

P **GEOLOGY**

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THE PENNSYLVANIA GEOLOGICAL SURVEY

VOL. 1/9

COMMONWEALTH OF PENNSYLVANIA

Raymond P. Shafer, Governor

STATE PLANNING BOARD

Irving Hand, Executive Director

Topographic and Geologic Survey

Arthur A. Socolow, State Geologist

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ON THE COVER — View of rockfall along the side of a Pennsylvania highway. This is an example of an environmental geology problem which can be predicted by advance studies of the environmental geology of an area.

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DECEMBER 1970

FROM THE DESK
OF THE
STATE GEOLOGIST . . .



METROPOLITAN ENVIRONMENTAL STUDIES

Environmental geology studies of two of Pennsylvania's metropolitan areas are discussed in this bulletin. A progress report is presented on the Pennsylvania Geological Survey's project in the Greater Harrisburg Area, and the approval of a comprehensive environmental study for the Greater Pittsburgh Area is announced. The latter is to be a cooperative state-federal project.

It is well to note that the involvement of geologists and geological surveys with the environment is not new, faddish, or an attempt to cash in on the trend of the moment. Geology by its definition, the science of the earth, has always been an environmental science. Geologists by their studies of the forms and processes on the earth's surface have long been engaged in environmental research. What has changed, however, is that the rest of our society has been awakening to the importance and to the mistreatment of our environment. And as more people in all walks of life begin to involve themselves with the environment, they are recognizing and utilizing geology more and more as a vital component in environmental planning and protection.

As geologic surveys have taken on more and more formally designated environmental studies, some concern has been expressed that the surveys may begin to neglect basic geologic mapping and fundamental geologic research. That should not and must not be allowed to happen. In order to carry out a comprehensive environmental geologic study of any given area, it is essential that there first be completed the basic geologic mapping, mineral resources investigations, and water resources studies. It is after these basic data are accumulated that their relationship and impact on man's activities can be considered. That is what the new trend in environmental geology is all about - relating basic scientific data and knowledge to man and his environment.

The Pennsylvania Geological Survey is pleased that the citizens of Pennsylvania, as well as other state and local agencies, are becoming aware of the geologic aspects of environmental planning. We are striving to meet the new needs and demands, even as we shall continue to carry out the basic geologic mapping and research from which environmental geologic projects can be carried to fruition.

Arthur G. Socolow

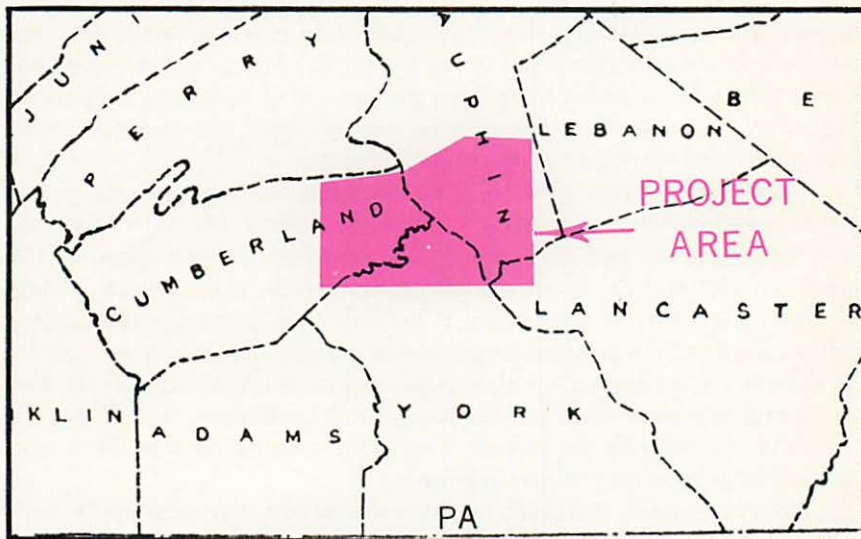
ENVIRONMENTAL STUDY OF THE HARRISBURG AREA

ENVIRONMENTAL GEOLOGY IS THE APPLICATION OF GEOLOGY TO MAN IN HIS ENVIRONMENT

The Pennsylvania Geological Survey has initiated a new kind of geological study for the most heavily populated portion of the Harrisburg Metropolitan Area. Planners estimate that by 1997 an increase of 74 percent in population will occur in the Harrisburg area. The major portion of this increase will take place along an east-west belt in the central portion of the project area. Concurrently, industrial growth will accelerate, and housing, water and transportation demands will proliferate as well as many other requirements. All of this growth will place a formidable strain on the available land, water resources and mineral resources.

