c)
Modiomorpha concentrica (Conrad) (c)
Orthonota undulata (Conrad) (unc)
Grammysia arcuata (Conrad) (unc)

Cephalopods

Michelinoceras sp. (r)
Bactrites? aciculum (Hall) (c)

Trilobites

Trimerus (Dipleura) dekayi Green (c)
Greenops (Greenops) boothi var. *calliteles* (Green) (r)

Crinoids

Unclassified (calyces and columns) (c)

Cricoconarids

Tentaculites bellulus (Hall) (r)
T. attenuatus (Hall) (r)

Most of the species identified above are illustrated in Ellison (1965). Individual specimens from which the identifications were made have been deposited in the paleontologic reference collection of the Pennsylvania Geological Survey and are available for study. Systematic work on the crinoids is now in progress.

The upper Mahantango shales were deposited in a shallow, subtidal marine environment. Epifaunal and shallow infaunal filter-feeders and epifaunal deposit feeders dominate the fauna at Shadle, suggesting that the organisms lived in nutrient-rich, well-oxygenated waters. Periods of intermittent sedimentation and generally clear water apparently resulted in the proliferation of filter-feeding organisms (i.e., the two highly fossiliferous horizons previously noted), whereas periods of continual sedimentation were more hospitable to infaunal deposit feeders (i.e., the bioturbated claystone that characterizes much of the upper Mahantango).

The writer wishes to thank Misses Kathy Haines and Lesley Mull for providing numerous fossil specimens.

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Jon D. Inners

U.S. Geological Survey Issues New Maps

The U.S. Geological Survey recently published five geological, hydrological and miscellaneous maps covering parts of Pennsylvania. The geologic maps are 7½-minute quadrangle with all text and illustrations on the map sheet.

- GQ-1132 Geologic map of the Nesquehoning Quadrangle, Carbon and Schuylkill Counties, Pa.
- GQ-1133 Geologic map of the Tamaqua Quadrangle, Carbon and Schuylkill Counties, Pa.
- HA-530 Floods of June 1972 in the Harrisburg area, Pa.
- I-737 Geologic map of anthracite-bearing rocks in the southern half of the Delano Quadrangle, Schuylkill County, Pa.
- MF-578-A Map showing slate quarries and dumps in the Stroudsburg Quadrangle, Pa.-N.J. with a discussion of the environmental significance.

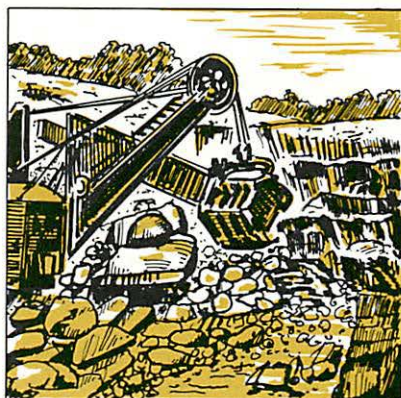
Each of these maps is available for \$1.00 by writing to:

U.S. Geological Survey
1200 S. Eads Street
Arlington, Va. 22202

SURVEY ANNOUNCEMENTS

CONSTRUCTION RAW MATERIALS IN THE GREATER PITTSBURGH REGION

The nature and distribution of mineral raw materials which are essential to any type of construction is spelled out in detail in the Pennsylvania Geological Survey's new publication, Mineral Resources Report M 67, "Greater Pittsburgh Region Construction Aggregates," by Bernard J. O'Neill, Jr. The study was undertaken in response to the heavy demand for these materials in the Pittsburgh Metropolitan Area and the increasing shortages as the readily available material is being used up.



Sand and gravel, crushed stone, and slag constitute the major sources for construction aggregate in the Greater Pittsburgh region. The active producers of these materials are identified in the report and information on the geologic formation, physical test results, and current uses of aggregate from each operation is summarized.

Eight geological subdivisions with a potential for sand and gravel are plotted and discussed by origin, relative age, lithology, thickness, extent of weathering, and evaluated for construction aggregate. Areas where residential, industrial and/or recreational land-use conflicts exist are screened out.

The outcrop patterns for the Loyalhanna Formation and the Vanport Limestone—two important sources of crushed stone in the region—are plotted and isopachs showing the thickness of the Vanport are shown. Six other geological units supplying crushed stone and the availability of slags are also discussed. An evaluation of the potential for each unit is made.

