

# G E N N S Y L V A N I A G E O L O G Y



THE PENNSYLVANIA GEOLOGICAL SURVEY

VOLUME 97

**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:** Modern hieroglyphics on the Old Red Sandstone: wall of small quarry in the Catskill Formation along Pennsylvania Route 402, north of Peck's Pond, Pike County. Photo courtesy of William H. Bolles.

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**AUGUST 1978**



FROM THE DESK  
OF THE  
STATE GEOLOGIST . . .



### GROUNDWATER COMES OF AGE

A number of recent developments on the national, state, and local level have demonstrated that there is now widespread recognition that consideration must be given to protect and manage our subsurface or groundwater resources. It wasn't always so, particularly here in the east. Emphasis in the past was on the visible surface waters. Groundwater was out of sight, and, thus, out of mind. On a regional basis it was underused, while in many places the groundwater was badly misused.

Now, awareness and help is coming from many other quarters. The Delaware River Basin Commission recognized the importance of groundwater management many years ago and specified that proposed new, high-yield water wells would have to have prior approval and permitting. Now the Susquehanna River Basin Commission has taken similar steps.

In Washington the U.S. Office of Surface Mining, created by the new federal coal strip mine act, is designating specific requirements that will protect groundwater from undue quality and quantity impacts by coal strip mines.

In those areas of Pennsylvania where many new deep coal mines are being planned in response to our energy needs, it is noteworthy that county and town officials are specifically requesting that government agencies, as well as company representatives, look into the question of the impact of the proposed deep coal mines upon the groundwater resources of the respective areas.

With the growing and widespread use of irrigation techniques amongst our farmers across the Commonwealth, more and more have turned to the use of wells and groundwater and these people also are also expressing great interest in sound groundwater management.

The Pennsylvania Geological Survey has for over 50 years been delineating the occurrence, and touting the importance, of the subsurface water of the Commonwealth. We welcome the growing awareness of groundwater importance and we recognize the need for responsible groundwater management procedures. To that end we shall continue to assemble and analyze the basic data on groundwater and related geologic conditions upon which sound water management decisions can be made.

*Arthur G. Socolow*

# GEOLOGICAL RESEARCH IN PENNSYLVANIA 1978

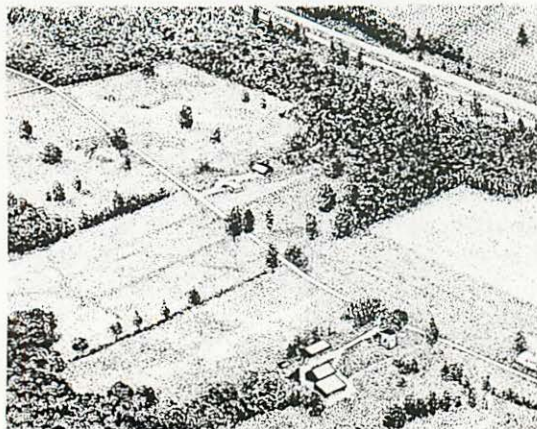
## INTRODUCTION

This publication is the twenty first annual report on Geological Research and Publications in Pennsylvania. This is an attempt to list all current geologic research in Pennsylvania and includes persons and projects other than those of the Pennsylvania Geological Survey. Because of the extensive response and large number of projects reported to us, we have had to exercise editorial license to reduce the description of the research projects to fit our available space. We have also attempted to determine an anticipated completion date (ACD) for each project. The anticipated completion date is the estimate of the date when the author will complete his report; additional time for publication should be projected.

The listings are grouped into major categories of research to facilitate your search for information on a particular subject. Publications in press are listed by author.

As with all compilations, there may be omissions; this is unintentional. Additional copies of this report may be obtained by writing to the Bureau of Topographic and Geologic Survey, Department of Environmental Resources, P. O. Box 2357, Harrisburg, Pennsylvania 17120.

## RESEARCH IN PROGRESS



## AREAL GEOLOGY

T. M. BERG, A. A. SOCOLOW, D. M. HOSKINS, A. R. GEYER, Pa. Geol. Survey, S. I. ROOT, Esso Productions, W. E. EDMUNDS, Consultant, D. B. MacLACHLAN, W. D. SEVON, and A. D. GLOVER, Pa. Geol. Survey. Revision of Pennsylvania State Geologic Map. Compilation maps for the revision have been released to open file and may be examined at the Survey's headquarters in Harrisburg. Remaining work to be done includes drafting and editing. Publication scheduled for mid-1979.

M. J. BERGIN, U.S. Geol. Survey. Northern Anthracite Field, Pa. Work in current year will consist of geologic map compilation for Kingston, Pittston, and Wilkes-Barre West quadrangles. Studies will continue on distribution, stratigraphy, and structure of Mississippian and Devonian rocks surrounding the Northern Anthracite field to determine regional correlations and relationships to Southern, Western-Middle, and Eastern-Middle Anthracite fields. ACD: Indefinite. HERBERT BLODGET, NASA, and GREGORY SMITH, DAVID O'HARA and WILLIAM BRAGONIER, R & P Coal Company. Potential Use of Remote Sensing for Mine Roof Stability Studies [Indiana and Armstrong Cos., Pa.] A cooperative project between NASA and R & P Coal to determine if remote sensing techniques can be used to predict mining conditions and patterns of sedimentation. ACD: Oct. 1978.

G. W. COLTON, U.S. Geol. Survey. Bedrock Geology of the Jersey Shore Quadrangle. ACD: 1978.

C. H. DODGE, U.S. Geol. Survey. Reconnaissance Mapping in Northwestern Pa. Reconnaissance mapping (compiled at 1:24,000) is underway in Elk, southeastern Forest, northern Jefferson, and southern McKean Counties. Work to date has concentrated on field investigations and subsurface data collection. Study will include bedrock geologic maps and cross sections. ACD: 1980.

J. B. EPSTEIN, U.S. Geol. Survey. Geology of the Wind Gap Quadrangle. ACD: 1978.

R. T. FAILL, A. D. GLOVER, and J. H. WAY, Pa. Geol. Survey. Geology and Mineral Resources of the Altoona 15' Quadrangle, Blair, Cambria, Centre, and Clearfield Cos., Pa. Mapping of bedrock units from Cambrian to Pennsylvanian in age, surficial units (alluvium, colluvium), structures in the Valley and Ridge province and Allegheny Plateau province, with discussions of economic deposits (primarily coal), engineering properties, and environmental characteristics. ACD: 1979.

LOUIS HEYMAN, Pa. Geol. Survey. The Subcrop Beneath the Onondaga-Huntersville-Bois Blanc Formations in the Subsurface of Western Pa. The above units overlie, with increasing unconformity, rocks from Lower Devonian to the south to Upper Silurian



to the north. The subcrop pattern may delineate otherwise concealed, deeper structure and hydrocarbon traps. ACD: 1979.

J. D. INNERS, Pa. Geol. Survey. Geology and Mineral Resources of the Bloomsburg and Mifflinville Quads., Columbia Co., Pa. ACD: 1980.