The area of interest covers approximately 325 square miles in Cumberland, Dauphin, and York Counties with the city of Harrisburg in the key, central position.

The purpose of this new study by the Pennsylvania Geological Survey is to apply geological principles, interpretations and data toward an understanding of the project area that will be immediately useful to planners, engineers, government officials and the general public.



HARRISBURG PROJECT AREA

Much of the geologic and water resource information is presently available in Pennsylvania Geological Survey publications, unpublished material and other sources. Additional basic investigations are being undertaken to supplement the existing information; new, different types of interpretations and maps will be

derived from the compiled data. Advice and information will be gathered from local governmental and planning organizations and appropriate state and federal agencies.

PARTS OF STUDY

The four main parts of the study are:

BASIC GEOLOGY

MINERAL RESOURCES

GROUND WATER RESOURCES

ENGINEERING GEOLOGY

These main sections and their component parts will be related to application. Illustrations and photos will be included in the report to demonstrate principles and geologic conditions as they affect man and his environment.

Listed below are brief discussions of the four main parts of this report:

BASIC GEOLOGY

Important characteristics of the rocks include such descriptive information as: type of rock, reaction of rock to weathering, thickness of layers, attitude (dip) of rock layers, frequency, size, shape and orientation of rock fractures, relation of topographic forms (relief) to rocks and others.



**PROMINENT FRACTURES
IN TOUGH DIABASE ROCK**



**PINNACLE WEATHERING IN
SOLUBLE LIMESTONE**

The distribution of various rock types is shown on the geologic map, which is a key tool in geologic investigations. The geologic map will show the type of rock and its structural characteristics for any location in the greater Harrisburg area.

USE - basic geologic data for engineering geology application, to determine ground-water availability, foundation characteristics of rocks, prospective sites for solid waste disposal, mineral occurrences and many others.

GROUND-WATER RESOURCES

Ground-water is the water stored in rocks below the surface of the earth. The information to be obtained and compiled for this report includes: location of selected water wells, depths of wells, range and average yields of wells, depth to water, additional producing characteristics of the water-bearing rocks, quality of water and others.



PRODUCING WATER WELL

USE - evaluation of individual aquifers (water-bearing rocks), determination of ground-water availability in an area, optimum depth for wells, optimum topographic setting for well site, recharge potential of aquifers, sensitivity to pollution, partial evaluation of solid waste disposal sites and others.

MINERAL RESOURCES

Distributions and descriptions of mineral resources are to be presented. Data compiled includes depths to mineral deposits; size, shape and quantity (reserves) of specific mineral commodities; quality and ultimate value of mineral deposits, relationships of mineral resources to adjacent rocks and others.

**PRIMARY USE IS
EXCAVATION OF MINERAL**



**SECONDARY USE IS
WATER SUPPLY**



USE - Planning - Planners and government officials with prior knowledge and appreciation of mineral deposits can plan to have industry extract all or part of the resource before developing and building upon the area - priorities can be established - the ultimate, total value of the mineral resource can be determined. The multiple use concept can be effectively used if precise mineral data is available *at the beginning* of planning; for example -



**OTHER SECONDARY USE-
SANITARY LANDFILL**

QUARRY to SANITARY LANDFILL to RECREATION AREA

ENGINEERING GEOLOGY

The geologic conditions which affect engineering works are to be considered in this portion of the report. Information to be developed includes



**FOUNDATION FAILURE
IN LIMESTONE SINKHOLE**

depth to bedrock, condition of rock mass, cut-slope stability of rocks, foundation stability, excavation characteristics of rocks and physical tests such as compressive strength, shear strength, porosity and others.

USE - The engineering geology information is used in the planning, design and construction of engineering works and affects safety, construction efficiency and economics.

USE - Involved in the evaluation of solid waste disposal sites and subsurface liquid waste disposal wells. Involved in the recognition of, modification of or correction of "geologic hazards" which are produced by man's alteration of his natural environment.

The environmental geology study of the Harrisburg Metropolitan Area is scheduled for completion late in the summer of 1971 and will be made available to all interested persons.



