

COMMONWEALTH OF PENNSYLVANI Milton J. Shapp, Governor DEPARTMENT OF ENVIRONMENTAL RESOURCES Maurice K. Goddard, Secretary TOPOGRAPHIC AND GEOLOGICAL SURVEY Arthur A. Socolow, State Geologist CONTENTS The State Geologist Reports Geological Research in Pennsylvania 2 Publications Published 19 Survey Announcements 31 ON THE COVER: Pennsylvania's idyllic landscape of farmland, mountains and forests, as seen along the Susquehanna River near Tunkhannock. Photo courtesy of Grant Heilman, Lititz, Pa. PENNSYLVANIA GEOLOGY is published bimonthly by the Topographic and Geologic Survey, Dept. of Environmental Resources, Harrisburg, Pennsylvania, 17120. Articles may be reprinted from this magazine if credit is given to the Topographic and Geologic Survey. AUGUST 1974

FROM THE DESK OF THE STATE GEOLOGIST . .



GEOLOGY GOES UNDERGROUND

In recent years we have been pleased to note that geology is playing an ever-increasing role in our society at the national, state, and local levels. Geology is now involved in such diverse functions as land use planning, floodplain management, designation of wilderness areas, planning of mass transit routes, solid and liquid waste disposal site evaluation, area economic development, design of public water and sewage systems, and prevention of hazards such as landslides and subsidence.

Recently, as a member of the National Academy of Science's Committee on Tunnelling Technology, I was impressed with the stated need for geologic mapping and data as spelled out by engineers on the Committee, as well as administrators of the National Academy. The plea of the engineers was for the geologic community to step up the pace of geologic mapping in urban areas, with particular emphasis on subsurface geologic data in a language and format usable by engineers and designers. There is need for specific local data on rock properties and rock structures as they affect excavation and construction. The use of underground excavations for transportation, storage, mining, industry, and power generation is greatly increasing, particularly in the crowded urban and suburban areas. A new factor which is accelerating underground excavation is the recognition that underground placement of facilities alleviates undesirable environmental impacts of surface installations. Thus, the economics of subsurface installation is changing with the recognition that excavation costs are balanced by avoiding project delays and the high costs of surface environmental safequards.

The engineering community engaged in subsurface excavation and installations points out that geologic mapping programs and subsurface investigations need to focus on the metropolitan areas where much of the excavation work is now concentrated and where more is likely to be undertaken in view of the stress on mass transit systems and improved water and sewage systems. The engineers urge geologists to provide detailed data on the subsurface rock structures and rock properties with which engineers must deal in their project work.

GEOLOGICAL RESEARCH IN PENNSYLVANIA 1974

INTRODUCTION

This publication is the seventeenth annual report on Geological Research and Publications in Pennsylvania. Because of the extensive response and large number of projects reported to us, we have had to exercise editorial authority and reduce the description of the research in progress to fit our available space. In addition, we have attempted to determine an anticipated completion date (ACD) for each project.

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 are omissions. This in unintentional. Additional copies of this report can be obtained by writing to the Bureau of Topographic and Geologic Survey, Department of Environmental Resources, Harrisburg, Pennsylvania 17120.

RESEARCH IN PROGRESS



AREAL GEOLOGY H. H. ARNDT, U.S. Geol. Survey. Western Middle Anthracite Field. ACD: 1974.

T. M. BERG and W. D. SEVON, Pa. Geol. Survey. Geology and Mineral Resources of the Skytop 7½' Quad., Monroe and Pike Cos., Pa. Field work is completed and office compilation is underway.

T. M. BERG and W. D. SEVON, Pa. Geol. Survey, and MILENA BUCEK, the Pa. State Univ. Geology and Mineral Resources of the Pocono Pines and Mt. Pocono 7½' Quads., Monroe Co., Pa. Field work is completed and the bedrock geologic map is finished. A surficial geology map is nearing completion.

A. A. DRAKE, JR., U.S. Geol. Survey. Allentown Quad. and Vicinity [eastern Pa.]. Objectives: To decipher the tectonic history of the area with special emphasis on the emplacement of gravity slides, Alpine nappes, and thrust sheets as well as the mechanics of multiple deformation. Field work is complete in the Hellertown, Allentown East and Catasauqua quads. and has been started in the Cementon, Slatedale, New Tripoli, and Topton quads. ACD: 1980.

W. E. EDMUNDS, J. D. INNERS, and M. A. SHOLES, Pa. Geol. Survey, G. B. GLASS, Wyoming Geol. Survey, V. C. SHEPPS and G. A. ASHLEY. Geology and Mineral Resources of the Southern Half of the Houtzdale 15' Quad., Clearfield Co., Pa. ACD: 1974.

J. B. EPSTEIN, U.S. Geol. Survey, W. D. SEVON, Pa. Geol. Survey, J. D. GLAESER, The City Coll. of the City Univ. of N.Y., and G. G. CONNALLY, SUNY at Buffalo. Wind Gap Area, Pa. Mapping of Lehighton and Palmerton quads. completed and in press. Wind Gap, Kunkletown, and Saylorsburg quads. being prepared for publication. Report on cleavage in eastern Pa. in preparation. ACD: 1974.

R. T. FAILL, Pa. Geol. Survey. Geology and Mineral Resources of the Montoursville South and Muncy 7½' Quads., Lycoming Co., Pa. ACD: 1974.

G. W. FISHER, M. W. HIGGINS, and I. ZIETZ, U.S. Geol. Survey, Geologic Interpretation of Aeromagnetic Map of the Northern Piedmont [Va., Md., Pa., Del., N.J.]. ACD: 1975.

A. D. GLOVER, Pa. Geol. Survey, and W. A. BRAGONIER, R & P Coal Co. Geology and Mineral Resources of the Dubois 15' Quad. Field work is completed and report is in preparation. A. D. GLOVER and J. H. WAY, JR., Pa. Geol. Survey. Geology and Mineral Resources of the Altoona 15' Quad.

S. H. HOLLIS, Bryn Mawr Coll. Geology of the Bunker Hill Volcanics and Associated Rocks in the Martinsburg Shale. The southern half of the Fredericksburg 7½' quad. has been mapped in detail. ACD: 1974.

D. M. HOSKINS, Pa. Geol. Survey. Geology and Mineral Resources of the Millersburg 15' Quad. [central Pa.]. ACD: 1974.

D. M. LAPHAM, Pa. Geol. Survey. The Serpentinites and Associated Rocks of Lancaster Co., Pa. ACD: 1976 or later.

D. B. MACLACHLAN, Pa. Geol. Survey. Geology of the Reading 15' Quad.

S. I. ROOT, Pa. Geol. Survey. Geology and Mineral Resources of the Mechanicsburg and Carlisle 7½' Quads. Plan to prepare a reconnaissance geologic map of Cumberland County in cooperation with A. Becher and W. Wetterhall of U.S.G.S.

A. W. ROSE, The Pa. State Univ., and HARRY CROUSE, D'Appolonia Assoc. Coal Resources, Pine Creek Drainage [Lycoming and Tioga Cos.]. ACD: 1974.

A. W. ROSE and H. W. SCHASSE, The Pa. State Univ. Geology and Mineral Deposits, Butler Knob and Adjacent Quads., Huntingdon Co. The relationship of sulfides to structure and stratigraphy is under study. ACD: 1974.

S. P. SCHWEINFURTH, U.S. Geol. Survey. Claysville-Avella [Washington Co.]. In preparation: Geology of the Avella quad. and part of the Steubenville East quad.

W. D. SEVON and T. M. BERG, Pa. Geol. Survey, and L. D. SCHULTZ, Lehigh Univ. Geology, Mineral Resources and Environmental Characteristics of Pike Co., Pa. Field work, including extensive sampling and analysis of surficial deposits, will be completed during the 1974 field season.

R. B. WELLS and R. T. FAILL, Pa. Geol. Survey. Geology and Mineral Resources of Montoursville North and Huntersville Quads., Lycoming Co. ACD: 1974. G. H. WOOD, JR., U.S. Geol. Survey. Southern Anthracite Field. Limited field checking will continue in the area of the Weatherly $7\frac{1}{2}$ ' quad. A geologic map of anthracite in the Nesquehoning $7\frac{1}{2}$ ' quad. is being prepared for publication.

ECONOMIC

GEOLOGY



THOMAS ARKLE, JR., C. W. LOTZ, JR., ROBERT REPPERT, FORREST JONES, ALAN KEISER and MICHAEL ROSCOE, W.Va. Geol. and Econ. Survey. Coal Resources Investigation and Pollution Potential Study. Maps of surface and underground mines and existing data on coal by seams are being compiled, and field parties are conducting geologic work and collecting additional data on the physical and chemical characteristics of coal seams and associated rocks. ACD: 1983.