The data presented in this report are designed to aid in locating: (1) areas with a demonstrated or apparent potential as sources of aggregate; and (2) active producers of aggregate. These data should be of particular value to the producers of aggregate who are facing predictable exhaustion of reserves, encroachment of other land uses,

or adverse zoning regulations. Consumers of aggregates will benefit from the information concerning active producers as well as the knowledge of future resources sites. This report will also be of interest and applied use to professional planners, Federal and State agencies, educational institutions, and all others interested in construction aggregates.

Bulletin M67, "Greater Pittsburgh Region Construction Aggregates," written by Bernard J. O'Neill, Jr., may be obtained from the Bureau of Publications, P.O. Box 1365, Harrisburg, Pennsylvania 17125, at \$5.00 plus \$0.30 sales tax for Pennsylvania residents; checks should be made payable to "Commonwealth of Pennsylvania."

SURPLUS TOPOGRAPHIC MAPS

As a result of the continuing revision program, we have a stock of surplus outdated 7½-minute topographic quadrangle maps. We are offering these maps at no charge, singly or in small quantities, to all interested parties.

When requesting maps indicate how many different quadrangles and the number of copies of each you desire; second and third choices should be indicated in case we run short. Contact: Dr. Arthur Socolow, State Geologist, Pennsylvania Geological Survey, Harrisburg, Pa. 17120.

Abbottstown
Arendtsville
Bangor
Biglerville
Bushkill
Camden
Caledonia Park
Carlisle
Dawson
Dillsburg
East Greenville
Elderton
Ernst
Everett East
Everett West
Fairfield
Gettysburg
Greencastle
Hopewell
Hustontown
Iron Springs

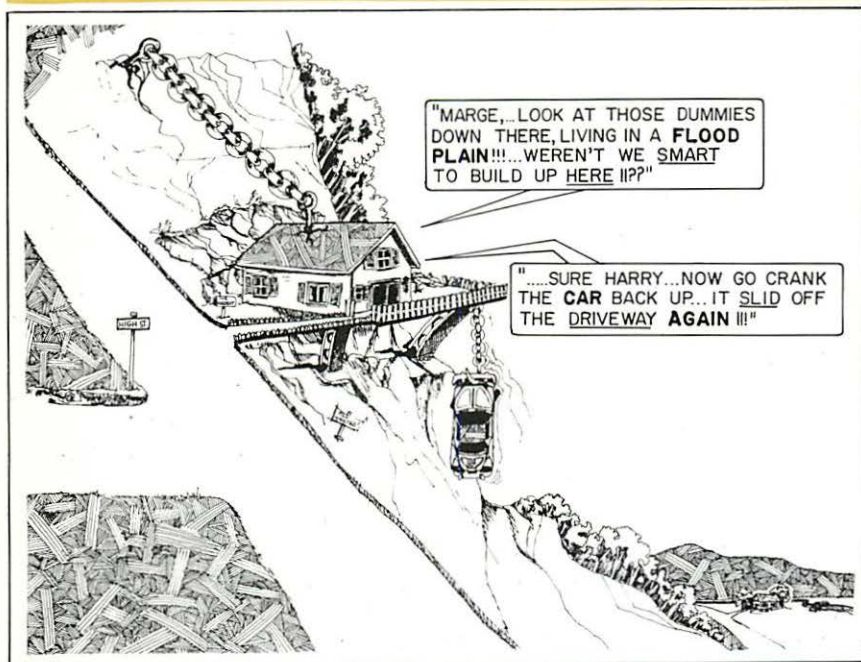
Kennett Square
Lake Canadohta
McConnellsburg
Mercersburg
Mt. Holly Springs
Newfoundland
Quakertown
Saltillo
St. Thomas
Saxton
Scotland
Seven Valleys
Stahlstown
Waynesboro
Wells Tannery
Wertsville
West Grove
West York
Williamson
York

ERIE COUNTY BEACH RIDGES REPORTED

A detailed report on the nature and origin of beach ridges of Erie County, and of the glacial events which formed them, has been issued by the Pennsylvania Geological Survey as Bulletin G 64, Pleistocene Beach Ridges of Northwestern Pennsylvania, by Elizabeth E. Schooler. Based on field mapping and laboratory research, the study established the sequence of glacial events, the resulting development of the Great Lakes, and the composition and distribution of the resulting beach ridges. A detailed map and discussion of the surficial geology of the Harborscreek 7½-minute quadrangle of Erie County are also presented.