ROCKFALLS ALONG ROAD

William G. McGlade

SOUTHWESTERN PENNA. ENVIRONMENTAL STUDY

The Southwestern Pennsylvania region, centering on Pittsburgh, is one of the six metropolitan areas in the United States which have been designated by the United States Department of the Interior for a comprehensive study of environmental and resource factors affecting growth and redevelopment. The four-year project will be conducted jointly by the United States Geological Survey and the Pennsylvania Topographic and Geologic Survey. Federal funds will cover 85% of the total project cost of nearly two million dollars. The detailed project work will be carried out by staff members of the U. S. Geological Survey, the Pennsylvania Geological Survey, and by contract with the private sector.

The growth of metropolitan areas is greatly controlled by their land and water resources. A detailed evaluation and inventory of those physical resources is necessary for long-range planning and effective decision making.

The new Southwestern Pennsylvania Environmental Study will cover the six counties of Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland. This is an area faced with many special environmental problems, such as landslides on unstable slopes, subsidence related to mined-out areas, water pollution by industrial wastes and acid mine water, flash floods, and limited construction resources. The goal of the environmental study will be to define those and other factors needed to plan for housing, industrial development, waste disposal, transportation networks, and recreation facilities.

The Southwestern Pennsylvania Environmental Resources Study is to be a practical demonstration of the role of geology in planning for wise land use and environmental protection.



**SOUTHWESTERN
PENNSYLVANIA
ENVIRONMENTAL
STUDY AREA**

AWARD-WINNING PAPER ON ENGINEERING GEOLOGY

Peter Wilshusen of the Pennsylvania Geological Survey was awarded first prize for his paper on *Engineering Characteristics of The Rocks of Pennsylvania*, presented at the Meeting of the Association of Engineering Geologists. The paper was among 37 others presented during the technical sessions in Washington, D. C. in the week of October 18. More than 300 geologists attended the meetings to discuss problems having to do with the application of geology to engineering practice.

Engineering geologists are concerned with the relationship of rock and soil conditions to the design, construction and maintenance of highways, bridges, buildings, dams and other engineering structures. If a highway is to cross a limestone terrain filled with solution cavities, caves and sink holes, an engineering geologist will have provided information so the road can be safely built. If a large earth fill dam is to be built, an engineering geologist will have studied the foundation so it can be treated against leakage beneath the embankment. These two examples show the importance of this often unseen work to the satisfactory completion of large construction projects.

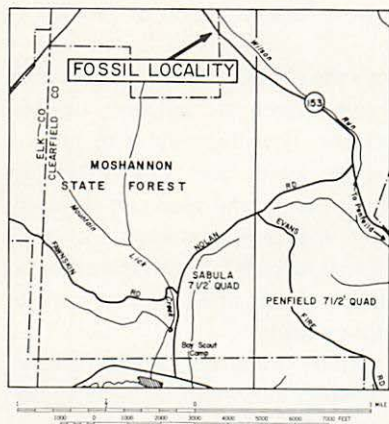
Mr. Wilshusen outlined the results of a study underway by the Pennsylvania Geological Survey in which rock characteristics important to the engineer, designer, contractor, planner and consultant are being described for rock units across the State. Questions to be answered by the study are: 1. What are the materials to be dealt with and what is their condition? 2. How do they react to stress? 3. What is the degree of permeability? 4. Does a site contain construction materials for the proposed project or of economic value outside the project? 5. What groundwater conditions can be expected? 6. What earth processes, such as flooding, are active? 7. How stable is the land? We are providing some answers to these questions through a group effort of Survey staff members who are gathering pertinent geologic information. The first results are to be published soon.

PENNSYLVANIAN HEADS BUREAU OF MINES

Dr. Elburt F. Osborn was sworn in on October 23 as the 13th Director of the United States Bureau of Mines. Dr. Osborn was formerly Dean of the College of Mineral Industries at the Pennsylvania State University and more recently served as Vice President for Research at the University. The Pennsylvania Geological Survey congratulates its fellow Pennsylvanian and fellow geologist upon this most important appointment.