D. B. MacLACHLAN, Pa. Geol. Survey. Geology and Mineral Resources of the Reading and Birdsboro Quads., Berks Co., Pa.

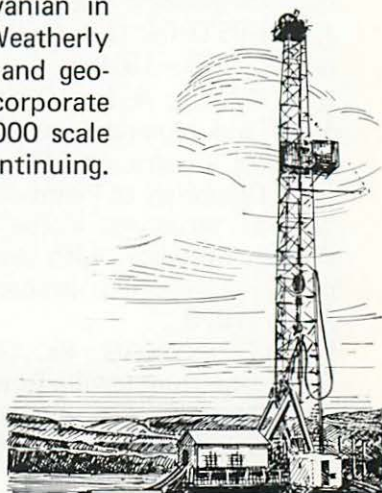
H. W. SCHASSE, Pa. Geol. Survey/The Pa. State Univ., and A. W. ROSE, The Pa. State Univ. The Geology and Mineral Deposits of Jacks Mountain in the Mount Union and Butler Knob 7½-Minute Quads., Central Pa. Detailed geologic map and cross sections (1:24,000), structural interpretations, map of mineral localities. Sphalerite and galena occur in Silurian Tuscarora Formation along tension fractures and joints and as breccia fillings along transverse macroscopic faults. ACD: June 1978.

W. D. SEVON, T. M. BERG, Pa. Geol. Survey, and L. SCHULTZ, Gilbert Commonwealth, Inc. Geology and Mineral Resources of Pike Co., Pa. Report will include separate bedrock and surficial geologic maps at scale 1:50,000 and an accompanying text. ACD: 1978.

J. H. WAY, Pa. Geol. Survey. Geology and Mineral Resources of the Washingtonville and Millville Quads., Montour, Columbia, and Northumberland Cos., Pa. Project includes the geologic mapping of bedrock and surficial deposits, defining and sampling materials with possible economic potential, and describing environmental and engineering characteristics of all geologic units in the area. ACD: 1980.

G. H. WOOD, JR., U.S. Geol. Survey. Southern Anthracite Field. Continue to study, report, and produce information about stratigraphy, structure, depositional-erosional history, and resources of rocks ranging from Silurian to Pennsylvanian in age. Work is presently being done in Weatherly 7½-minute quadrangle. Compile mining and geologic data and, with resource studies, incorporate into geologic quadrangle maps at 1:24,000 scale and coal maps at 1:12,000 scale. ACD: Continuing.

## ECONOMIC GEOLOGY



T. M. BERG, A. D. GLOVER, M. A. SHOLES, V. M. SKEMA, and H. W. SCHASSE, Pa. Geol. Survey. Coal Resources of Greene and Washington Cos., Pa. Data currently in Survey files and all new data that can be obtained on the rocks in Greene and Washington Counties are being prepared for computer entry under the National Coal Resource Data System (NCRDS). ACD: Apr. 1979.

J. A. COMET, Oil City, Pa., W. S. LEEPER, L. S. BEERS, and J. L. BLUM, National Fuel Gas. Reinterpretation of Seismic Data [NW Pa., Southern N.Y.].

J. L. CRAFT, Pa. Geol. Survey. Evaluation of Gravel Quality Problems, Upper Allegheny River, Northwest Pa. A field and laboratory study of the gravel quality conditions related to gravel terrace operation in the Upper Allegheny River. ACD: Summer 1978.

G. W. LENEY, U.S. Dept. of Energy, and BENDIX FIELD ENGINEERING CORPORATION. National Uranium Evaluation Program (NURE). Programs in progress in Pennsylvania include airborne radiometric surveys in Scranton, Newark, Williamsport, Harrisburg quadrangles, hydrogeochemical sampling in Scranton, Newark, geologic evaluation in Scranton, Newark, Williamsport, Harrisburg. (All 1° x 2° map series, scale 1:250,000.) Also miscellaneous research under NURE includes some work in Pennsylvania. ACD: 1979-83.

B. J. O'NEILL, JR., and J. H. BARNES, Pa. Geol. Survey, and K. J. LILES, U.S. Bur. of Mines. Properties and Uses of Clays and Shales in South-Central Pa. A continuation of the series of programmed studies to evaluate the economic potential of clay-shale raw materials for ceramic and nonceramic uses. ACD: 1979.

B. J. O'NEILL, JR., Pa. Geol. Survey, K. J. LILES, U.S. Bur. of Mines, and J. H. BARNES, Pa. Geol. Survey. Properties and Uses of Pennsylvania Shales and Clays, Southwestern Pa. A continuation of the series of programmed studies to evaluate the economic potential of clay-shale raw materials for ceramic and nonceramic uses. ACD: 1978.

B. J. O'NEILL, JR., and FIELD MAPPING DIVISION, Pa. Geol. Survey, and U.S. BUR. OF MINES. Investigations for High-Calcium Limestones in Pa. Objectives are threefold: (1) to sample and analyze limestone units where information is lacking, incomplete, or widely scattered; (2) to map any newly discovered, high-calcium limestone unit that has a potential for commercial extraction; and (3) to synthesize the data into publications which will be useful guides to exploration targets. ACD: Continuous.

H. M. PENLEY and T. A. BAILLIEUL, Bendix Field Engineering Corp. Scranton Quad. Evaluation [Scranton NTMS 2° quad., Pa.]. Uranium evaluation of the Scranton quadrangle for the NURE

project (National Uranium Resource Evaluation). ACD: Mar. 1979.  
R. G. PIOTROWSKI and J. A. HARPER, Pa. Geol. Survey. Stratigraphic Relations of the Devonian Organic-Rich Shales in the Sub-surface of Western Pa. This project is a portion of the resource evaluation phase of the Dept. of Energy's Eastern Gas Shale Project. The study will include stratigraphic cross sections, isopach maps, facies distribution maps, and regional structure maps for the Upper and Middle Devonian clastics with special emphasis on the potential gas-producing Devonian organic-rich shales. ACD: Oct. 1978.

G. H. P. POPPER, Bendix Field Engineering Corp. Harrisburg Quad. Evaluation [Harrisburg NTMS 2° quad, Pa.]. Uranium evaluation of the Harrisburg quadrangle for the NURE project.

A. W. ROSE, SCOTT TREGASKIS, STEPHEN HOWE, The Pa. State Univ., and H. W. SCHASSE, The Pa. State Univ./Pa. Geol. Survey. Geology and Geochemistry of Pb-Zn Occurrences in Central Pennsylvania [mainly Centre, Huntingdon, Blair, and Bedford Cos.]. Pb-Zn near Woodbury and Mapleton is localized by late Paleozoic thrust faults or shears in areas of tight and complex folding. Includes studies of fluid inclusions and sulfur isotopes. ACD: 1978.

W. O. SHORT, Bendix Field Engineering Corp., and G. W. LENEY, U.S. Dept. of Energy. Catskill Delta [Carbon Co. near Jim Thorpe]. ACD: Late 1979.

R. C. SMITH, II, Pa. Geol. Survey. Trace Element Content of Sphalerite and Galena from Pa. Pure mineral concentrates of sphalerite and galena will be analyzed by atomic absorption, emission spectroscopy, x-ray fluorescence, and fire assay for such elements as Mn, Fe, Co, Ni, Ga, Ge, Ag, Cd, In, Sn, and Bi. The analyses will be evaluated for by-product, exploration, and environmental significance. ACD: July 1980.

## ENGINEERING GEOLOGY

J. P. WILSHUSEN, Pa. Geol. Survey. Geologic Hazards in Pa. A descriptive report illustrated with maps, photographs, and sketches outlining the occurrence of geologic hazards in Pa. Natural geologic hazards in this state are (1) landslides and related phenomena, 2) sinkholes and solution phenomena, and 3) earthquakes. Each is discussed as a naturally occurring hazard and then in relation to the activities of man. ACD: July 1978.