ERNST CLOOS, Johns Hopkins Univ. Geology of the Thomasville area, York Co.

J. L. CRAFT, Pa. Geol. Survey. Quality of Glacial Gravels in the Franklin-Warren Area. Objectives are to obtain a better understanding of composition of land-based gravel deposits in the Franklin-Warren area; to develop a method whereby prime exploration targets for quality gravel can be identified; and to look for methods of upgrading low-quality gravel to high-quality gravel. ACD: 1975.

J. M. DENNISON, Univ. of N.C. Factors Favoring Uranium Protore in Fluvial or Probably Fluvial Strata of Precambrian and Paleozoic Age in Pa., Ohio, N.Y., and N.J. Summary based on literature study and field investigation to delimit distribution and character of fluvial and possibly fluvial strata, seeking relationships favorable for uranium. ACD: 1974.

J. C. GRIFFITHS, The Pa. State Univ. Value of Mineral Resources of Pa. ACD: 1975-76.

W. S. LYTLE, LAJOS BALOGH and LILLIAN HEEREN, Pa. Geol. Survey. Oil and Gas Field Map of Pa. The 1963 map will be updated as of June 1974. ACD: 1975.

W. S. LYTLE and LILLIAN HEEREN, Pa. Geol. Survey. Oil and Gas Pipelines in Pa. The October 1972 oil pipelines and gas pipelines maps will be brought up to date as of June 1974 at a scale of 1:500,000. ACD: 1974.

W. S. LYTLE, Pa. Geol. Survey, and petroleum engineers with oil companies in Pa. Updating of Mineral Resource Rept. 32, Crude Oil Reserves of Pa. New data will be used to update the 1947 reserve figures to the present. ACD: 1974.

B. J. O'NEILL, JR., Pa. Geol. Survey. Limestones in Pa. with Potential for Use in Stack-Gas-Removal (SO_X) Systems. ACD: 1974.

B. J. O'NEILL, JR., Pa. Geol. Survey. Properties and Uses of Shales and Clays in Southwestern Pa. A continuation of the series of programmed studies to evaluate the economic potential of shale-clay raw materials for ceramic and non-ceramic uses. ACD: 1974.

A. W. ROSE and P. DEINES, The Pa. State Univ., and D. C. HER-RICK, Univ. of Alberta. Mineralogy and Isotope Geochemistry of Cornwall-type Magnetite Deposits. Magnetite and calcite samples from Dillsburg, Grace Mine, French Creek, and Boyertown are being analyzed for O¹⁸ to determine if the very heavy values found for Cornwall are typical. Sulfur isotope analyses have also been run. ACD: 1974.

M. S. SILVERMAN, Univ. of Toledo. Determination of Mineralization Controls by Geochemical Analysis of Soils Along Fracture Zones in the Northern Shenandoah Valley. It is hoped that this project will help in determining whether or not fracture zones have localizers for sulfide mineralization in this stratigraphic and tectonic setting. ACD: 1975.

R. C. SMITH, II, Pa. Geol. Survey. Lead and Zinc Occurrences of Pa. [central and S.E. Pa.]. Occurrences of sphalerite and/or galena are being located, described, and sampled. Field studies have been completed for many occurrences and the open-file status of most reports will be announced in late 1974. ACD: 1975.

W. R. WAGNER, Pa. Geol. Survey. Revised Surface Structure Map of Greater Pittsburgh Area and Its Relation to Oil and Gas Fields. Anticipated publication date is 1975.

WALLACE deWITT, JR., A. G. EPSTEIN, L. D. HARRIS, R. L. MILLER, and W. J. PERRY, U.S. Geol. Survey. Appalachian Basin Oil and Gas Resources. Objectives: To prepare a synthesis of the Appalachian basin evaluating the petroleum potential, to delineate potentially productive areas within selected lithofacies or stratigraphic units, to designate areas for local intensive study, and to encourage exploratory drilling in the untested parts of the basin. ACD: 1980.



ENVIRONMENTAL

GEOLOGY

S. S. ALEXANDER, D. P. GOLD and J. DEIN, The Pa. State Univ. Applications of ERTS-1 Remote Sensing to Strip Mine and Acid-Mine Drainage Problems in Pa. [W. Branch of Susquehanna, Kylertown area]. The objective is to assess the usefulness of ERTS-1 data for (1) monitoring the areal extent of stripping for coal, (2) detecting areas adversely affected by acid-mine drainage, and (3) determining the effectiveness of reclamation and abatement procedures. ACD: 1975.

D. H. BATIPPS, A. W. Martin Associates, Inc. Crum Creek Water Quality Study. The purpose of this study is to determine the effect of proposed highway construction of L.R. 1010, Section B-1, Delaware Co., on the turbidity and sediment load entering the Crum Creek Reservoir of the Philadelphia Suburban Water Co. ACD: 1976.

W. W. BECK, JR. and R. W. KANE, A. W. Martin Associates, Inc. Relationship between Underground Mine Water Pools and Subsidence in the Northeastern Pa. Anthracite Fields. Study concerns the determination of critical mine pool factors that define the relationship between mine pool water level fluctuations and surface subsidence. ACD: 1974. R. P. BRIGGS, U.S. Geol. Survey. Element A of USGS-Appalachian Regional Commission Project: Inventory of Disturbed Ground, Allegheny Co. Objectives are to inventory landslides, mining effects, and other earth disturbance features by means of aerial photographs and field verification, thus identifying actual and potential problem areas in Allegheny Co. The completion of field work is scheduled this year.

R. P. BRIGGS, U.S. Geol. Survey. Element D of USGS-Appalachian Regional Commission Project: Integration of Element A with Existing Data, Allegheny Co. The purpose of this project is to integrate new data from other elements with existing data and interpret them to produce derivative maps aimed at improved land and resource use.

R. P. BRIGGS, U.S. Geol. Survey. Greater Pittsburgh Regional Studies. Laboratory activities this year will include compilation of geologic, hydrologic, topographic, soils, land use, mining, and resource data; analysis, evaluation, and interpretation of data. A wide variety of environmental and derivative maps are being prepared for the Greater Pittsburgh region. A report on regional nutrient water-quality reconnaissance, and a drainage gazetteer of streams, dams, and water-measuring locations are being prepared.

JOE FISCHER, Dames and Moore. Geology and Seismology, Fulton Generating Station [Fulton Township, Pa.].

J. F. WEHMILLER, Univ. of Delaware. Stream Channel Morphology, Rocky Run, Delaware Co., Pa. ACD: 1974.

GENERAL GEOLOGY

G. O. W. KREMP, Univ. of Ariz. A Re-evaluation of Global Plantgeographic Provinces of the Late Paleozoic. A research project concerning the climatological and plantgeographic situation of Pa. in the Late Paleozoic.

GEOCHEMISTRY

D. M. LEWIS and K. K. TUREKIAN, Yale Univ. Natural and Man-Induced Controls of the Geochemistry of a Major River: The Susquehanna River. ACD: 1975. A. W. ROSE, The Pa. State Univ., and D. I. PENNINGTON, Sanders and Thomas. Uses of Geochemical Exploration to Locate Chrome Ores, State Line District, Lancaster, Pa. ACD: 1975.

F. M. SWAIN, Univ. of Minn. and Univ. of Del. Low Temperature Pyrolysis of Devonian Shales [central Pa.]. It is the purpose of the present research to determine quantitative and qualitative yields of hydrocarbons when the shales are subjected to low temperature pyrolysis. ACD: 1975.

J. F. WEHMILLER, Univ. of Del., and THOMAS CAHILL, Tri-County Conservancy. Geochemistry of Pristine Watersheds, Brandywine Basin. ACD: 1975.

R. W. WHITE, U.S. Geol. Survey. Dispersion of Elements in the Zone of Weathering [quarry of John T. Dyer, two miles west of Birdsboro, Pa.]. The weathered profile on diabase has been sampled as a part of a topical study of the geochemistry and mineralogy of weathering of diabase in N.J., Pa., Va., and N.C., and of basaltic rocks in several western states. ACD: 1975.

GEOMORPHOLOGY

W. B. WHITE, The Pa. State Univ. Caves of Pa. A complete compilation of short descriptions and geological interpretation of the limestone caves of Pa. is underway. A volume of western Pa. caves is complete and work on central Pa. is now underway.