NEW FOSSIL LOCALITY FOR CLEARFIELD COUNTY

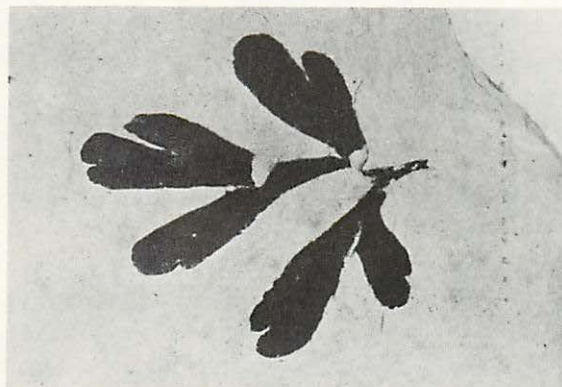
A fascinating variety of Mississippian fossils is available for both amateur and professional paleontologists, as well as any lay naturalist who wishes to step back about 325 million years into the past. In the extreme northwestern corner of Clearfield County, shales, siltstones, and sandstones in a borrow pit in the middle part of the Pocono Formation yield plant and invertebrate fossils along with a few vertebrate fragments.



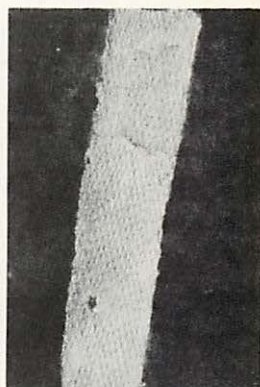
The borrow pit is located on the southwestern side of Pennsylvania Route 153 on Boone Mountain, about 4.1 miles northwest of the village of Penfield. There is ample parking space for a few cars opposite the large road cut just northwest of the borrow area, on the northeastern side of the road. Collectors must use this parking space and walk carefully back to the site, using caution and common sense with regard to traffic.

At least two Mississippian plant genera, *Adiantites* and *Lepidodendropsis*, may be collected from the greenish silt-

stone and sandstone rubble at the base of the borrow pit face. Well-preserved, partly carbonaceous, impressions of plant stems up to three inches wide have been found. Careful searching in some of the finer-grained, shaly units will reveal beautifully-preserved leaves. Some excellent specimens have been collected from the road cuts to the northwest of this borrow area.



MISSISSIPPIAN PLANT FOSSIL
ADIANTITES SPECTABILIS



MISSISSIPPIAN
PLANT FOSSIL

Abundant molds of Mississippian brachiopods with some pelecypods, crinoid columnals, and rare bryozoans occur in patches in the layers that form the floor of the pit. Occasional, small, fish bone fragments will catch the eye of the careful observer; they are bluish-white and display bony structure when examined with a hand lens. Common brachiopod genera are *Rhipidomella*, *Spirifer*, *Camarotoechia*, and *Productus*; an occasional large *Orbiculoidea* may be found. The pelecypod *Cypricardinia* has been tentatively identified at this locality.



MISSISSIPPIAN BRACHIOPODS

The fossils were included in deposition of the middle portion of the Pocono Formation — part of a deltaic complex that extended over much of central Pennsylvania during the Mississippian Period. Land plants were common during this time and were forerunners of those that formed the great coal swamps of the Pennsylvanian Period. The marine invertebrates were obviously prolific in the delta front muds and sands.

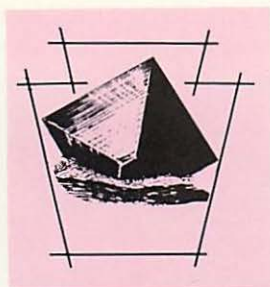
Thomas M. Berg

PROLIFIC GASOLINE FIELD

In the October 1969 issue of *PENNSYLVANIA GEOLOGY*, we reported on the occurrence of subsurface gasoline floating on the water table of a limestone terrain in Hampden Township, just across the Susquehanna River from Harrisburg. At that time 112,000 gallons of gasoline had been pumped from 35 wells which had been drilled in the one square mile area for recovery purposes.

During the past year tests and examinations have been carried out on the near-by pipelines and gasoline storage tanks, without any success in locating the specific source of the gasoline. Meanwhile, pumping has continued to recover the gasoline. It has been found that five or six of the wells are the major producers; indications are that these wells lie along a major fracture trace along which the gasoline tends to concentrate. It is also noteworthy, that the recovery rate per well per day tends to decrease as the water table rises, suggesting that with a higher water table the gasoline spreads out beyond the fracture.

As of November 15, 1970, there has been recovered from this little "gasoline field" 208,296 gallons of quality, usable gasoline!



EARTH SCIENCE TEACHERS' CORNER

U. S. GEOLOGICAL SURVEY'S LEAFLET SERIES

Several new titles have been added to the U.S.G.S. list of popular geology leaflets and booklets:

"Geologic Maps of the Moon", 4p. leaflet.