## ENVIRONMENTAL GEOLOGY

L. J. BACHMAN and R. R. PARIZEK, The Pa. State Univ. Environmental Geology of Moshannon Valley Area [Philipsburg, Osceola Mills and vicinity, Centre and Clearfield Cos., Pa.]. In this study, the ground water flow system in the Moshannon Valley area will be described, geologic factors affecting development in the area will be discussed, and the geology of a portion of the Sandy Ridge 7½' quadrangle will be mapped. ACD: Mar. 1979.

R. B. FINKELMAN, U.S. Geol. Survey. Release of Toxic Trace Elements from a Burning Bituminous Culm Bank [Mather, Pa.]. ACD: Aug. 1978.

N. K. FLINT, Univ. of Pitt., and members of a Univ. of Pitt. team headed by Dr. M. A. Shapiro, School of Public Health. Ohio River Basin Energy Study (ORBES) [Pa.]. This is Phase II of a U.S. Environmental Protection Agency (EPA) project to assess the possible impacts from energy conversion in 6 states of the Ohio River basin through the year 2000. ACD: 1978.

N. K. FLINT and DARL ROSENQUEST, Univ. of Pitt. Landslide-Hazard Mapping in Squaw Run Area Watershed, Allegheny Co. This project involves field mapping at a scale of 1 inch to 200 feet of all landslides, both recent and ancient, using specially prepared topographic maps obtained through the recently organized Squaw Run Area Watershed Association. ACD: June 1978.

A. R. GEYER, Pa. Geol. Survey, and W. H. BOLLES, Pa. Dept. of Education. Outstanding Geologic/Scenic Features of Pa. Outstanding geologic/scenic features cataloged have values of such distinctive quality as to be of county, state, or national significance. More than 270 have been identified. About two-thirds of these have been investigated and photographed. ACD: Dec. 1978.

M. M. MARTIN and R. R. PARIZEK, The Pa. State Univ. Prediction of Acid-Mine Drainage Quality [Clarion Co.]. Overburden and water sampling is completed and chemical and statistical analysis is underway to relate acid-mine drainage quality to age and type of mine restoration and the chemical and petrographic characteristics of the coal overburden. ACD: Nov. 1978.

R. R. PARIZEK, E. G. WILLIAMS, The Pa. State Univ., and R. J. HORNBERGER, Univ. of Pa. Delineation of Acid Mine Drainage Potential of Coal-bearing Strata of the Pottsville and Allegheny Groups in Western Pa. A regional data base consisting of water quality parameters, coal-mining patterns, and geologic factors is being assembled. Computer mapping techniques are being employed in the analysis and graphic display of the data. ACD: July 1978.

J. P. WILSHUSEN, Pa. Geol. Survey, and M. E. HORNE, Consultant. Greater York Area Environmental Geology. A compilation of geologic information pertinent to the development and environmental protection of the greater York area, composed predominantly of maps with interpretive legends discussing geology, water resources, mineral resources, and engineering characteristics of bedrock and soils. ACD: Nov. 1978.

## GENERAL

## GEOLOGY



D. M. HOSKINS, Pa. Geol. Survey. Highway Geology from Harrisburg to Philipsburg [U.S. 22-322]. This is a revision of General Geology Report 29. It will be an expanded guide to significant stratigraphic and structural geology stops along U.S. 22-322 from Blue Mountain to the Allegheny Front. ACD: Winter 1979.

W. R. SHIRK, Shippensburg St. Coll. The Geology of Southcentral Pa. Geology of the Great Valley, South Mountain, and Triassic Lowland with emphasis on environmental geology, applied geomorphology, and environmental land-use planning. Self-study field guide with road log and selected site analysis of 18 areas will be included. ACD: Early 1979.

J. P. WILSHUSEN, Pa. Geol. Survey. Geology of the Appalachian Trail in Pa. A description with map and figures discussing the geology along the approximately 215 miles of the Appalachian Trail in Pennsylvania with special attention to outstanding geologic features along the trail and visible from it. ACD: Jan. 1979.



## GEOCHEMISTRY

MARY FEELEY and T. O. WRIGHT, Allegheny Coll. Geochemistry of the Jonestown Red Beds. ACD: 1978.

R. L. FOLGER, E. I. BAUCOM, R. B. FERGUSON, V. PRICE, J. D. HEFFNER, and P. L. JONES, E. I. duPont de Nemours and Company for Savannah River Laboratory. National Uranium Resource Evaluation/Hydrogeochemical and Stream Sediment Reconnaissance [eastern U.S.]. A total of approximately 12,800 stream water, stream sediment, and ground water samples were collected in the Williamsport, Harrisburg, Scranton, and Newark NTMS 1° x 2° quadrangles for uranium and associated multi-element analyses. ACD: Dec. 1978.

H. E. KOESTER, U.S. Geol. Survey. Ground-Water Quality in Pa. Data from the U.S.G.S. (WATSTORE) and B.W.Q.M. (STORET) systems are being assembled and computerized, located on stable base maps and interpreted by the use of select computer programs. A final report and atlas will show existing ground-water quality and will discuss problem areas. ACD: 1979-80.

A. W. ROSE, SIMON PIRC, P. M. TOLE, The Pa. State Univ. Uranium in Sandstones and Shales of the Catskill Formation [eastern and central Pa.]. The abundance of uranium in normal rocks and its stratigraphic and lateral variability are being investigated as a guide to uranium deposits. The uranium in zircons is being measured as a possible means of recognizing U-rich source areas. ACD: 1979.



## GEOMORPHOLOGY

E. L. WHITE and W. B. WHITE, The Pa. State Univ. Geomorphology of the Appalachian Highlands. Principal karst landforms in the Appalachian Highlands were measured for 62 small watersheds between Pennsylvania and Alabama. These were related to both the fluvio-karst character of the Appalachians and to the rock type and structural setting. ACD: Continuous.

W. B. WHITE, The Pa. State Univ. Caves of Pa. Compilation of descriptions of the caves of the Valley and Ridge Province is well underway with data on Blair, Centre, Huntingdon, and Snyder Counties largely complete. ACD: Summer 1978.



## GEOPHYSICS

W. G. FARLEY, Bendix Field Engineering Corp., and LKB RESOURCES, INC. Thorpe Airborne Gamma Ray and Magnetic Survey [Newark, Scranton, Harrisburg, and Williamsport 1° x 2° quad.]. B. F. HOWELL, JR., The Pa. State Univ. Seismic Hazard Evaluations of the U.S. [conterminous 48 states]. Gumbel's statistical theory of extreme values is being tested to evaluate how well it can be used to predict the occurrence rates of large earthquakes from the occurrences of small earthquakes at any location. ACD: 1981.

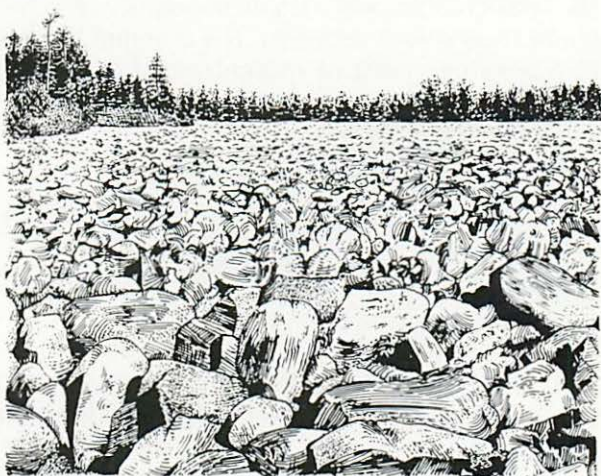
P. M. LAVIN, The Pa. State Univ. Gravity Map of Pa. The gravity map (1:1,000,000) is being prepared using a contour interval of 2 milligals. ACD: Sept. 1978.