GEOPHYSICS

S. S. ALEXANDER, P. M. LAVIN, M. G. JUSTICE and S. J. GALI-ETTE, The Pa. State Univ. Mapping Overburden Thickness in Limestone Regions [central Pa. (State Coll. area)]. Conventional seismic refraction surveying was done to estimate soil velocities and thicknesses between drill holes in a limestone region. Further work is in progress to use seismic surface waves to infer the in-situ density, shear modulus, and Young's modulus of the soil. ACD: 1975. W. A. CRAWFORD, Bryn Mawr Coll., J. H. KALMBACH, Harvard Univ., and J. L. FRIEDBERG, Aeroservice Corp. Magnetic and Gravity Profiles across the Honey Brook Anorthosite [N. half, Wagontown quad., S.E. Pa.]. We hope to be able to make some statements about the size and shape of the anorthosite body and the nature of its contact with adjacent country rocks. ACD: 1974.

R. J. GREENFIELD and CHARLES STOYER, The Pa. State Univ. Use of Electromagnetic and Electrical Methods to Study Ground Water Pollution by Acid Mine Water. A geophysical survey was made in Kylertown, Pa., in an area where the ground water is polluted with acid mine drainage. It was demonstrated that fracture traces which act as conduits for ground-water flow can be located with electromagnetic surveying methods. ACD: 1974.

JOHN HENDERSON, U.S. Geol. Survey. Aeromagnetic mapping for Pa. at 1:250,000 has been completed. Four maps for the central and northern part of the State are being prepared for open-file release.

B. F. HOWELL, JR., The Pa. State Univ. Relative Seismic Hazard in the U.S. Maps of Cumulative Seismic Hazard Index based on past seismicity have been prepared and values of Average Regional Seismic Hazard Index (ARSHI) found from these data. Values of expectable recurrence intervals of earthquakes of different sizes are being sought.

J. C. HOWER, Ohio State Univ. Paleomagnetism of the Ordovician Igneous Rocks of Lebanon Co., Pa. [Jonestown-Mt. Zion-Bunker Hill]. ACD: 1975.

P. M. LAVIN and M. A. SCANLIN, The Pa. State Univ. Regional Gravity and Magnetic Surveys. Regional gravity and total magnetic field intensity surveys were conducted along a traverse across Mine Ridge anticline and extending from New Holland to Oxford, Pa. Quantitative interpretation of the anomalies is in progress. ACD: 1974.

M. L. SBAR and L. R. SYKES, Lamont-Doherty Geol. Observatory. Study of the Seismicity in the Vicinity of the Proposed Tocks Island Dam [Delaware Water Gap].

K. W. VOLK and P. M. LAVIN, The Pa. State Univ. Paleomagnetism of Mesozoic Intrusives in Southeastern Pa. The paleomagnetism of diabase bodies is being used to determine the detailed late-stage tectonic history of the Triassic Basin. ACD: 1975.



GLACIAL GEOLOGY

D. R. COATES, SUNY at Binghamton. Reappraisal of the Glaciated Appalachian Plateau. ACD: 1974.

D. R. COATES and J. T. KIRKLAND, SUNY at Binghamton. Applications of a Glacial Model for Large-Scale Terrain Derangements [Glaciated Appalachian Plateau in N.Y. and Pa.]. The correlation of topographic anomalies and glacial deposits with a theoretically derived ice model suggests a new approach to glaciation in a rugged terrain. ACD: 1974.

G. H. CROWL, Ohio Wesleyan Univ. The Late Wisconsinan Glacial Border in Northeast Pa. Border has been remapped from the Appalachian Front north of Benton almost to Trout Run, a part of a larger project extending northwest from the Lehigh R. near White Haven. ACD: 1974.



HYDROLOGY

R. M. FOOSE, Amherst Coll. Determination of Hydrogeologic Parameters of Carbonate Rocks in Hershey Valley (Porosity, Permeability, Specific Yield, Transmissibility). Through a series of pump tests and the measurement of more than 25 points of observation in a twoweek time period, and 6 points of observation by continuous recording, an understanding of all the parameters that affect the behavior of water in several carbonate formations (Ordovician age) is being developed.

A. R. GEYER and E. T. SHUSTER, Pa. Geol. Survey. General Geology and Ground Water for Subbasins in the State Water Plan. This project will result in a description of the hydrologic properties of the various rock units in each subbasin of the State Water Plan. Only existing data will be used. ACD: 1974.

E. T. SHUSTER, Pa. Geol. Survey. Hydrogeology of the DuBois Area, Jefferson and Clearfield Cos.

E. L. WHITE, The Pa. State Univ. Flood Hydrology of Carbonate Watersheds in the Appalachian Mtns. The objective is to devise a model which will relate the flood behavior with geomorphic parameters of drainage basins in carbonate terrains. ACD: 1975.

C. R. WOOD, U.S. Geol. Survey, and D. B. MACLACHLAN, Pa. Geol. Survey. Geology and Hydrology of Northern Berks Co. ACD: 1974.

IGNEOUS AND METAMORPHIC PETROLOGY



M. L. CRAWFORD and ROB KUHLMAN, Bryn Mawr Coll. Mapping and Petrology in the West Chester and Coatesville 15' Quads.

A. A. DRAKE, JR. and R. I. TILLING, U.S. Geol. Survey. Petrochemistry of the Precambrian Rocks of the Reading Prong [eastern Pa., northern N.J., southern N.Y.]. ACD: 1980.

J. R. HUNTSMAN and W. A. CRAWFORD, Bryn Mawr Coll. The Petrology of the Country Rocks in the Honey Brook Anorthosite Area, Chester Co. ACD: 1975.

D. A. YOUNG, Univ. of N.C. Studies of the Baltimore Gneiss in the Philadelphia Area. ACD: 1975.



MINERALOGY

J. H. BARNES and D. M. LAPHAM, Pa. Geol. Survey, and WAYNE F. DOWNEY, JR., Juniata Coll. Mineralogy Associated with Burning Anthracite Deposits. A report on minerals forming from sublimation of gases produced by subsurface fires in anthracite mines and culm banks in Luzerne, Schuylkill and northern Dauphin Cos. ACD: 1974.

R. W. GRANT and ARTHUR MONTGOMERY, Lafayette Coll. Investigation of Pa. Minerals. Investigation of older occurrences, where data are incomplete, and occurrences of minerals new to the State. We are currently compiling an updated and validated list of Pa. minerals.

D. M. LAPHAM, J. H. BARNES and A. R. GEYER, Pa. Geol. Survey. Mineral Collecting in Pa. An updating and revision of General Geology Rept. 33, including addition of information on minerals, mineral collecting, and related geology for significant localities in Pa. ACD: 1976.

D. K. SMITH, The Pa. State Univ., and R. C. HAEFNER, SUNY at New Paltz. Identification of New Minerals from Cedar Hill Quarry, Lancaster Co. Two new copper minerals have been recognized in the serpentine bodies in southern Lancaster Co. We are attempting to obtain detailed chemical and crystallographic data in order to adequately validate them as new minerals.

D. K. SMITH, The Pa. State Univ., and D. C. OSWALD, Carnegie Museum. Crystal Structures of the Polymorphs of ZnS. Polymorphic forms of wurtzite have been described from the clay-ironstone concretions found in the Brush Creek limestone of the Conemaugh Fm.

of Pennsylvanian age. If X-ray diffraction proves that the crystals are pure polymorphs, their crystal structures will be determined to see if there are any detectable differences in the basic structure of the layers.

PALEONTOLOGY



MARIANNE ABLE and H. W. PFEFFERKORN, Univ. of Pa. History of Paleobotany in Pa. Development of Pa. paleobotany (including palynology) and complete bibliography. ACD: 1974-75.

J. R. BEERBOWER, H. E. ROBERSON, J. D. GRIERSON and I. KARCZ, SUNY at Binghamton. Devonian Terrestrial Habitats and Evolution of Terrestrial Communities. An investigation of the various terrestrial habitats represented in middle and late Devonian rocks in Pa., N.Y., and the Maritime provinces. Will involve combined paleon-tologic, paleobotanical, physical, sedimentological, and geochemical studies. ACD: 1975.

T. M. BERG, Pa. Geol. Survey. Pa. Geol. Survey Paleontology Collection. Work has begun on reestablishment of a reference collection.

T. M. BERG, Pa. Geol. Survey, and R. E. THOMS, Portland State Univ. Burrowing habits of *Archanodon* (Devonian) compared to *Margaritifera* (Holocene). Research has continued intermittently over the past year.

J. A. HARPER, Univ. of Pittsburgh. Gastropods of the Conemaugh Marine Events (Pennsylvanian) of the Appalachian Basin [W. Pa., W.Va., E. Ohio]. Samples will be processed for the recovery of microand macro-gastropods. A study will be made to determine if marine transgressive-stillstand-regressive phases result in any distinct evolutionary trends in the gastropods. ACD: 1976.