"Use and Conservation of Minerals", 4p. leaflet.

"Natural Steam for Power", 10p. leaflet.

"Collecting Rocks", 8p. leaflet.

"U. S. Geological Survey Library", 4p. leaflet.

"The Geologic Setting of the John Day Country", 23p. booklet.

"John Wesley Powell, Soldier, Explorer, Scientist", 23p. booklet.

"Geologic Time", 20p. booklet.

River Basins of the United States - Series

The Delaware, 4p. folder.

The Columbia, 4p. folder.

The Hudson, 4p. folder.

The Potomac, 4p. folder.

All of the above publications are available from the U. S. Geological Survey, Distribution Section, 1200 South Eads Street, Arlington, Virginia 22202, free of charge.

STEREOGRAM BOOK OF ROCKS, MINERALS AND GEMS

Hubbard Press has recently published a stereogram book of 159 full-color rock, mineral, and gem photos in matched pairs for stereo viewing. This book with the aid of a stereoscope enables the reader to study these rocks, minerals, gems, lunar rocks and crystal systems in three dimensions. Sample pages of the book are available for examination from Hubbard Press, 2855 Shermer Road, Northbrook, Illinois 60062.

ENVIRONMENTAL STUDIES NEWSLETTER

An Environmental Studies (ES) Project is currently underway in Boulder, Colorado. The project directors, Drs. William D. Romey and Robert E. Samples, say this project represents a pioneer effort to develop materials for teachers that

will allow the student to express himself regarding the immediate environment in which he lives. A major distinction of this program is that three environments are considered. The first is the inner environment of the child. The second is the immediate environment in which he lives, and the third is the global environment which is of so much concern to mankind.

Because Environmental Studies is nondisciplinary and usable in a wide variety of content areas, teachers in nonscience as well as science fields may be interested in the materials. If your name is not on their regular NEWSLETTER mailing list or if you know of someone who would like to receive news on the progress of the Environmental Studies program, write your name on a postcard and send it to — NEWSLETTER, Environmental Studies Program, Box 1559, Boulder, Colorado 80302.

CALCIOSTRONTIANITE (?)

At Winfield, Union County, Pennsylvania there is a quarry in Keyser limestone that has become well known as a mineral-collecting locality (see Pa. Geol. Survey Bulletin G-33, "Mineral Collecting In Pennsylvania"). Many fine mineral specimens from this quarry have found their way into collections throughout the northeastern United States. Of particular interest have been the fluorescent aragonite, celestite, and "strontianite".

It is this latter mineral, strontianite, that is now in question. Originally, this mineral was identified as aragonite on the basis of crystal form. Subsequent chemical testing showed that strontium was the dominant element. An x-ray pattern confirmed that aragonite was incorrect and an almost perfect match was obtained with standard x-ray patterns for strontianite. However, this may not yet be the final truth of this seemingly elusive mineral occurrence. Some work done by R. V. Dietrich (American Mineralogist, 1960, p. 1119 - 1124) on similar occurrences in Virginia has come to our attention. Dr. Dietrich found that some strontianite-like minerals contained as much as 8.1% CaO and that the x-ray pattern of this material differed very slightly from that of pure strontianite (strontium carbonate with no calcium). He designated this mineral calciostrontianite.

The x-ray patterns of the Winfield "strontianite" have been re-checked and fit more closely that of calciostrontianite than that of strontianite. Although a chemical analysis for calcium should be made before positive identification is concluded, calciostrontianite is presently the more likely name for this Winfield mineral. Those of you who have this mineral in your collection should place a question mark after the name, either calciostrontianite (?) or strontianite (?). Those collectors who do not have good specimens should try to obtain them. Calciostrontianite, even with a question mark, is an unusual mineral.

D. M. Lapham

VANDALISM SOLVED BY GEOLOGICAL "DETECTIVES"

Geological knowledge and methods are not usually considered to be typical crime-solving tools. Nevertheless, rocks can be potent weapons and geologists can become involved in criminal detection. A case in point was the problem recently submitted to, and solved by, the Pennsylvania Geological Survey.