LISA LeCLAIR, JEFF TREMBLY, OTTO MULLER, and W. H. DIMENT, U.S. Geol. Survey. Gravity Survey of Western Pennsylvania. ACD: Sept. 1978.

ROB VAN DER VOO, A. N. FRENCH, and R. B. FRENCH, Univ. of Mich. Paleomagnetism of Appalachian Redbeds [Pa., Md., Va., and W. Va.]. Paleomagnetic studies are underway on Paleozoic redbeds in the Valley and Ridge Province of the central Appalachians. These redbeds include the Catskill, Rose Hill and Juniata Formations. ACD: 1979.

## GLACIAL

## GEOLOGY



E. B. EVENSON, Lehigh Univ., L. A. SIRKIN, Adelphi Univ., and W. D. SEVON, Pa. Geol. Survey. Wisconsinan Deglaciation Chronology of Northeastern Pa. and Northwestern N. J.: A Mapping/Palynological/Radiometric Approach. Mapping of ice marginal deposits will provide the geometry of deglaciation. Provenance investigations will relate the moraines to the Laurentide ice lobe which

deposited them. An absolute deglaciation chronology will be based on  $C^{14}$  dates from sediments identified, palynologically, as representing the Tundra (HERB) Pollen Zone. ACD: 1981.

D. E. MARCHAND, U.S. Geol. Survey. Map of Quaternary Deposits [central Susquehanna Valley, esp. Union and Snyder Counties]. ACD: Field work completed.



## HYDROLOGY

E. S. BAIR and R. R. PARIZEK, The Pa. State Univ. Hydrogeologic Ramifications of Open-Pit Anthracite Mining [Tamaqua, Pa.; Southern Anthracite field]. The project entails a series of aquifer tests on various geologic materials under various geologic conditions likely to be encountered during the construction of a 2-3 square mile open-pit mine extending down to sea level. The purpose of the aquifer tests is to obtain valid field values of hydraulic conductivity, transmissivity, storativity, vertical leakage, and streambed infiltration rates which would be used in a finite-element digital model of the local ground-water flow system. The digital model would be used to predict ground-water flow rates and quantities into the mine for various configurations of the mine. ACD: Aug. 1980.

J. T. GALLAHER, U.S. Geol. Survey. Geology and Hydrology of Erie Co., Pa. The water resources of Erie County will be described. Special emphasis will be on glacial deposits. The occurrence and distribution of saline water will be described. ACD: 1980.

S. P. GARABEDIAN and R. R. PARIZEK, The Pa. State Univ. Streambed Infiltration in the Anthracite Coal Region. This project is still in the planning stages. ACD: Early 1979.

E. D. HESS, Pa. Geol. Survey. Water Well Inventory [Pa.]. Identifications of lithologic units, positioning of wells by coordinates, and analysis of rock units as potential aquifers. ACD: Ongoing.

G. R. SCHINER, T. F. BUCKWALTER, and C. H. DODGE, U.S. Geol. Survey. Water Resources of the Clarion River and Redbank Creek Basins in Western Pa. Provide basic ground- and surface-water information, oriented to the water and energy problems within the two basins, and to provide aid to the implementation of water-resources planning, management and development by water users. ACD: June 1978.

M. D. SINCAK, Cambrian-Somerset Council of Governments, and ULDIS KAKTINS and H. C. FRY, JR., Univ. of Pitt. Runoff and Flooding Characteristics of Solomon Run, Clayboard Run, Peggys Run and Sams Run located in Greater Johnstown, and related deficiencies in the design of numerous culverts and bridges along these waterways. ACD: Mar. 1978.

R. A. SLOTO and L. J. MCGREEVY, U.S. Geol. Survey. Digital Model of Ground-Water Flow in Deeply Weathered Crystalline Rocks, Chester County. A digital model has been developed to simulate ground-water flow in the upper Pickering Creek basin in Chester County. The model simulates changes in the local hydrologic system which may be caused by potential development. ACD: June 1978.

R. W. SPILLER and R. R. PARIZEK, The Pa. State Univ. Statistical Approach to Ground Water Prospecting [eastern Pa.]. Water wells are being inventoried in eastern Pennsylvania and their positions classified as being located on or off photo linear features using aerial photos. Several statistical techniques are being used to determine if yields of wells located on such linear features differ significantly from wells located off such features. ACD: Sept. 1978.

J. B. URBAN, W. J. GBUREK, JAMES HOOVER, and WALTER HEALD, U.S. Dept. of Agriculture. Storm Water Detention and Ground-Water Recharge [Willow Grove, Pa.]. A porous asphalt parking lot has been designed and installed. The 25-year storm was used as the design criterion. ACD: 1982.

C. R. WOOD, U.S. Geol. Survey. Ground-Water Resources of the Gettysburg and Hammer Creek Formations, SE Pa. ACD: June 1978.



# IGNEOUS AND METAMORPHIC PETROLOGY



M. L. CRAWFORD, Bryn Mawr Coll. Investigation of Metamorphic Rocks and Fluid Inclusions, SE Pa. Compositions and densities of fluid inclusions are being investigated to determine what correlation can be made between rock chemistry, metamorphic conditions, and fluid inclusion properties. ACD: 1980.

M. L. CRAWFORD and W. A. CRAWFORD, Bryn Mawr Coll. Metamorphic History and Development of the Pa. Piedmont [SE Pa.]. A comprehensive quadrangle by quadrangle remapping and restudy of the Pennsylvania Piedmont east of the Susquehanna River, to include the Honey Brook Upland.

M. L. CRAWFORD, Bryn Mawr Coll., M. E. WAGNER and JULIA HANDY, Univ. of Pa., and ROBERT COWARD, Bryn Mawr Coll. Chemical and Metamorphic Study of Mafic Rocks of the Piedmont [Piedmont south and west of a line between West Chester and Bryn Mawr]. Four groups of mafic rocks can be distinguished on the basis of their occurrence. The study attempts to determine whether or not these four groups are related to each other in age and/or tectonic setting and from this information to try to gain a greater understanding of the development of the central part of the U.S. Appalachian orogen. ACD: Mid 1979.

A. A. DRAKE, JR., R. I. TILLING, and P. T. LYTTLE, U.S. Geol. Survey. Petrochemistry and Radiogenic Heat Producing Minerals of Reading Prong Rocks [Pa., N.J., N.Y.]. Preliminary work suggests that hornblende-granite-alaskite suite has high heat productivity values and that sodic metasedimentary-metavolcanic rocks have unusual Th/U ratios. Work this year will be concentrated in eastern U.S. ACD: 1981.

A. M. THOMPSON, Univ. of Del., and DAVID GOLIKE. Petrogenesis and Structure of the Wilmington Complex, Chester Co. Field mapping and petrochemistry of granulitic metamorphic and igneous rocks in Chester County and adjacent Delaware. ACD: May 1979.