J. A. HARPER and H. B. ROLLINS, Univ. of Pittsburgh. New Ophiuroids (Echinodermata: Asterozoa) from the Brush Creek (Pennsylvanian; Conemaugh) of Western Pa. Two ophiuroids from the Brush Creek marine shales of Punxsutawney are being described, and a study of the functional morphology of one is being prepared. ACD: 1974.

WARREN NORTON, Univ. of Pittsburgh. Paleoecology and Distribution of Foraminiferida in the Brush Creek Marine Event (Missourian; Pennsylvanian), Appalachian Basin [W. Pa., E. Ohio, W.Va.]. Pennsylvanian Formainiferida in the Brush Creek Marine Event show two major biofacies: a nearshore brackish-water fauna of arenaceous taxa in generally shaley sediments; and an offshore marine fauna of fusulinids and *Tetrataxis* in limey sediments. ACD: 1975.

WARREN NORTON, Univ. of Pittsburgh. *Zatrachys serratus* Cope (Amphibia) from the Monongahela and Dunkard Groups [S.W. Pa., W.Va.]. Fragments of skulls and mandibles of the Permian amphibian *Zatrachys serratus* Cope, together with associated vertebrate remains, suggest that the Pennsylvanian-Permian boundary in the Appalachian Basin should be placed at the base of the Benwood Carbonate Mbr., Pittsburgh Fm. ACD: 1974.

W. A. OLIVER, JR., U.S. Geol. Survey. Corals of the Keyser Limestone.

H. G. RICHARDS and WILLIAM GALLAGHER, Acad. of Nat. Sci., Phila., and WILLIAM DARRAH, Gettysburg Coll. Preparation of Catalogue of Paleobotanical Collection of Academy [world-wide, but with many records from Pa.]. ACD: 1974.

H. B. ROLLINS and JACK DONAHUE, Univ. of Pittsburgh. Appalachian Basin Upper Pennsylvanian Marine Benthic Communities [Pa., Ohio, W.Va., Md.]. ACD: 1976.

ALFRED TRAVERSE and BRUCE CORNET, The Pa. State Univ. Palynostratigraphy of Newark Group Rocks of the Gettysburg and Newark Basins, Pa. Carnian-Norian (Triassic) palynofloras from the upper New Oxford Fm. of the Gettysburg basin and from the lower Brunswick Fm. of the Newark basin (Pa. and N.J.) are being compared with palynofloras of other Newark Group basins in N.C., Va., Conn., and Mass., in order to establish acceptable time-stratigraphic correlations between basins.



SEDIMENTOLOGY

J. D. GLAESER, The City Coll. of the City Univ. of N.Y. Control of Primary Sedimentary Structures in Uranium Accumulations in Devonian Catskill Deposits. ACD: 1974.

G. S. GOHN, Univ. of Delaware. Sedimentology of Cambrian Carbonate Rocks in Southeastern Pa. ACD: 1975.

C. J. ROTTMAN, Johns Hopkins Univ. Keefer Sandstone: Regional Variation in Grain Size, Shape and Compositon [Appalachian Valley and Ridge province from central Pa. to western Va.]. ACD: 1975-76.



STRATIGRAPHY

PING-FAN CHEN, W.Va. Geol. Survey. Stratigraphy, Paleogeography, Tectonics, and Oil Possibilities in Lower Paleozoic Rocks of Central Appalachians. ACD: 1974.

J. M. DENNISON, Univ. of N.C., and K. O. HASSON, East Tenn. State Univ. Hamilton Group Cross Section [from Ohio River to most eastern outcrops in area 10 miles north or south of Mason and Dixon Line]. ACD: 1974.

W. E. EDMUNDS, A. D. GLOVER, V. W. SKEMA, J. D. INNERS, and M. A. SHOLES, Pa. Geol. Survey. Project TASIC. This project (Temporarily Available Stratigraphic Information Collection) is a continuing program involved with the recovery of stratigraphic data from active coal and clay strip mines and construction sites, while exposures are available. The long-term project is designed to provide data for future mapping and regional mineral resource evaluation.

LOUIS HEYMAN, Pa. Geol. Survey. The Oriskany Sandstone and Related Rocks in the Subsurface of Pa. [western and northern half of Pa.]. ACD: 1975.

J. D. INNERS, Pa. Geol. Survey. Stratigraphy and Paleontology of the Onesquethaw Stage (Lower/Middle Devonian) in Pa. and Adjacent States. ACD: 1974.

W. E. NUNAN, Univ. of N.C. at Chapel Hill. Stratigraphy and Sedimentology of the Loudoun and Weverton Fms. on the West Side of the Blue Ridge Anticlinorium, Waynesboro, Va., to Mechanicsburg, Pa. ACD: 1975.

D. B. TATLOCK, The Peoples Natural Gas Co. Upper Devonian Stratigraphy and Production Potential: Pa. ACD: 1974.

ALFRED TRAVERSE and R. R. WILSON, The Pa. State Univ. Palynostratigraphy of Uppermost Devonian to Lower Pottsville Rocks of the Allegheny Plateau of West-Central Pa. Objective: To define more precisely the time-stratigraphic relationships within the stratigraphic sequence.

J. S. UTTLEY, Ohio State Univ. Stratigraphy of the Maxville Group and Correlative Strata in Ohio, Pa., and W.Va. A subsurface regional study of the post-Waverly (Mississippian) pre-Pennsylvanian carbonate section of Ohio and neighboring states. ACD: 1974.

W. R. WAGNER, Pa. Geol. Survey. Growth Faults in the Cambrian and Lower Ordovician Rocks of Western Pa. Cambrian and Lower Ordovician growth faults define a new northeast-southwest-trending basin between northwestern Pa. and the outcrop belt in central Pa. R. B. WELLS, R. T. FAILL and D. M. HOSKINS, Pa. Geol. Survey. Middle Devonian Stratigraphy in Central Pa.: A Revision [Mifflintown, Millerstown, and Millersburg 15' quads.]. ACD: 1974.

D. L. WOODROW, Hobart and William Smith Colls., and FRANK FLETCHER, Susquehanna Univ. Upper Devonian Stratigraphy in Northeast Pa. This project will result in a stratigraphic synthesis of the N.Y./Pa. border areas from Milford/Port Jervis to Tioga/Corning. Surface and subsurface data are included. ACD: 1975.



STRUCTURE

W. E. EDMUNDS, W. R. WAGNER, LOUIS HEYMAN, Pa. Geol. Survey, and J. A. HARPER, Univ. of Pittsburgh. Revised Surface Structure Map of Greater Pittsburgh Area. Map at scale of 1:125,000 prepared for Greater Pittsburgh Regional Studies program of U.S. Geol. Survey. ACD: 1975.

R. T. FAILL, Pa. Geol. Survey. Fossil Deformation in Valley and Ridge Province. Fossils throughout the province exhibit angular and shape distortions caused by a penetrative deformation. To evaluate this deformation, crinoid columns have been collected across the province, and are in the process of being measured. ACD: 1974.

PETER GEISER, Univ. of Conn. Structural Study of the Appalachian Bend in Md. and Pa. Divergence of fabric axis of cleavage and bedding in the Bloomsburg Fm. varies systematically on the scale of a single first-order fold. The relationship of this variation to the Appalachian bend is being investigated. ACD: 1975.

REPORTS PUBLISHED

AGARWAL, R. K., EBEN, F. C. and TAYLOR, C. E., 1973, Rock mechanics program at Grace Mine [abs.]. Mining Eng., v. 25, p. 33. ALEXANDER, S. S., 1974, Application of remote sensing to natural resource and environmental problems in Pennsylvania. Earth and Min. Sci., v. 43, no. 7, p. 49-53.

______, The use of ERTS-1 data for mapping strip mines and acid mine drainage in Pennsylvania, *in* Symposium on significant results obtained from ERTS-1. NASA-Sp. 327, v. 1, p. 569-576.

ALTERMAN, I. B., 1973, Rotation and dewatering during slaty cleavage formation: Some new evidence and interpretations. Geology, v. 1, no. 1, p. 33-36.

ARNDT, H. H., WOOD, G. H., JR. and SCHRYVER, R. F., 1973, Geologic map of the south half of the Shamokin quadrangle, Northumberland and Columbia Counties, Pennsylvania. U.S. Geol. Survey Misc. Geol. Inv. Map I-734.

BARNES, J. H., 1973, Lake Erie reaches record high level. Pa. Geology, v. 4, no. 3, p. 2-4.

_____, 1973, Three new minerals for Pa. Pa. Geology, v. 4, no. 4, p. 30-31.

BERG, T. M. and SEVON, W. D., 1974, Value of color aerial photography for geologic mapping of Pike County, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 6.