The Industrial Development Department of the Penn Central Transportation Co. submitted two rock samples to the Survey with the following problem. New automobiles from Detroit were arriving in New Jersey with smashed windows, dents, and scars resulting from rocks thrown at the passing railroad cars. The problem was whether, from an examination of the rocks found in the automobiles, we could identify the location of the vandalism, so that concentrated policing procedures could be initiated. Obviously, the whole length of track between Michigan and New Jersey could not be policed. In addition, there were two routes that could have been used to transport the automobiles, one through New York State and one through Pennsylvania, making any policing job even more difficult.

Along those two railroad routes there is an incredible variety of rock types and many of them can be found at several different places along the two routes. Here though, we had a bit of luck. The rocks that caused the damage were examined microscopically in the Pennsylvania Geological Survey laboratory. Both were found to be a coarse-grained (pegmatitic) gneiss containing feldspar, quartz, biotite mica, chlorite, and slender crystals, probably of the mineral called apatite. These minerals and the rock texture provided the critical clue that the rock specimens were from a metamorphic terrain.

The mineralogy of the rock samples permitted the search to be narrowed to southeastern New York and Pennsylvania. These areas, known as the Reading Prong in New York and the Piedmont in Pennsylvania, both contain metamorphic rocks. Could the Survey narrow the problem area further? We thought so. The rock type of the thrown samples occurs along the Penn Central Railroad in Pennsylvania, but there it usually has less biotite and almost never any apatite. On the other hand, rocks containing these minerals are common in a limited area of southeastern New York State. Therefore, we suggested that the most likely source of the thrown rocks would be along a stretch of tracks in the vicinity of West Point, north of New York City. This was confirmed by Penn Central's own geologists in an independent study of only the northern route.

The results are now in. Policing action by the Penn Central Railroad was initiated in the West Point area. Sure enough, several of the culprits were spotted there in action, and appropriate measures were taken by the railroad. Case closed.

SURVEY ANNOUNCEMENTS

REPORT ON THE PALMYRA AREA GEOLOGY

The Bureau of Topographic and Geologic Survey has released a new publication, "Geology, Mineral Resources, and Environmental Geology of the Palmyra Quadrangle, Lebanon and Dauphin Counties", by Alan R. Geyer.

In this report particular attention has been given to the effect upon the environment and land use by the properties and distribution of the various rock and mineral resources. The geologic map is particularly keyed to show the engineering properties and groundwater availability for each of the rock formations; difficult foundation conditions, potential cave-in sites, and excavation properties are identified for the entire area.

The Palmyra Quadrangle area is one of complex geologic conditions with a number of valuable mineral resources. The high-calcium limestone of the area is widely used for fluxstone, agricultural lime, cement manufacture, filler material and construction stone. The new publication details the chemical and physical properties of this valuable limestone, as well as its distribution and reserve potential. The shale formations of the area which are valuable for brick manufacture and light-weight aggregate are also described in detail.

The new report on the geology of the Palmyra Quadrangle will be of interest and benefit to the residents, planners, industrial developers, and all who are interested in wise land use and our environment.

Bulletin A-157D, Geology, Mineral Resources and Environmental Geology of the Palmyra Quadrangle, Lebanon and Dauphin Counties, is available from the Bureau of Publications, P. O. Box 1365, Harrisburg, Pa. 17125, for \$2.50 plus sales tax:

NEW ATLAS OF METAL MINES AND OCCURENCES

The Pennsylvania Geological Survey has published *Metal Mines and Occurrences* as Part 3 of the Atlas of Pennsylvania's Mineral Resources. Authored by Professor Arthur W. Rose, this new bulletin is an important step in identifying

and evaluating the economic potential of the Commonwealth's metallic mineral industry.

Metallic mineral resources are in ever-increasing demand. Those which were easily found at the surface were developed early in Pennsylvania's industrial history. While the Commonwealth once had thousands of metal mines in production, most have been exhausted or are too small to compete in today's market where only large-tonnage deposits are economically minable.

Some of the old areas may hold the key to future mining in Pennsylvania. As foreign sources become less available, as demand continues to grow, and as technology advances to allow the exploitation of deposits of lower grade, old mining areas and low-grade deposits may have new potential for economic development. Thus, *Metal Mines and Occurrences* can serve as an aid in the re-examination of the economic potential of mineral occurrences in Pennsylvania.