## MINERALOGY



J. H. BARNES, Pa. Geol. Survey, and W. F. DOWNEY, JR., Juniata Coll. Mineralogy Associated with Burning Anthracite Deposits [Luzerne, Schuylkill, N. Dauphin Cos.]. Study of minerals forming from sublimation of gases produced by subsurface fires in anthracite mines and culm banks. ACD: 1978.

R. B. FINKELMAN and M. E. MROSE, U.S. Geol. Survey. Characterization of New Minerals from the Surfaces of Burning Culm Banks [anthracite and bituminous regions]. ACD: 1980.

D. T. HOFF, Pa. Historical and Museum Comm. Mineralogy of the Harry T. Campbell Sons' Quarry, Gettysburg, Pa. The geology, mineral associations, and paragenesis of more than thirty mineral species known to occur at the Campbell Quarry are described in detail. ACD: June 1978.

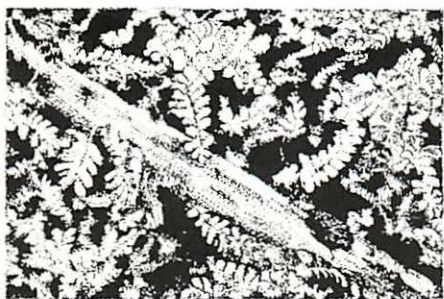
LORRAINE KREPS and T. O. WRIGHT, Allegheny Coll. Sedimentary Petrology of the Graywacke from Shochary Ridge and the Hamburg Klippe near Hamburg, Pa. ACD: 1978.

M. E. MROSE, U.S. Geol. Survey. Mineralogical Investigations. Continue mineralogical study of new minerals found associated with burning culm banks in Pennsylvania and finalize paper on Nd-rich carbonate hydrate from Saucon Valley, originally described as "lanthanite." ACD: Continuing.

R. C. SMITH, II, Pa. Geol. Survey. Mineralogy and Geology of Uranium Occurrences in Eastern Pa. The primary and secondary uranium minerals in sandstone host deposits will be briefly examined by x-ray diffraction and optical methods in an attempt to better understand the genesis of the deposits and the present-day leaching of uranium from the outcrop. ACD: Oct. 1978.

R. C. SMITH, II, M. L. ANNE and others, Friends of Mineralogy. The Mineralogy of Pennsylvania 1966-1975.





## PALEONTOLOGY

T. M. BERG, Pa. Geol. Survey, and R. E. THOMS, Portland St. Univ. Comparison of Burrows of the Devonian Bivalve *Archanodon* with Those of the Holocene Bivalve *Margaritifera*. Burrow structures in the Middle Devonian Bellvale Sandstone of N.J. and N.Y. have been documented by Berg in the N.J. Acad. of Sci. as the work of *Archanodon*. A poster session covering progress of this research will be presented by the authors at the International Devonian Symposium to be held in Bristol, England, Sept., 1978.

J. A. HARPER, Pa. Geol. Survey. A New Eospondylid Ophiuroid from the Conemaugh Group (Pennsylvanian) of Western Pa. A small specimen identified as an eospondylid ophiuroid is described from the Brush Creek Shale of Punxsutawney. The family Eospondylidae is transferred to the order Oegophiurida based on ossicle morphology. ACD: 1978.

J. A. HARPER, Pa. Geol. Survey, and H. B. ROLLINS, Univ. of Pitt. Color-Banding in Pennsylvanian Gastropods of N.A. [including Pa.]. This will be a comprehensive study of color-banding preserved in gastropods from numerous horizons in the Pennsylvanian of North America. Emphasis will be placed on aspects of polymorphism and apparent mode of life. ACD: 1979.

D. M. HOSKINS, Pa. Geol. Survey. Fossil Collecting in Pa. (2nd ed.). General Geology Rept. All fossil localities will be reexamined to determine if still available and suitable for fossil collectors. New localities will be added where necessary. ACD: Winter 1978-79.

W. F. KLOSE II, Paleontological Research Inst.  
1. Cones and Megaspores of *Lepidocarpon* from Pa. [NE Pa.]. Materials for the study collected and curated. Review of specimens (types) at the USNM completed. ACD: 1979.

2. Additions to the Coal Fauna (Allegheny) of Pennsylvania [NE Pa.]. Specimens of crustaceans, insects, and medusa found in the past few years will be treated. ACD: 1978.



3. The Flora of the Baltimore Coal (Allegheny) [Wilkes-Barre]. ACD: 1979.

4. The Flora of the Sugarnotch 2 Vein. ACD: 1978.

5. The Flora and Fauna of the Buck Mountain 5 Coal [Southern Anthracite basin]. A study of fossil plants, insects, and crustacea from the Buck Mt. 5 coal (basal Allegheny Series) in the Southern Anthracite basin in the Klose, Badman, William Penn Memorial Museum, USNM, and Reading Public Museum (Unger Collection) collections. ACD: 1980.

MICHAEL McSTRAW and T. O. WRIGHT, Allegheny Coll. Lithologic and Faunal Similarities between the Graywacke at Shochary Ridge and the Ramseyburg Graywacke near the Lehigh River. ACD: 1978.

A. V. MORGAN, Univ. of Waterloo. A Beetle Fauna from Longswamp (Mertztown), Pa. A 4" diameter core has been recovered from Late Glacial and Holocene sediments at Mertztown, Pa. The core has produced a small but well preserved insect fauna (primarily Coleoptera) which is currently under investigation. ACD: 1979.

W. A. OLIVER, JR., U.S. Geol. Survey. Corals and Biostratigraphy of Keyser Limestone [Pa., Md., Va., W. Va.]. Systematic paleontology and distribution of rugose and tabulate corals are being studied. Field and lab work are 25% (est.) completed. ACD: 1982.



## SEDIMENTOLOGY

EDWARD COTTER, Bucknell Univ. Silurian Shallow Shelf Sedimentation: Serenity and Storms [central Pa.]. ACD: Fall 1978.

J. C. FERM, Univ. of S. Car., W. A. BRAGONIER, R & P Coal Co., and GEORGE PEDLOW, Chevron Oil Co. Guide to Cored Rocks of the Pittsburgh Basin. Several thousand core samples from diamond drill holes were sampled and grouped into lithologically similar groups. Samples from each lithologic group were photographed and assigned a 3-digit lithologic code. A guidebook to the cored rocks will be assembled from the photographs. ACD: Apr. 1979.

J. D. GLAESER, Duke Univ., and J. D. GLAESER & ASSOCIATES. Devonian Slope Sedimentation in the Central Appalachian Basin:

Source and Reservoir Deposits. A detailed stratigraphic framework linking source and reservoir deposits has practical application to continent-margin slope deposits, probable stratigraphic pathways linking known organic-rich lower continental margin beds to potential reservoirs on the continental shelf of eastern N. A. ACD: Apr. 1978.

S. O. MOSHIER, SUNY at Binghamton. Depositional Regimes in the Upper Cambrian [Conococheague carbonates of SE Pa.]. Petrographic analysis, statistical evaluation of lithologic repetition or cyclicity and study of vertical changes and lateral correlation of sections as an aid in developing a depositional model for these rocks in their regional setting. ACD: May 1979.

D. E. ROUSE, Allegheny Coll., and C. H. DODGE, U.S. Geol. Survey. Petrology and Petrography of the Knapp Formation (Early Mississippian) of Northwestern Pa. Emphasis is on petrographic analysis of thin sections of Knapp Conglomerate Member. Samples were collected in Elk, eastern Forest, and McKean Counties. ACD: June 1978.