This report will be of interest and use to land use planners and engineers working in the area, to professional geologists and students concerned with the glacial history of northwestern Pennsylvania, and to the general reader interested in the explanation of features which form the present-day landscape.

Bulletin G 64 (38 pp., 14 fig., 2 large maps) is available for \$2.95 (plus 18¢ sales tax) from Pennsylvania Bureau of Publications, P.O. Box 1365, Harrisburg, Pa. 17125.



Cartoon: Courtesy of the Washington County Planning Commission
Cartoon by Frank DeGennaro

P.S. Geologists know there are alternatives to these extremes.

Interior Promotes Methane Recovery from Coalbeds

(reprinted from Dec. 12, 1974 issue of COAL NEWS)

Degasification of coalbeds before mining is a ready means of supplementing commercial supplies of natural gas as well as reducing the methane hazard to miners, Maurice Deul, a Bureau of Mines research supervisor, told the recent meeting of the Pennsylvania Governor's Energy Council.

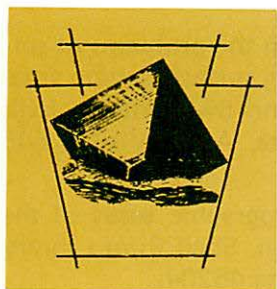
He pointed out that since September, 1972, one billion cubic feet of methane—interchangeable with natural gas—has been drained from two experimental Bureau degasification sites.

"Because methane is an explosion hazard when released during underground coal mining, it must be swept out of the mine by constant ventilation," Mr. Deul said. "Instead of being released into the air and wasted; however, the methane could be drained from the coalbed in advance of mining, collected and used as a pipeline-quality fuel."

Bureau tests indicate that the Pittsburgh coalbed contains an estimated 130 billion cubic feet of methane, worth more than \$65 million, under Washington County, Pa., alone, he said, and 350 billion cubic feet of the gas, worth more than \$175 million, under Greene County, Pa. He added that if only half of the Washington County methane could be recovered, it would be enough to heat 100,000 homes for 10 years.

Secretary of the Interior Rogers C. B. Morton commended the Pennsylvania council for its interest in the methane-recovery technology. "We're extremely interested in getting coalbed degasification going on a large scale," he said.

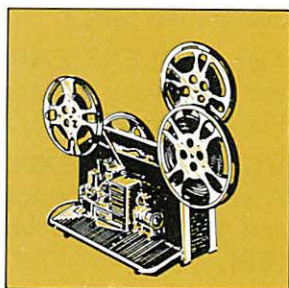
The Bureau has pioneered two techniques for removing methane from coalbeds—one method, adapted from oil well technology, is "hydraulic fracturing" of the bed to promote gas flow, and the other is draining methane through bore-holes started from the surface. Methane from a Bureau bore-hole project in West Virginia is being distributed to residential and commercial consumers through connection with an existing gas pipeline.



EARTH SCIENCE TEACHERS' CORNER

new films

The following films were announced at the recent annual meeting of the Geological Society of America; charges (if any) should be obtained from the companies which issued the films. **THE CITY THAT WAITS TO DIE** (57 min.). Presents the city of San Francisco, showing potential destruction and modern attempts to predict and control earthquakes. Time-Life Films, Inc. (TLF), Time-Life Building, New York, New York 10020.



THE BEACH, A RIVER OF SAND (20 min.). Investigates the source, movement, and ultimate fate of beach sand. Encyclopedia Britannica Education Corp. (EB), 1822 Pickwick Ave., Glenview, Ill. 60025.

APOLLO 17: ON THE SHOULDERS OF GIANTS (28 min.). Documentary account of the journey to Taurus-Littrow. NASA Regional Film Library.

THE DINOSAUR HUNTERS (50 min.). The badlands of Utah present the landscape for this film which describes the work of the vertebrate paleontologist. (TLF).