BIRX, DEBORAH, 1974, Pennsylvanian paleobotany of the Bernice Basin, Sullivan, Wyoming, and Luzerne Counties, Penna. Pa. Geology, v. 5, no. 2, p. 11-13.

BOLSTAD, D. D., ALLDREDGE, J. R. and MAHTAB, M. A., 1973, Procedures used for sampling fracture orientations in an underground coal mine. U.S. Bur. Mines Rept. Inv. 7763.

BRANTHOOVER, G. L., 1973, Review of a rock-slope design after construction, north-central Pennsylvania. Assoc. Eng. Geol. Bull., v. 10, no. 2, p. 157-160.

BRIGGS, R. P., 1973, Guide to selected large-scale geologic maps of southwestern Pennsylvania (west of 78°45' meridian and south of 41°15' parallel). U.S. Geol. Survey Open-file report.

_____, 1974, Map of overdip slopes that can affect landsliding in Allegheny County, Pennsylvania. U.S. Geol. Survey Misc. Field Studies Map MF-543. BUCHAUER, M. J., 1973, Contamination of soil and vegetation near a zinc smelter by zinc, cadmium, copper, and lead. Environ. Sci. Technol., v. 7, no. 6, p. 559-566.

BUSCH, W. F., 1973, Extent and frequency of floods on Schuylkill River near Norristown, Pennsylvania. U.S. Geol. Survey Hydrol. Inv. Atlas HA-483.

CLOOS, ERNST, 1974, Mining Cambrian limestone at Thomasville, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 12-13.

CLOOS, ERNST and PETTIJOHN, F. J., 1973, Southern border of the Triassic Basin, west of York, Pennsylvania: fault or overlap? Geol. Soc. America Bull., v. 84, no. 2, p. 523-535.

COATES, D. R. and KING, C. A. M., 1973, Glacial geology of Great Bend and adjacent region, *in* Coates, D. R., ed., Glacial geology of the Binghamton-western Catskill region. State Univ. of N.Y. Publications in Geomorphology, Contrib. No. 3, p. 2-30.

COOPER, F. D., 1974, The mineral industry of Pennsylvania in 1971. Pa. Geol. Survey, 4th ser., Inf. Circ. 74.

CORNET, BRUCE, TRAVERSE, ALFRED and MCDONALD, N. G., 1973, Fossil spores, pollen, and fishes from Connecticut indicate Early Jurassic age for part of the Newark Group. Science, v. 182, p. 1243-1247.

CRAFT, J. L., 1973, Preliminary overburden thickness map on the Pittsburgh coal, Allegheny, Beaver and Washington Counties, Pennsylvania. Pa. Geol. Survey, 4th ser., Open-file report.

______, 1974, Structural influence on urban landslides [abs.]. Pennsylvania Acad. Sci. Abs., Ann. Mtg. of Pennsylvania Acad. Sci. and Program of Pjas Anniversary Leadership Conf., Bloomsburg State Coll., Apr. 18-29, 1974, p. 12.

CUFFEY, R. J., LUTZ-GARIHAN, A. B. and GARIHAN, J. M., 1974, The Hollidaysburg mastodon (Proboscidea, Pleistocene, Penn-sylvania) [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 6, p. 504-505.

DANIELS, D. L., 1974, New gravity map of the Baltimore 2° sheet (1:250,000 series) Md., Va., W.Va., Pa. [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 17-18.

DENNISON, J. M. and HASSON, K. O., 1974, Lithostratigraphic nomenclature recommendations for Devonian Hamilton Group in southern Pennsylvania, Maryland, and the Virginias [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 18

DEWINDT, J. T., 1973, Occurrence of *Rusophycus* in the Poxono Island Formation (Upper Silurian) of eastern Pennsylvania. Jour. Paleontology, v. 47, no. 5, p. 999–1000.

DONAHUE, J. and ROLLINS, H. B., 1974, Conemaugh (Glenshaw) marine events. Field Guidebook, Eastern Section, Am. Assoc. Petroleum Geologists, Pittsburgh Geol. Soc. and Univ. of Pittsburgh.

DOWNEY, W. F., JR., 1974, Geological conditions in burning anthracite-northeastern Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 19.

EDMUNDS, W. E., 1974, Preliminary structure contour map of Allegheny County, Pennsylvania. U.S. Geol. Survey Open-file report.

_____, 1974, Preliminary structure contour map of Armstrong County, Pennsylvania. U.S. Geol. Survey Open-file report.

_____, 1974, Preliminary structure contour map of Beaver County, Pennsylvania. U.S. Geol. Survey Open-file report. ______, 1974, Preliminary structure contour map of

Butler County, Pennsylvania. U.S. Geol. Survey Open-file report.

Washington County, Pennsylvania. U.S. Geol. Survey Open-file report. , 1974, Preliminary structure contour map of

Westmoreland County, Pennsylvania. U.S. Geol. Survey Open-file report.

EMRICH, G. H., PITCAIRN, FEODOR and WITWER, DAVID, 1974, Geologic environmental planning in a major metropolitan area [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 22–23.

EPSTEIN, J. B., 1973, Geologic map of the Stroudsburg quadrangle, Pennsylvania-New Jersey. U.S. Geol. Survey Geol. Quad. Map GQ-1047.

EPSTEIN, J. B. and BERRY, W. B. N., 1973, Graptolites from the Martinsburg Formation, Lehigh Gap, eastern Pennsylvania. Jour. Research U.S. Geol. Survey, v. 1, no. 1, p. 33-37.

FAILL, R. T., 1973, Kink band folding, Valley and Ridge province, Pennsylvania. Geol. Soc. America Bull., v. 84, no. 4, p. 1289-1313.

_____, 1973, Tectonic development of the Triassic Newark-Gettysburg Basin in Pennsylvania. Geol. Soc. America Bull., v. 84, p. 725-740.

______, 1974, Enclosing bedding as a reference datum [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 23.

FAILL, R. T., HOSKINS, D. M. and WELLS, R. B., 1974, Middle Devonian stratigraphy in central Pennsylvania, a revision [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 23-24.

FAILL, R. T., WELLS, R. B., NICKELSEN, R. P. and HOSKINS, D. M., 1973, Structure and Silurian-Devonian stratigraphy of the Valley and Ridge province, central Pennsylvania. Guidebook, 38th Field Conf. Pa. Geologists, Pa. Geol. Survey, Harrisburg.

FELDMAN, A. D., 1973, Downstream effects of the levee overtopping at Wilkes-Barre, Pennsylvania during tropical storm Agnes [abs.]. Eos, v. 54, no. 4, p. 274.

FINKELMAN, R. B., LAPHAM, D. M., BARNES, J. H. and DOWNEY, W. F., JR., 1974, Observations on minerals from burning anthracite seams and culm in Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 27-28.

FISCHER, JÖSEPH, 1973, Philadelphia Electric Company Fulton Generating Station Units 1 and 2 Preliminary Safety Analysis Report. FLIPPO, H. N., 1973, Flood of June 1972 in Wilkes-Barre area, Pennsylvania. U.S. Geol. Survey Hydrol. Inv. Atlas HA-523.

FREY, M. G., 1973, Influence of Salina salt on structure in New York-Pennsylvania part of Appalachian Plateau. Am. Assoc. Petroleum Geologists Bull., v. 57, no. 6, p. 1027-1037.

GALLAHER, J. T., 1974, Summary ground-water resources of Allegheny County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 35.

GBUREK, W. J. and HEALD, W. R., 1974, Soluble phosphate output of an agricultural watershed in Pennsylvania. Water Resources Research, v. 10, no. 1, p. 113-118.

GLAESER, J. D., 1974, Alternative sedimentary associations of uranium in Devonian Catskill deposits, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 29.

______, 1974, Upper Devonian stratigraphy and sedimentary environments in northeastern Pennsylvania. Pa. Geol. Survey, 4th ser., Gen. Geol. Rept. 63.

GLASS, G. B., 1973, Contrasting the effects of coal mining in Wyoming and Pennsylvania [abs.]. Am. Assoc. Petroleum Geologists Bull., v. 57, no. 5, p. 957.

_____, 1972, Geology and mineral resources of the Philipsburg 7½-minute quadrangle, Centre and Clearfield Counties, Pennsylvania. Pa. Geol. Survey, 4th ser., Atlas 95a.

GOHN, G. S. and CHACKO, JOHN, 1974, Ichnofossils and the bathymetry of sedimentary facies in the Chickies Formation, York County, Pennsylvania [abs]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 30-31.

GOHN, G. S. and THOMPSON, A. M., 1974, Lithofacies in the Marburg and Wissahickon Formations near the Martic Line, York and Lancaster Counties, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 31.