## STRATIGRAPHY



T. M. BERG, Pa. Geol. Survey, and W. E. EDMUNDS, Consultant. The Huntley Mountain Formation of North-Central Pa. A new formation including the nonmarine transitional sequence between the Catskill Formation and the Burgoon Sandstone is being named. The formation has its type section at Huntley Mountain near Waterville, Pa. It has been mapped over about 4,000 square miles for the new state geologic map. ACD: Late 1978.

C. H. DODGE, U.S. Geol. Survey. Revised Stratigraphic Nomenclature of the Mississippian in Northwestern Pa. The stratigraphic nomenclature of the Mississippian of Clarion, Elk, Forest, Jefferson, and McKean Counties is being revised to conform with accepted usage, where appropriate, in Crawford, Venango, and Warren Counties. Work to date has concentrated on field investigations and subsurface data collection. Extensive use is being made of geo-

physical (primarily gamma-ray) logs for correlation purposes. ACD: 1980.

W. E. EDMUNDS, Consultant, T. M. BERG, W. D. SEVON, R. G. PIOTROWSKI, and LOUIS HEYMAN, Pa. Geol. Survey, and L. V. RICKARD, N.Y. Geol. Survey. The Mississippian and Pennsylvanian Systems of Pa. and N.Y. Summary of the lithostratigraphy, biostratigraphy, sedimentology, historical geology, and economic geology of the Mississippian and Pennsylvanian Systems in Pennsylvania and New York. ACD: Mar. 1978.

W. E. EDMUNDS, Consultant, T. M. BERG and W. D. SEVON, Pa. Geol. Survey, and G. R. SCHINER, U.S. Geol. Survey. Field Trip and Guidebook of the Mississippian System in Northern Pa. Stratigraphy, sedimentology, and historical geology of the Mississippian of northern Pennsylvania. ACD: May 1979.

K. O. HASSON, East Tenn. St. Univ., and J. M. DENNISON, Univ. of N. Car. Stratigraphy of the Devonian Harrell and Millboro Shales in Parts of Pennsylvania, Maryland, West Virginia, and Virginia [south-central and southwest]. ACD: May 1978.

LOUIS HEYMAN, Pa. Geol. Survey. The Ridgeley Formation in the Subsurface of Pa. The subsurface Ridgeley Formation is defined by geophysical log markers. Delineation of the unit, a subsurface section showing lithic variations in the unit, and map showing the extent and thickness of the unit and percent sandstone are planned. ACD: 1978-79.

V. A. SCHMIDT, J. D. DONAHUE, and H. B. ROLLINS, Univ. of Pitt. Paleomagnetism of Carboniferous Sediments in the Appalachian Basin [western Pa., eastern Ohio, northern W. Va.]. During the Carboniferous, the earth's magnetic field was predominantly in the reversed polarity configuration. Thus, any normal polarity events should serve as stratigraphic markers. The aim is to define a comprehensive magnetostratigraphy for the Appalachian Basin. A. M. THOMPSON, Univ. of Del., and DAVID GOLIKE. Paleobathymetry of Reedsville Formation, Central Valley and Ridge. T. O. WRIGHT, Allegheny Coll., G. C. STEPHENS, Bryn Mawr Coll., and ELLEN WRIGHT, Allegheny Coll. Mid-Upper Ordovician Clastic Rocks of Eastern Pa. The stratigraphy of the Martinsburg and other rocks related to the Taconic Orogeny is being restudied to resolve existing ambiguities and to provide detailed evidence for paleogeographic reconstructions based on modern tectonic models. ACD: 1980.



# STRUCTURAL GEOLOGY



PING-FAN CHEN, W. Va. Geol. & Econ. Survey. The Tectonics of the Central Appalachians. ACD: July 1978.

A. A. DRAKE, JR., P. T. LYTTLE, MICHAEL TAYLOR, J. E. REPETSKI, CHRISTINE TURNER-PETERSON, KAREN WENRICH-VERBECK, U.S. Geol. Survey, and G. G. LASH and ROBERT KASTELIC, Lehigh Univ. Central Appalachian Tectonic History [Newark and Baltimore 1° x 2° quads.]. A study of the evolution of the central Appalachians, particularly the role played by each of the major orogenies, their interrelations and possible plate models. Structural studies will be supported by basin analysis and conodont studies. Present emphasis is on detailed geology of Hamburg and Kutztown 7½-minute quadrangles and reconnaissance geology of Newark and Baltimore 2-degree quadrangles. ACD: Sept. 1983.

LOUIS HEYMAN, Pa. Geol. Survey. Subsurface Structure of the Plateau Region of North-Central and Western Pa. A map of the subsurface structure on the top of the Ridgeley Formation, the base of the Mandata Shale, and the top of the Salina G unit, each where appropriate, is being compiled. ACD: 1979.

G. G. LASH, Lehigh Univ., and A. A. DRAKE, JR., and P. T. LYTTLE, U.S. Geol. Survey. Structure and Stratigraphy of the Pen Argyl Member of the Martinsburg Formation in Lehigh and Berks Cos., Pa. This project is a field study of the stratigraphic and structural relations of the Pen Argyl Member, the upper member of the Martinsburg Formation, to allochthonous and autochthonous rocks west of the Lehigh River. ACD: May 1978.

JAY PARRISH and P. M. LAVIN, The Pa. State Univ. Regional Structure and Tectonics Associated with the Dixonville Kimberlite, Indiana Co., Pa. Regional and local gravity and magnetic surveys are being interpreted with respect to the small kimberlite intrusion near Dixonville, Pa. and other kimberlites in Pa., N.Y., Va., Ky., and Tenn. ACD: Sept. 1978.

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# SURVEY ANNOUNCEMENTS

## NEW GEOLOGIC ATLASES ISSUED

Three new geologic atlases have been issued by The Pennsylvania Geologic Survey for portions of Clearfield, Centre, Cumberland, Monroe and Pike counties. Each of the atlases contains detailed, full-colored geologic maps of the bedrock as well as the unconsolidated surficial deposits. The detailed maps (scale 1:24,000) and accompanying reports pay particular attention to the economic importance of the various geologic formations, as well as the engineering and environmental characteristics which will affect development and land-use planning. These atlases will be of importance to residents of the areas, planners, local officials, industry, and conservationists.

Atlas 85cd, *Geology and Mineral Resources of the Ramey and Houtzdale Quadrangles, Clearfield and Centre Counties, Pennsylvania*, by G. B. Glass and others, is available for \$18.50 (plus tax for Pa. residents).

Atlas 138ab, *Geology and Mineral Resources of the Carlisle and Mechanicsburg Quadrangles, Cumberland County, Pennsylvania*, by S. I. Root, is available for \$6.75 (plus tax for Pa. residents).

Atlas 214a, *Geology and Mineral Resources of the Skytop Quadrangle, Monroe and Pike Counties, Pennsylvania*, by T. M. Berg and W. D. Sevon, is available for \$6.50 (plus tax for Pa. residents).

The above publications should be ordered from the State Book Store, P. O. Box 1365, Harrisburg, Pa. 17125.