The new publication contains 14 pages of text, two tables, and a map all in a section form that can be added to the previous M-50 Atlas publications on limestone and clay resources in Pennsylvania. All metal occurrences except residual iron oxide deposits and magnetite in metamorphic rocks are included. A total of 371 mineral localities are plotted on the map and described in the text. Information given includes production figures, history, and a summary of the geology. The deposits are classified primarily by the age of the host rocks that the metals replace and secondarily by geologic type. The list of 93 references will prove useful to geologists and mining engineers seeking more detailed information.

Production from these metallic deposits has totaled more than a billion dollars (at 1968 prices) to date. As the new publication makes clear, the future in Pennsylvania looks promising, especially for iron and zinc. Known occurrences of copper, lead, nickel, and uranium also merit consideration for the future.

This publication also will be useful to economic geologists interested in the origin of large ore provinces, to compilers of nation-wide resource estimates, and to planners or developers interested in the value and potential of land for development. Because mining is an exploitation of the land, this publication also should be of importance to conservationists and all those concerned with the quality of our environment.

Metal Mines and Occurrences, Part 3 of Bulletin M-50, Atlas of Pennsylvania's Mineral Resources, may be obtained from the Bureau of Publications, P. O. Box 1365 Harrisburg, Pa. 17125, for \$1.60 plus sales tax.

STRATIGRAPHIC OFFICER

Pennsylvania State Geologist Arthur A. Socolow has been elected as Vice Chairman of the American Commission on Stratigraphic Nomenclature.

LIMESTONE FIGHTS AIR POLLUTION

Investigations in progress by the United States Bureau of Mines and several other organizations indicate that ground limestone used in coal fired electric plants may permit the use of high sulfur fuel without air pollution from sulfur oxides. In this process ground limestone is introduced into the combustion area where it is calcined. The resulting hot lime reacts with sulfur oxides from burning coal to produce solid particles of calcium sulphate which are recovered with the fly ash. Experiments with various rocks indicate that the fineness and porosity of the calcined lime is the principal factor controlling the efficiency of sulfur scavenging. Magnesian or dolomitic limestones appear to be as effective as more purely calcic varieties of limestone.

The economic and technologic feasibility of this process in large scale power plants has yet to be demonstrated, but if it is successfully established, it would have substantial impact on major sectors of the Pennsylvania mineral industry. Many of the coals presently mined in Pennsylvania contain more sulfur than is approved by current air pollution control standards in urban areas, and it can be presumed that these standards may become more stringent and widespread. As a major portion of these coals are used for power generation, it is obvious that technology for the safe utilization of higher sulfur coals will have a significant benefit to the Pennsylvania coal industry. Extensive development of limestone consumption by the electric power industry would be an entirely new market for limestone producers.

Continuing changes may be anticipated in power generation and transmission technology which will influence the relative costs of minemouth versus near user steam plants, but present indications are that in many cases power can most economically be generated close to the users. The principal external cost of power sites in or near urban areas is air pollution control of sulfur oxides. More economic control of such pollution may significantly alter the options of regional planners.

Southeastern and central Pennsylvania communities are generally fairly well situated with respect to limestone sources which would probably be suitable for sulfur control. Unplanned urban expansion, however, has already eliminated certain sources of limestone supply and threatens others. Where regional planning has been undertaken, it is generally recognized that certain areas must be reserved for the quarrying of construction materials. Limestone for sulfur control represents simply another demand on the same resources. It cannot presently be anticipated what the extent of this demand may prove to be. The significant point for planning is that planners must not only project existing demands to future needs, but must make allowance for technological changes which will affect demands.