GOODWIN, P. W. and ANDERSON, E. J., 1974, Paleogeography of a Cambrian clastic tidal flat [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 32.

GREENFIELD, R. J. and STOYER, C. H., 1973, Tracing ground water by geophysical methods. Presented at the SME Fall Meeting and Exhibit. Preprint No. 73-F-346.

HARMON, R. S., LANGMUIR, D. and DEINES, P., 1973, Diurnal variations in chemical and isotopic compositions of carbonate surface and ground waters [abs.]. Eos, v. 54, no. 4, p. 260.

HEAD, J. W., 1974, Correlation and paleogeography of upper part of Helderberg Group (Lower Devonian) of central Appalachians. Am. Assoc. Petroleum Geologists Bull., v. 58, no. 2, p. 247-259.

HIGGINS, M. W., 1974, Superimposition of folding in the northeastern Maryland Piedmont and its bearing on the history of tectonics of the central Appalachians. Am. Jour. Sci., v. 273-A, p. 150-195.

HIGGINS, M. W., FISHER, G. W. and ZIETZ, ISIDORE, 1973, Aeromagnetic discovery of a Baltimore Gneiss dome in the Piedmont of northwestern Delaware and southeastern Pennsylvania. Geology, v. 1, no. 1, p. 41-43.

_____, 1974, Mill Creek dome revisited. Geology, v. 2, no. 1, p. 28.

HINDS, R. W. and WARD, A. N., JR., 1974, Lower Tuscarora (Silurian) marine faunal assemblage from central Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 38.

HOFMANN, A. W., MAHONEY, J. W., JR. and GILETTI, B. J., 1974, K-Ar and Rb-Sr data on the detrital and postdepositional history of Pennsylvania clay from Ohio and Pennsylvania. Geol. Soc. America Bull., v. 85, no. 4, p. 639-644.

HOLLOWELL, J. R., 1974, Ground-water conditions caused by tropical storm Agnes. Pa. Geology, v. 5, no. 2, p. 2-9.

HOWELL, B. F., JR., 1973, Geology, seismicity and environmental impact, *in* Moran, Douglas, ed., Average Regional Seismic Hazard Index (ARSHI) in the United States. Los Angeles, Los Angeles University Publishers, p. 277-285.

HSU, F. and ROSE, A. W., 1973, Exploration in the Nittany Valley area, Centre County, Pa., using stream sediment and water geochemistry [abs.]. Mining Eng., v. 25, no. 8, p. 32.

JACOBEEN, FRANK, JR. and KANES, W. H., 1974, Structure of Broadtop synclinorium and its implications for Appalachian structural style. Am. Assoc. Petroleum Geologists Bull., v. 58, no. 3, p. 362-375.

JACOBSON, R. L. and LANGMUIR, DONALD, 1973, Dischargegeochemical relationships among some carbonate spring waters [abs.]. Eos, v. 54, no. 4, p. 264. JAMES, J. A., 1973, Geology disciplines Lancaster Lime and Stone Corporation's quarry development [abs.]. Mining Eng., v. 28, no. 8, p. 31.

JORDAN, R. R., PICKETT, T. E., WOODRUFF, K. D. and others, 1973, Preliminary results on the Chester, Pennsylvania earthquake of 28 February 1973 [abs.]. Earthquake Notes, v. 44, no. 1-2, p. 65-66.

_____, 1974, Delaware-New Jersey-Pennsylvania earthquake of February, 1973 [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 41-42.

KAISER, W. R., 1973, Delta cycles in the Middle Devonian of Pennsylvania [abs.]. Diss. Abs. Int., v. 33, no. 11, p. 5349B.

KENT, B. H., 1974, Geologic causes and possible preventions of roof fall in room-and-pillar coal mines. Pa. Geol. Survey, 4th ser., Inf. Circ. 75.

KING, C. A. M. and COATES, D. R., 1973, Glacio-periglacial landforms within the Susquehanna Great Bend area of New York and Pennsylvania. Quaternary Research, v. 3, no. 4, p. 600-620.

KIRCHGASSER, W. T., 1974, Stratigraphic sequence of the ammonoid *Probeloceras* Clarke in the Upper Devonian of the Appalachian basin [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 44-45.

LAMBORN, RICHARD and GUTSCHICK, R. C., 1974, *Bifungites*, trace fossils from Devonian-Mississippian rocks of Pennsylvania and Montana [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 6, p. 525.

LAPHAM, D. M., 1973, The future of anthracite—A possible solution to the sulfur problem. Pa. Geology, v. 4, no. 6, p. 2-4.

LAPHAM, D. M., SMITH, R. C. II and BARNES, J. H., 1973, Some possible minerals which might reasonably occur in Pennsylvania. FM Region 3 Newsletter, Aug., p. 4-8.

LOVELL, H. L., 1973, Coal mine drainage pollution. Earth Min. Sci., v. 42, no. 7, p. 54-55.

LOWRIGHT, R. H., 1973, Environmental determination using hydraulic equivalence studies. Jour. Sed. Petrology, v. 43, no. 4, p. 1143-1147.

LYTLE, W. S., 1973, Oil and gas developments in Pennsylvania in 1972. Pa. Geol. Survey, 4th ser., Prog. Rept. 186.

______, 1973, Pennsylvania oil and gas developments in 1972. Am. Assoc. Petroleum Geologists Bull., v. 57, p. 1549-1551, 1558-1561, 1569.

_____, 1973, Pennsylvania oil and gas developments in 1972. International Oil Scouts Assoc., v. 43, Pt. I and II. ______, 1973, Preliminary oil and gas fields map of Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties, Pennsylvania. U.S. Geol. Survey Open-file report.

_____, 1974, Increased oil and gas exploration in Pennsylvania. Pa. Geology, v. 5, no. 1, p. 2-3.

MAIN, LINDA, 1973, What starts a coal mine fire? Pa. Geology, v. 4, no. 6, p. 7-9.

MARCHAND, M. O'B., 1974, A system of quantitative landscape evaluation [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 50-51.

MATHEWS, H. L., CUNNINGHAM, R. L., CIPRA, J. E. and others, 1973, Application of multispectral remote sensing to soil survey research in southeastern Pennsylvania. Soil Sci. Soc. Am., Proc., v. 37, no. 1, p. 88-93.

MATHEWS, H. L., CUNNINGHAM, R. L. and PETERSEN, G. W., 1973, Spectral reflectance of selected Pennsylvania soils. Soil Sci. Soc. Am., Proc., v. 37, no. 3, p. 421-424.

MCCASLIN, J. C., 1973, Oil's birthplace becomes prime wildcat area. Oil and Gas Jour., v. 71, no. 6, p. 87, sketch map.

MCCULLOCH, C. M. and DEUL, MAURICE, 1973, Geologic factors causing roof instability and methane emission problems; the Lower Kittanning coalbed, Cambria County, Pennsylvania. U.S. Bur. Mines Rept. Inv. 7769.

MORRIS, R. W., ROLLINS, H. B. and SHAAK, G. D., 1973, A new ophiuroid from the Brush Creek Shale (Conemaugh Group, Pennsylvanian) of western Pennsylvania. Jour. Paleontology, v. 47, no. 3, p. 473-478.

MUNDI, E. K., 1973, The physical characteristics of some fractured aquifers in central Pennsylvania and a digital simulation of their sustained yields [abs.]. Diss. Abs. Int., v. 33, no. 12, pt. 1, p. 5918B. MURPHY, J. L., 1973, *Protosalvinia (Foerstia)* zone in the Upper Devonian sequence of eastern Ohio, northwestern Pennsylvania, and western New York. Geol. Soc. America Bull., v. 84, p. 3405-3410. NEWPORT, T. G., 1973, Summary ground-water resources of Clarion County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 32.

_____, 1974, Summary ground-water resources of Washington County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 38.

______, 1974, Summary ground-water resources of Westmoreland County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 37. NICKELSEN, R. P., 1974, Origin of cleavage and distorted mudcrack polygons [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 59.

O'CONNOR, B. J., 1973, A model for the staurolite-disappearance isograd; examples from Waterbury, Connecticut and Philadelphia, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 5, no. 5, p. 424-425.

O'LEARY, D. W., 1973, The form, structure and evolution of the Allegheny Front in Centre County, Pennsylvania [abs.]. Diss. Abs. Int., v. 33, no. 12, pt. 1, p. 5919B.

O'NEILL, B. J., JR., 1973, Clay and shale resources in the Greater Pittsburgh region, Phase I, Summary of existing data. Pa. Geol. Survey, 4th ser., Open-file report.

_____, 1973, Clay and shale resources in the Greater Pittsburgh region, Phase II, Data collection. Pa. Geol. Survey, 4th ser., Open-file report.