## SURPLUS TOPOGRAPHIC MAPS

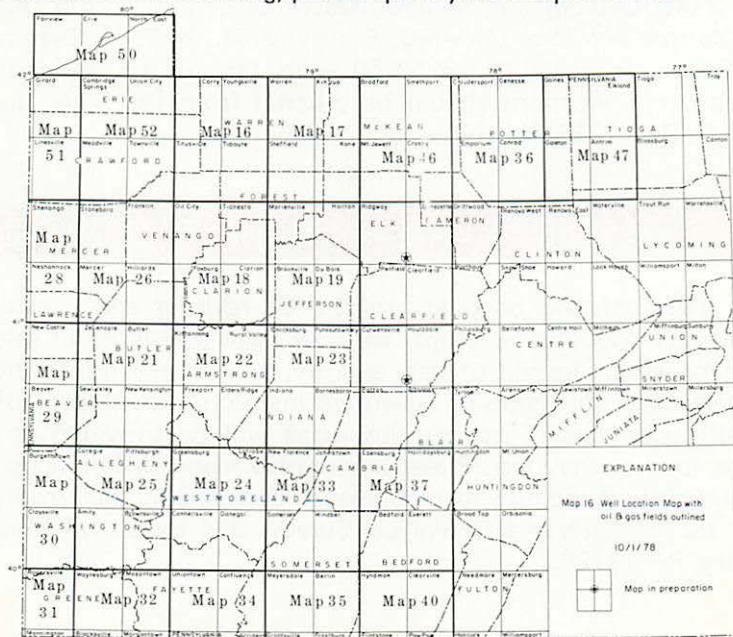
As a result of the ongoing program of revising and updating Pennsylvania's topographic maps, we now have a number of quadrangle maps which are out of date and are, therefore, surplus. These are still excellent for group or classroom instruction in map reading and profile exercises. These surplus maps will be provided at no charge as long as they last. Please advise how many different quadrangles are desired and how many copies of each quadrangle. Address requests to: Pennsylvania Geological Survey, 914 Executive House, Harrisburg, PA 17120.



## NEW OIL AND GAS BASE MAP AVAILABLE

Three new oil and gas base maps, #50, 51, 52, are now available and twenty-two previously published base maps are also available. Each base map encompasses four 15-minute topographic quadrangles and is at the scale of 1 inch equaling a mile and shows locations of oil and gas wells and the outlines of the oil and gas fields. Refer to index map. A five-minute grid, quadrangle names, county boundaries, and major rivers and towns make up the background of the base map. All deep wells known and all shallow wells on record with the Pennsylvania Geological Survey are located, and the status (dry, oil producing, gas producing, etc.) is shown by symbol. Deep wells (Tully Formation or deeper) are differentiated and elevation and total depth are shown. Symbols indicate the availability of geophysical log and sample data on open file in the Survey's Oil and Gas Division office in Pittsburgh. An index map with the legend shows the outlines of oil and gas fields within the mapped area, thus indicating areas of extensive pre-1956 drilling. A listing of the field names is also included.

Paper prints of the base maps can be obtained by writing to the State Book Store, P. O. Box 1365, Harrisburg, Pennsylvania 17125. The cost of each base map is \$0.50, plus a 6 percent sales tax to Pennsylvania residents. A check for the appropriate total amount made out to the Commonwealth of Pennsylvania must accompany the order. When ordering, please specify the map number.



## URANIUM NEAR OLEY, BERKS COUNTY

Uranium has been discovered by the Pennsylvania Geologic Survey in pegmatitic gneiss near the headwaters of Monocacy Creek, 1 km (.6 mile) west of Oley, Berks County. Examination of outcrops of Precambrian gneiss along Pa. Route 73 with a Geiger counter on April 5, 1978, ultimately resulted in finding an area of approximately  $\frac{1}{2} \times 1$  kilometer (.3 x .6 mile) where the salmon-pink albite gneiss is enriched in uranium and, possibly, thorium.

Rock exposures in the area are few, but a 100 foot horizontal channel sample (excluding a 5 ft. covered interval and a 9 ft. barren, hornblende biotite gneiss zone) was collected by V. Skema and the author across the face of the inactive Moxon borrow pit (Figure 1). Radioactivity along the channel varied from 0.1 to 0.3 mR/hr, with the highest activity being associated with the more closely spaced  $N50\pm10$  E-trending shear zones. Analysis of this sheared and somewhat weathered sample yielded 67 ppm  $U_3O_8$ . Reconnaissance with a gamma-ray spectrometer in the woods immediately above the channeled-sample section suggests that this exposure is typical of the overall pegmatitic albite gneiss in this area.

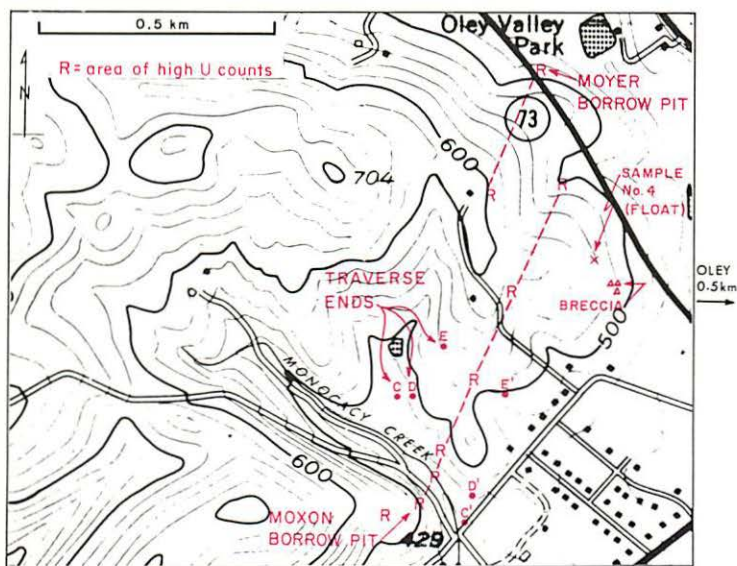


Figure 1. Location map of uranium mineralization in albite gneiss, Oley area, Berks County.

Five additional gamma-ray traverses (NW-SE) were conducted to determine the extent, variability, and orientation of mineralization. Figure 1 shows the areas where high uranium counts were found. The thorium counts were less variable and suggest smaller amounts of thorium. Figure 2 shows the variation in uranium counts along traverse E. Each traverse yielded a distinct 75 to 150 ft. wide uranium count anomaly above the already high background for this area. Continuity of anomalies between traverses has not been proven, but they may define three or more N20-25 E-trending zones enriched in uranium relative to the "normal" albite gneiss exposed in the Moxon borrow pit. The linearity of the hypothesized NE-trending zones suggests that the locus of more intense mineralization would be subvertical faults and/or shear zones. The presence of previously unmapped Hardyston Formation tectonic breccia in the area (Figure 1) suggests that additional structures are present.

Selected analyses of samples of albite gneiss collected from some of the uranium count anomalies are listed below:

| Element or Oxide              | Sample |     |     |      |
|-------------------------------|--------|-----|-----|------|
|                               | 1      | 2   | 3   | 4    |
| Fe %                          | 1.5    | 2   | 1   | 10   |
| La ppm                        | 70     | 70  | 50  | 500  |
| Nb                            | 20     | 300 | 200 | 500  |
| Ti                            | 200    | 700 | 500 | 2000 |
| Y                             | 20     | 70  | 50  | 1000 |
| Zr                            | 20     | 300 | <20 | 200  |
| U <sub>3</sub> O <sub>8</sub> | 67     | 520 | 230 | 1100 |

**Sample**

- 1, 100 ft. channel sample from Moxon borrow pit.
- 2, float from area of highest counts on traverse D.
- 3, grab sample from 3-6 ft. wide zone in Moyer borrow pit.
- 4, float from stone pile in Moyer field.