D. B. MacLachlan

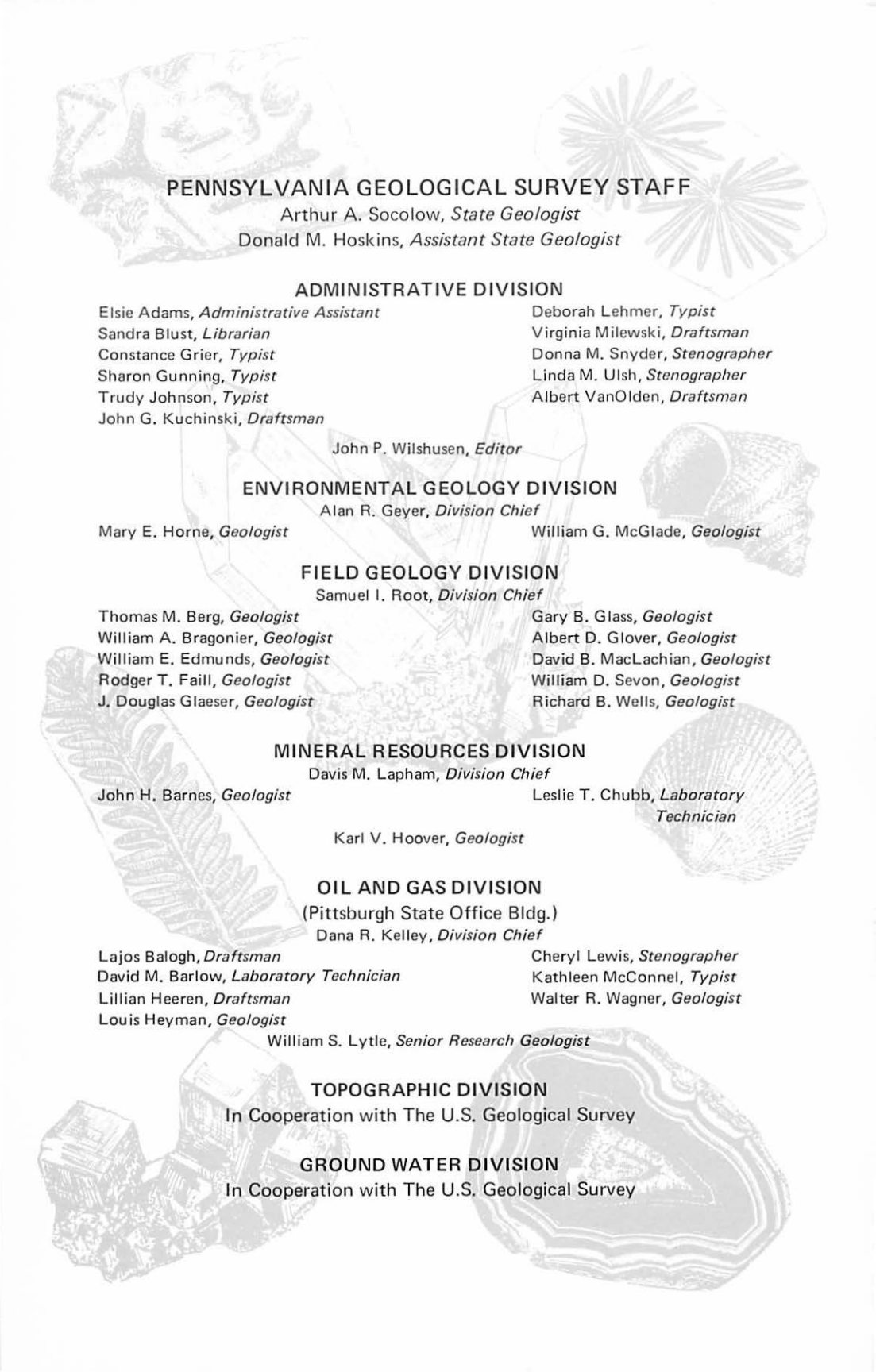


Two new sinkhole collapses recently appeared in a Lebanon Valley farm field underlain by limestone. This is another example of the impact of geology upon man's activities.

NEW SURVEY PUBLICATIONS

The following list of publications has been released by the Survey during the past few months. All of these publications are available at the Pennsylvania Bureau of Publications, P. O. Box 1365, Harrisburg, Pennsylvania, 17125. Checks should be made payable to the Commonwealth of Pennsylvania. For Pennsylvania addresses, please add 6% State Sales Tax. For free publications write to the Pennsylvania Geological Survey, Main Capitol Annex, Harrisburg, Pennsylvania, 17120.

<i>Publication</i>	<i>Price</i>
A 223 Geology and Mineral Resources of the Pennsylvania Portions of the Milford and Port Jervis 15' Quadrangles , by F. W. Fletcher and D. L. Woodrow, (64 p., 9 figs., 2 pls.)	\$2.10
IC 68 Chemical Analyses of Three Triassic (?) Diabase Dikes in Pennsylvania , by D. M. Lapham and T. E. Saylor (16 p., 2 figs.)	Free
M 50 Part 3 Metal Mines and Occurrences in Pennsylvania , by A. W. Rose (14 p., 1 pl. in loose leaf folio)	1.60
Pennsylvania Geological Publications, October 1970 , prepared by the Bureau of Topographic and Geologic Survey (60 p.)	Free



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