Pittsburgh region, Phase III, Clay and shale resources in the Greater tion map. Pa. Geol. Survey, 4th ser., Open-file report.

, 1973, Important sources of crushed stone and slag for construction aggregate in the Greater Pittsburgh region. Pa. Geol. Survey, 4th ser., Open-file report.

_____, 1973, Sand and gravel occurrences in the Greater Pittsburgh area. Pa. Geol. Survey, 4th ser., Open-file report.

_____, 1974, An industrial mineral conflict in northwestern Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 60-61.

______, 1974, Clay and shale resources in the Greater Pittsburgh region, Phase IV, Results of rotary kiln tests and chemical analyses of lightweight aggregate. Pa. Geol. Survey, 4th ser., Openfile report.

PENNINGTON, D. L. and ROSE, A. W., 1973, Chromium and nickel in soil as geochemical indicators for chromite deposits in the State Line District, Pennsylvania [abs.]. Mining Eng., v. 25, no. 8, p. 32.

______, 1974, Chromium and nickel as geochemical indicators for chromite deposits in the State Line District, Pennsylvania. Pa. Geol., v. 5, no. 1, p. 11.

PENNSYLVANIA GEOLOGICAL SURVEY, 1973, Topographic map of Lehigh County, Pennsylvania. Pa. Geol. Survey, 4th ser., Map 39, scale 1:50,000.

PERISSORATIS, CONSTANTINE, BRUECKNER, H. K. and DRAKE, A. A., JR., 1974, Structural and stratigraphic investigations of the Jutland Klippe, western New Jersey [abs.]. Geol. Soc. America

Abs. with Programs, v. 6, no. 1, p. 64.

POTH, C. W., 1974, Summary ground-water characteristics of Armstrong County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 34.

_____, 1974, Summary ground-water characteristics of Beaver County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 39.

______, 1974, Summary ground-water characteristics of Butler County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 36.

RAUCH, H. W., 1973, The effects of lithology and other hydrogeologic factors on the development of solution porosity in the Middle Ordovician carbonates of central Pennsylvania [abs.]. Diss. Abs., v. 34, no. 3, p. 547.

RITTER, D. F., KINSEY, W. F. III and KAUFFMAN, M. E., 1973, Overbank sedimentation in the Delaware River Valley during the last 6000 years. Science, v. 179, no. 4071, p. 374-375.

ROEN, J. B., 1972, Geologic map of the Oak Forest quadrangle and part of the Blacksville quadrangle, southwestern Pennsylvania. U.S. Geol. Survey Geol. Inv. Map I-699.

_____, 1973, Geologic map of the Midway quadrangle, Washington County, southwestern Pennsylvania. U.S. Geol. Survey Geol. Quad. Map GQ-1067.

ROEN, J. B. and KREIMEYER, D. F., 1973, Preliminary map showing the distribution and thickness of sandstone in the lower member of the Pittsburgh Formation, southwestern Pennsylvania and northern West Virginia. U.S. Geol. Survey Misc. Field Studies Map MF-529. ROOT, S. I., 1973, Limestone chemistry and acid insoluble residues. Pa. Geol., v. 4, no. 3, p. 13-15.

_____, 1973, Sequence of faulting, southern Great Valley of Pennsylvania. Am. Jour. Sci., v. 273, p. 97-112.

_____, 1973, Structure, basin development, and tectogenesis in the Pennsylvania portion of the Folded Appalachians, *in* DeJong, K. A. and Scholten, R., Gravity and tectonics, New York, John Wiley and Sons, p. 343-360.

SAMSON, P. L., 1974, Valley Forge State Park: History of the rocks. Pa. Geol. Survey, 4th ser., Park Guide 8.

SCHMOTZER, J. K., JESTER, W. A. and PARIZEK, R. R., 1973, Groundwater tracing with past sampling activation analyses. Jour. Hydrology, v. 20, no. 3, p. 217-236.

SEELAND, D. A., 1974, A geochemical reconnaissance for gold in the sedimentary rocks of the Great Lakes region, Minnesota to New York. U.S. Geol. Survey Bull. 1305. SEVON, W. D., 1973, "Early" Wisconsinan drift in Lycoming County, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 5, no. 2, p. 218.

_____, 1973, Glaciation and sedimentation in the Late Devonian and Early Mississippian of Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 5, no. 2, p. 218-219.

_____, 1974, Relative age and sequence of glacial deposits in Carbon and Monroe Counties, Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 71.

SHACKLETTE, H. T., BOERNGEN, J. G., CAHILL, J. P. and RAHILL, R. L., 1973, Lithium in surficial materials of the conterminous United States and partial data on cadmium. U.S. Geol. Survey Circ. 673.

SHUMAKER, R. C., 1974, Influence of Salina salt on structure in New York-Pennsylvania: Discussion. Am. Assoc. Petroleum Geologists Bull., v. 58, no. 3, p. 543-544.

SHUSTER, E. T., 1973, Ground-water and geologic studies in the Williamsport area. Pa. Geology, v. 4, no. 3, p. 7-8.

_____, 1973, Study basement flooding in Kingston area. Pa. Geology, v. 4, no. 3, p. 8-9.

SILSLEY, P. F. and BRIGGS, R. P., 1973, Municipalities, school districts, and selected other features related to quadrangle topographic maps—Greater Pittsburgh region, Pennsylvania. U.S. Geol. Survey Open-file report.

SMITH, R. C. II, 1973, The Woodberry zinc-lead occurrence, Bedford County. Pa. Geology, v. 4, no. 5, p. 4-6.

SMITH, R. C. II and WAY, J. H., JR., 1973, Multi-colored fluorite at New Paris. Pa. Geology, v. 4, no. 6, p. 16.

STREIB, D. L., RENTON, J. J. and HIDALGO, R. V., 1973, Organic acid content of some Upper Pennsylvania [sic] coals [abs.]. Geol. Soc. America Abs. with Programs, v. 5, no. 5, p. 440.

_____, 1973, Possible correlation of organic acid content of the Pittsburgh coal to the paleogeography of early Monomgahela [sic] time [abs.]. Geol. Soc. America Abs. with Programs, v. 5, no. 5, p. 440-441.

SZUKS, F. K., 1973, Silver ion geochemistry as a paleoenvironmental tool [abs.]. Geol. Soc. America Abs. with Programs, v. 5, no. 6, p. 518.

TEUFEL, L. W. and GROSTRONG, R. H., JR., 1973, Strain analyses of twinned calcite in a naturally deformed limestone mudcrack column. Eos, v. 54, no. 4, p. 457-458.

THOMS, R. E. and BERG, T. M., 1974, Comparison of the burrowing habits of a Devonian pelecypod with those of a Recent analogue [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 3, p. 267.

TRAINER, F. W. and WATKINS, F. A., JR., 1974, Uses of base-runoff recession curves to determine areal transmissivities in the Upper Potomac River basin. Jour. Research U.S. Geol. Survey, v. 2, no. 1, p. 125-131.

TRAVERSE, ALFRED, 1974, Plant microfossils help date rocks of questionable age. Earth and Min. Sci., v. 43, no. 4, p. 28-29.

UHRIN, D. C., 1974, Photo-interpretation of landslide-prone areas in eastern Washington County, Pennsylvania, and survey of residents of the Pittsburgh region, for land-use planning [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 6, p. 525.

U.S. GEOLOGICAL SURVEY, 1973, Aeromagnetic map of northern Frederick County, Maryland, and parts of adjacent counties in Maryland and Pennsylvania. U.S. Geol. Survey Open-file report.

WAGNER, W. R., CRAFT, J. L., HEYMAN, LOUIS and HARPER, J. A., 1973, Preliminary geologic map of Allegheny, Butler and Washington Counties, Pennsylvania. Pa. Geol. Survey, 4th ser., Openfile report.

WAGNER, W. R., KELLEY, D. R. and LYTLE, W. S., 1973, Stratigraphic framework of the Pittsburgh area, Pt. I, Allegheny, Washington, and southern Butler Counties. Pa. Geol. Survey, 4th ser., Openfile report.

_____, 1973, Stratigraphic framework of the Pittsburgh area, Pt. II, Westmoreland, Armstrong, northern Butler, and western Indiana Counties. Pa. Geol. Survey, 4th ser., Open-file report.

WARG, J. B. and TRAVERSE, ALFRED, 1973, A palynological study of shales and "coals" of a Devonian-Mississippian transition zone, central Pennsylvania. Geoscience and Man, v. 7, p. 39-46.

WAY, J. H., JR., 1973, Barite-limonite from the Altoona-Hollidaysburg area. Pa. Geology, v. 4, no. 3, p. 4-7.