Except for the fluorimetric uranium assays, the analyses are semi-quantitative via emission spectroscopy.

Thin films of fluorescent-green (under ultraviolet light) hyalite opal were found in both samples 2 and 4. Sample 4 was richest in uranium near magnetite, indicating that a magnetometer might aid prospecting. Also observed in sample 4 were golden-brown radioactive grains with a resinous luster and zircon-like structure and thin yellow films of an unidentified yellow secondary mineral along fractures.



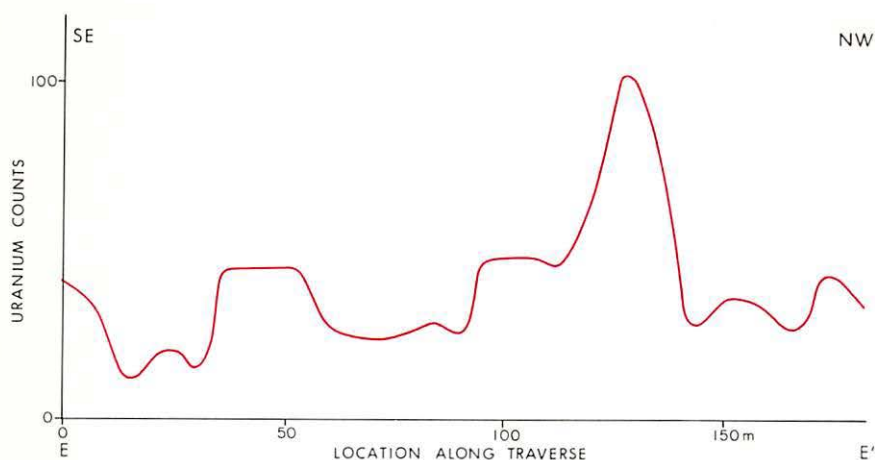


Figure 2. Variation in uranium counts along traverse E-E', which trends S48E. The data were collected at 8 meter intervals along the traverse. Based on float sampling and trace element analyses, in this area, the 100 uranium counts from the instrument used probably corresponds to on the order of 200 ppm  $U_3O_8$  in the surface float.

Neither of the two property owners, Jacob Moyer and John S. Moxon, desire to have anyone examine the properties without their advance permission. No collectable mineral specimens were observed.

From the data reported above it is not possible to evaluate the economic potential of this occurrence. Because of probable leaching of uranium from accessible samples, subsurface data is needed to properly evaluate the significance of this uranium mineral occurrence.

### MINERALOGICAL SOCIETY OF PENNSYLVANIA ISSUES NEW BOOK

The Mineralogical Society of Pennsylvania has announced that "Annotated Bibliography of Minerals New to the Pennsylvania List, 1965-1974" written by Juliet C. Reed, has been published. The printing of this booklet was subsidized by the society and is offered for sale at the cost price, \$2.75, plus \$.50 postage and handling. To request, address Mrs. Reed at 336 Rockland Road, Wayne, PA 19087. Members of the society can obtain this book at no cost, and this book, plus the book "Mineralogy of Pennsylvania, 1922-1965," written by Arthur Montgomery and published in 1969, are available free to any library on request to the society. The book combines features of special interest to collectors and to mineralogical researchers.

## Meet The Staff...

Robert Piotrowski, Chief  
Oil and Gas Geology Division



On May 25, Robert G. Piotrowski was appointed Chief of the Oil and Gas Geology Division in Pittsburgh. Bob joined the staff of the Pennsylvania Geological Survey in May 1975 as a petroleum geologist in the Oil and Gas Geology Division. His first assignment was the Upper Devonian Stratigraphic Framework project, which consisted of preparing cross sections from well control points to calculate net sand and thickness of defined zones and units. This project was incorporated with the U.S. Department of Energy's Eastern Gas Shale project, of which Bob is the principal investigator for Pennsylvania. The two projects will be published by the U.S. Department of Energy. Since joining the Survey, Bob has had several of his reports published. He has authored papers on Onondaga reefs and Devonian shale gas for *Pennsylvania Geology*, co-authored several Survey annual development reports and map of the overburden on the Upper Freeport Coal, and authored a paper on oil and gas developments in Pennsylvania in 1977 for the International Oil Scouts of America.

Bob was born in Homestead, Pa. in 1948 but spent most of his childhood in Falls Church, Virginia. He graduated from the University of Dayton cum laude in 1970 with a B.S. in geology. After graduation from college he was drafted into the Service, where he spent most of his time in Korea working as a personnel specialist. Bob continued his education at Duke University, and he was awarded a two year teaching assistantship while working on his thesis on "Carbonate Sedimentation on U.S. Atlantic and Eastern Gulf of Mexico Beaches." He received his M.S. in geology in 1974.

Upon completion of school, Bob worked for the Amoco Production Company in New Orleans where he had previously worked one summer. As chief exploration geologist in the Hosston-Cotton Valley play in Mississippi, he interpreted logs, samples, and drilling data in order to recommend purchase of acreage.

Bob readily accepted the position with the Survey for the opportunity to live and work in Western Pennsylvania. He now lives in Bridgeville, a Pittsburgh suburb, with his wife Judy and daughter Jill.

Bob is a member of the American Association of Petroleum Geologists and a Member of the Board of Directors of the Pittsburgh Geological Society.



## PENNSYLVANIA GEOLOGICAL SURVEY STAFF

Arthur A. Socolow, *State Geologist*  
Donald M. Hoskins, *Assistant State Geologist*

### TECHNICAL SERVICES


Shirley J. Barner, *Stenographer*  
Sandra Blust, *Librarian*  
John G. Kuchinski, *Draftsman*  
Christine Miles, *Geological Editor*  
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Jesse Craft, *Geologist* (Pittsburgh Office)  
Eugene D. Hess, *Geologist*  
Donna M. Snyder, *Stenographer*



Larry E. Taylor, *Hydrogeologist*  
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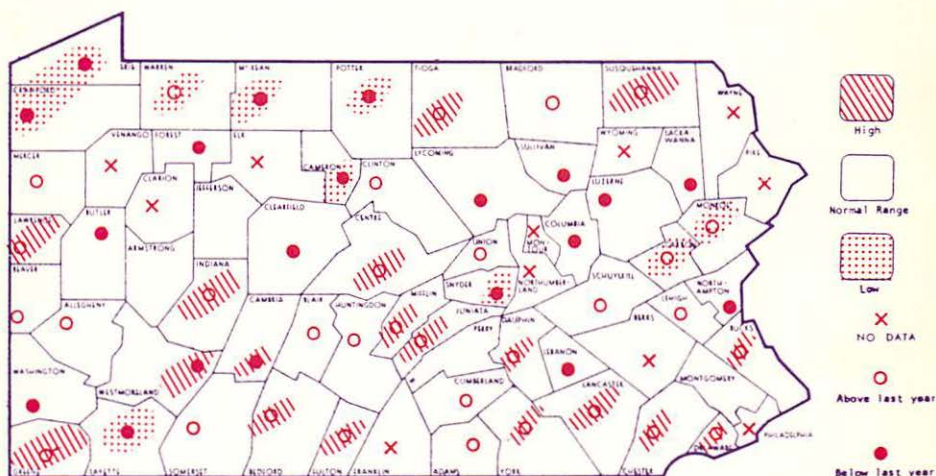
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# GROUND-WATER LEVELS FOR JULY 1978



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