THE DRIFTING OF THE CONTINENTS (50 min.). Informative study of the revolution in geology which is turning the earth sciences upside down. (TLF).

ENERGY SOURCES FOR THE FUTURE (20 min.). A perceptive view of the most promising future power sources. AGI/EBE Earth Science Series.

ICE IN THE ATMOSPHERE (19 min.). Film explores the world of atmospheric ice, from birth and growth of crystals in clouds to hail. National Center for Atmospheric Research (NCAR), P.O. Box 1470, Boulder, Colorado 80303.

THE RAVAGED LAND (14.5 min.). Focuses on the problems of surface mining in the U.S. Shows efforts to reclaim surface mining areas in the U.S. and land utilization in England and Switzerland. John Wiley & Sons, Inc. (JW), Educational Services, Audio-Visual, 605 Third Ave., New York, New York 10016.

THE RIVER MUST LIVE (23 min.). A photographic essay of the causes, effects, and solutions of water pollution. Shell Film Library (SFL), 450 N. Meridian St., Indianapolis, Indiana 46204.

THIS LAND (41 min.). Dynamic presentation of the evolution of the North American continent. Excellent presentation through the use of paleogeographic maps and skillfully blended dioramas and modern landscapes. (SFL).

THE VIOLENT EARTH (52 min.). A view of modern plate theory and the view of a restless changing planet. National Geographic Society, Washington, D.C. 20036.

VOLCANOES: EXPLORING THE RESTLESS EARTH (18 min.). A study of four volcanoes that shows the features of volcanic areas and the effects of volcanic eruptions on man and his environment. (EB).

WASTE—THE PENALTY OF AFFLUENCE (18 min.). Displays how satisfactory disposal of waste is a problem which accompanies population growth; also shows how new technology of "waste" recovery and recycling of materials can result in feasible solutions. International Film Bureau, Inc. (IBF), 332 S. Michigan Ave., Chicago, Ill. 60604.

THE WAYS OF WATER (13 min.). A contemplative look at the natural behavior of water and its relationship to the total ecosystem. (EB).

DEEPEST WELL IN APPALACHIAN BASIN

The No. 1 Leonard Svetz well was completed December 31, 1974 at a total depth of 21,460 feet, the deepest well in the Appalachian Basin. The well was drilled in Middlecreek Township, Somerset County, Pa., and was spudded in on October 18, 1973. The well was a wildcat drilled by AMOCO Production Company with the Noble Drilling Company as rotary tools contractor. Some problems encountered made it necessary to plug back the hole to 8824 feet and sidetrack, plug back again to 9610 feet and sidetrack at 14,096 feet. It has now been plugged and abandoned. No data has been released on the well, but it probably reached the Gatesburg, Upper Cambrian, which was its target.



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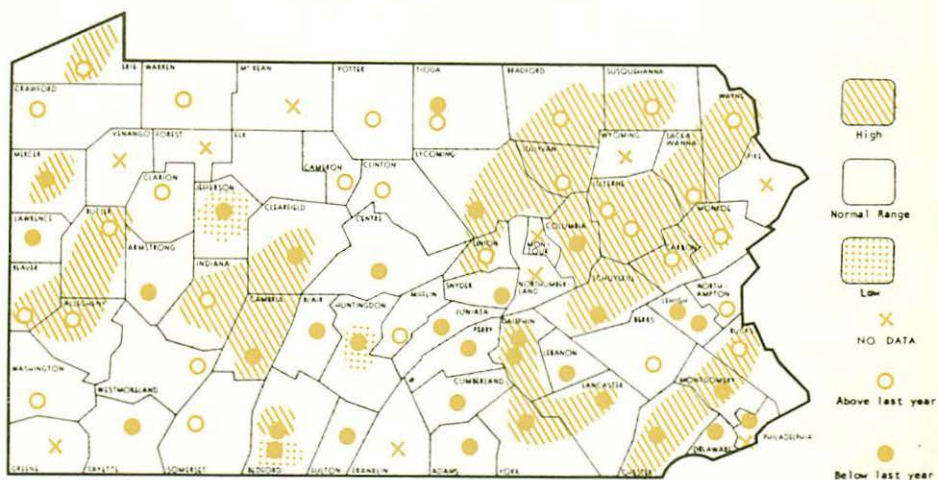
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