_____, 1973, Stalactitic limonite. Pa. Geology, v. 4, no. 4, p. 31-32.

WEBB, M. S., 1974, Surface temperatures of Lake Erie. Water Resources Research, v. 10, no. 2, p. 199-210.

WEHMILLER, J. F., 1974, Downstream response of a small watershed to impervious surfaces—an example? Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 84.

WELLS, R. B., 1974, Loyalhanna sandstone extended into northcentral Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 1, p. 84-85.

WILLIAMS, E. G., HOLBROOK, P. and LITHGOW, E. E., 1973, Properties and occurrence of bloating clays and shales in the Penn-sylvanian of western Pennsylvania [abs.]. Mining Eng., v. 25, no. 8, p. 31.

WILTSCHKO, D. V. and CHAPPLE, W. M., 1974, Kinematics of the Plateau folds of Pennsylvania [abs.]. Geol. Soc. America Abs. with Programs, v. 6, no. 4, p. 413.

WOOD, C. R., 1973, Evaluation of arsenic concentrations in the Tulpehocken Creek basin, Pennsylvania. U.S. Geol. Survey Open-file report.

WOOD, C. R., FLIPPO, H. N., LESCINSKY, J. B. and BARKER, J. L., 1972, Water resources of Lehigh County, Pennsylvania. Pa. Geol. Survey, 4th ser., Water Resource Rept. 31.

WOOD, G. H., JR., 1973, Geologic map of the Orwigsburg quadrangle, Schuylkill County, Pennsylvania. U.S. Geol. Survey Geol. Quad. Map GQ-1029.

______, 1973, Geologic map of the Pottsville quadrangle, Schuylkill County, Pennsylvania. U.S. Geol. Survey Geol. Quad. Map GQ-1028.

WOOD, G. H., JR. and ARNDT, H. H., 1973, Geologic map of the Delano quadrangle, Schuylkill County, Pennsylvania. U.S. Geol. Survey Geol. Quad. Map GQ-1054.

("PUBLICATIONS IN PRESS" will be published in October, 1974 issue.)



FROM THE DESK OF THE STATE GEOLOGIST (continued)

It is good to see that the use and need for geology is increasing. Geologists in turn must respond to the challenge to provide more data for the areas where such information is needed now and to present the data in a format that will serve the users. To that end, the Pennsylvania Geological Survey is conducting geological investigations in the Pittsburgh, Harrisburg, Williamsport, York, Reading, and Altoona metropolitan areas. Our aim is to produce geologic data and maps which will serve the surface and subsurface development activities of those areas.

arthur Q. Socolow

SURVEY ANNOUNCEMENTS

BLAIR-HUNTINGDON COUNTY ZINC-LEAD DATA ON OPEN FILE

The Pennsylvania Geological Survey will place on open file on September 9, 1974, geologic data which has been compiled on certain zinc and lead occurrences in Blair and Huntingdon Counties. One occurrence to be included in the released data is an abandoned limonite iron mine in the Beekmantown Group of Blair County from which a composite limonite sample was found to contain 1.6% zinc. Other occurrences covered in the new data include mineralization within the Bellefonte, Nittany, Tuscarora, and Tonoloway Formations. Trace element analysis of limonite occurrences in approximately fifty abandoned iron mines of central and southeastern Pennsylvania suggest that a few of these sites may actually be zinc gossans.

The open file data will be available for examination at the offices of the Pennsylvania Geological Survey, 419 Towne House Apartments, 660 Boas Street, Harrisburg, after 9 A.M., September 9, 1974.

CLAY AND SHALE RESOURCES IN THE GREATER PITTSBURGH REGION- PHASE IV ON OPEN FILE

The Bureau of Topographic and Geologic Survey, Department of Environmental Resources, in cooperation with the U. S. Geological Survey is continuing a multi-purpose clay-shale program under the Greater Pittsburgh Regional Studies Program.

Phase I of this program was a comprehensive compilation of existing lithologic, physical, chemical, mineralogic, and use data on clayshale samples from six counties in the Greater Pittsburgh Region. Phase II of the program consisted of the collection of 162 additional clay-shale samples. The results of the tests and chemical analyses for these 162 constituted Phase III.

Under Phase IV, 28 samples that indicated a promising potential as a source of lightweight aggregate were recollected on a bulk basis (200 lb. sample) and tested in a pilot-plant-size rotary kiln. The results of these tests together with chemical analyses for arsenic and organic carbon for 162 samples, and for mercury for 51 samples are presented in the Phase IV report. This report is now on open file at three locations: Bureau of Topographic and Geologic Survey, Room 419 Towne House Apartments, Harrisburg; the Survey's regional office at 1201 Kossman Building, Pittsburgh; and the U. S. Geological Survey, 102 East Mall, Carnegie. All interested persons are encouraged to examine this report at any of these locations.

PREVENTION OF ROOF FALL IN COAL MINES

Designed to help prevent the serious problem of roof fall in coal mines, the Pennsylvania Geological Survey has issued GEOLOGIC CAUSES AND POSSIBLE PREVENTIONS OF ROOF FALL IN ROOM-AND-PILLAR COAL MINES by Bion H. Kent. This report presents geologic information relating to the causes of shale roof falls and suggests ways to minimize the danger. The data have been gathered in active mining areas of Green County, Pennsylvania. Similar types of data can be collected and utilized in a wide variety of locations and situations.

Bulletin IC 75 is available for \$0.75 plus 6% sales tax for Pennsylvania residents from the Pennsylvania State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125.

NEW REPORT ON DEVONIAN STRATIGRAPHY

The Pennsylvania Geologic Survey has issued Bulletin G63, UPPER DEVONIAN STRATIGRAPHY AND SEDIMENTARY ENVIRON-MENTS IN NORTHEASTERN PENNSYLVANIA by J. Douglas Glaeser. Based on surface data and lithologic records from 14 deep wells in the region, this report develops a three-dimensional picture of the nature and distribution of the complex sedimentary environments represented by Upper Devonian rocks in Northeastern Pennsylvania.

This comprehensive report provides a value basis on which to prospect for oil and gas, groundwater, and possible uranium mineralization. It will also serve the needs of such applied geology as solid and liquid waste disposal, ground water recharge, and engineering construction design.

Bulletin G63, with 89 pages and a full-color correlation diagram, is available for \$4.30, plus 6% sales tax, from the Pennsylvania State Book Store, P. O. Box 1365, Harrisburg, Pa. 17125.

PENNSYLVANIA GEOLOGICAL SURVEY STAFF

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

TECHNICAL SERVICES

Shirley J. Barner, Stenographer Sandra Blust, Librarian Joanne Bowman, Typist John G. Kuchinski, Draftsman Christine Miles, Asst. Geological Editor

Virginia Milewski, Draftsman Mary A. Miller, Stenographer Marjorie Steel, Stenographer Albert Van Olden, Draftsman John P. Wilshusen, Geological Editor

ENVIRONMENTAL GEOLOGY DIVISION

Alan R. Geyer, Division Chief

Jesse Craft, *Geologist* (Pittsburgh Office) Eugene H. Hess, *Geologist* Evan T. Shuster, *Geologist*

Donna M. Snyder, Stenographer Grace Tyson, Clerk

GEOLOGIC MAPPING DIVISION

Samuel I. Root, Division Chief

Thomas M. Berg, Geologist William E. Edmunds, Geologist Rodger T. Faill, Geologist Albert D. Glover, Geologist Jon D. Inners, Geologist David B. MacLachlan, Geologist Phyllis Ritter, *Typist* William D. Sevon, *Geologist* Mark A. Sholes, *Geologist* Viktoras W. Skema, *Geologist* John H. Way, Jr., *Geologist* Richard B. Wells, *Geologist*

MINERAL RESOURCES DIVISION

Davis M. Lapham, Division Chief

John H. Barnes, Geologist John C. Benson, Typist Leslie T. Chubb, Laboratory Technician Bernard J. O'Neill, Geologist Robert C. Smith, Geologist

OIL AND GAS DIVISION

(Pittsburgh State Office Bldg.)

William S. Lytle, Division Chief

Lajos Balogh, Draftsman Robert Fenton, Laboratory Technician Lillian Heeren, Draftsman

200

Louis Heyman, Geologist Cheryl Cozart, Stenographer Elizabeth A. Eberst, Typist Walter R. Wagner, Geologist

TOPOGRAPHIC DIVISION

In Cooperation with The U.S. Geological Survey

GROUND WATER DIVISION

In Cooperation with The U.S. Geological Survey



GROUND-WATER LEVELS



BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY DEPT. OF ENVIRONMENTAL RESOURCES HARRISBURG, PA. 17120



CORRECT ADDRESS REQUESTED