PENNSYLVANIA GEOLOGY

THE PENNSYLVANIA GEOLOGICAL SURVEY
VOL. 6/6

COMMONWEALTH OF PENNSYLVANIA
Milton J. Shapp, Governor

DEPARTMENT OF ENVIRONMENTAL RESOURCES
Maurice K. Goddard, Secretary

TOPOGRAPHIC AND GEOLOGICAL SURVEY
Arthur A. Socolow, State Geologist

CONTENTS

Cover Photo: Entrance to the Brooks Model Coal Mine in Nay Aug Park in east Scranton. The model mine is located near the Everhart Museum and is the only model coal mine in Northeastern Pennsylvania open to the public daily from 10:00 a.m. to 6:00 p.m.

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DECEMBER 1975

FROM THE DESK
OF THE
STATE GEOLOGIST . . .

A MAN'S BEST FRIEND

The latest craze sweeping the country is a new kind of pet. Advertisements in major city papers feature "The pet rock, complete with travel case and training manual." Readers are urged to "give-a-rock-a-home" and are advised that the pet rock can be "trained to obey simple commands like Heel, Play dead, and Roll over."

As is so often the case, we must point out that again geologists have been ahead of the times! Geologists have long had pet rocks; many geologists have office shelves full of them, and some even take their special pets home. Certainly the geologist is a master at training his pets; on the shelf they never move, but on the hillside they roll over at the slightest prod of the geologic pick.

Speaking seriously, the esthetics of rocks and minerals have appealed to hundreds of thousands in all parts of the world. The mineral displays at museums large and small are prime attractions for visitors of all ages. Anyone who has experienced the beauty of the mineral collections at the Smithsonian Institute in Washington could not fail to be entranced.

Mineral collecting has become a tremendously widespread hobby. Individuals, entire families, and mineral clubs actively pursue the quest for mineral finds. There are few avocations which can match the challenge, the stimulation, and the healthful exposure of the search for minerals in the field.

Pennsylvania has long been a center of mineral collecting, with several world reknown collecting localities. The Pennsylvania Geological Survey's bulletin on Mineral Collecting in Pennsylvania is perennially our best seller; with the supply of the last printing exhausted, a revised edition is nearing completion and should be ready by spring.

Yes, they are urging pet rocks for the public. But so many of us in geology and mineral collecting already have our pets, and well trained too!

Arthur A. Socolow

Scranton's Mineral Heritage Preserved

by
William H. Bolles
Science Education Adviser
Department of Education

The economy of the Scranton area shifted from agriculture to mining during the 1840's due to the efforts of George and Selden Scranton. The mining of iron ore to be used in the production of rails was the first mineral industry. The Lackawanna Iron Furnaces on Cedar Avenue are the restored remains of the original iron furnaces built by George Scranton and associates as part of the Lackawanna Iron Company.

With the expansion of the railroads the Scrantons were quick to realize that the anthracite they used in their iron furnaces had great potential of its own. Attention became focused on the "black diamonds" which would shape the destiny of the city for the next 80 years.

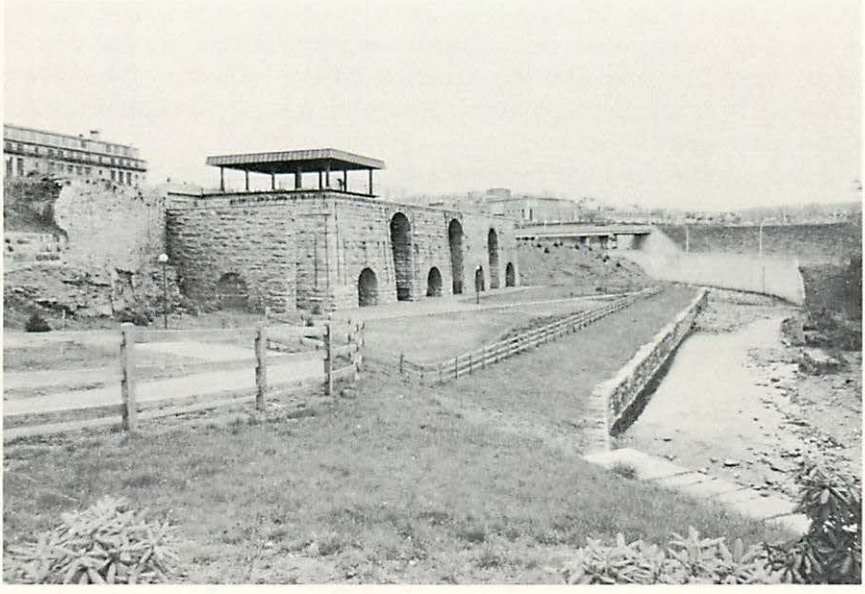

Fig. 1. Restored remains of the Lackawanna Iron Company furnaces at Cedar Avenue off Lackawanna Avenue.

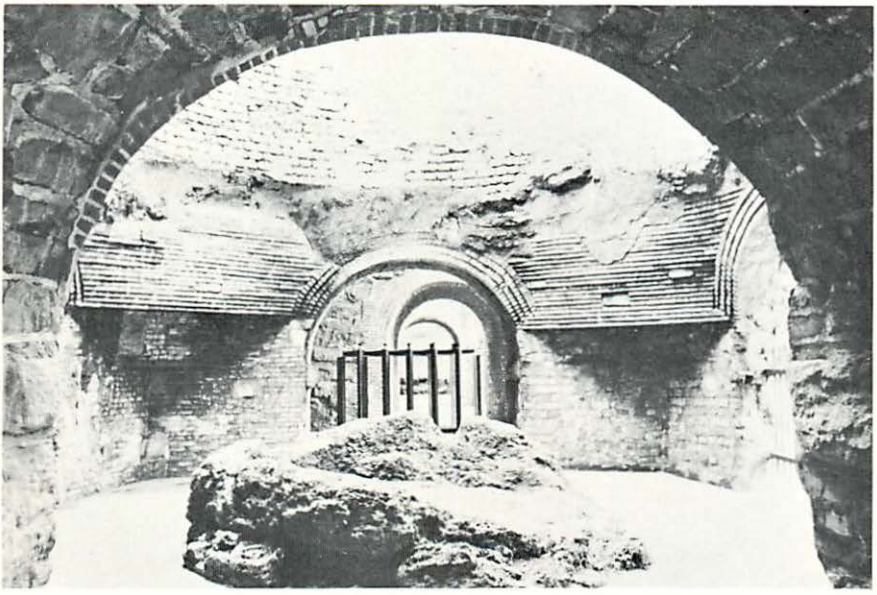

Fig. 2. Large mass of slag at the base of one of the restored furnaces.

Fig. 3. Motor used to pull loaded coal cars from the mines.

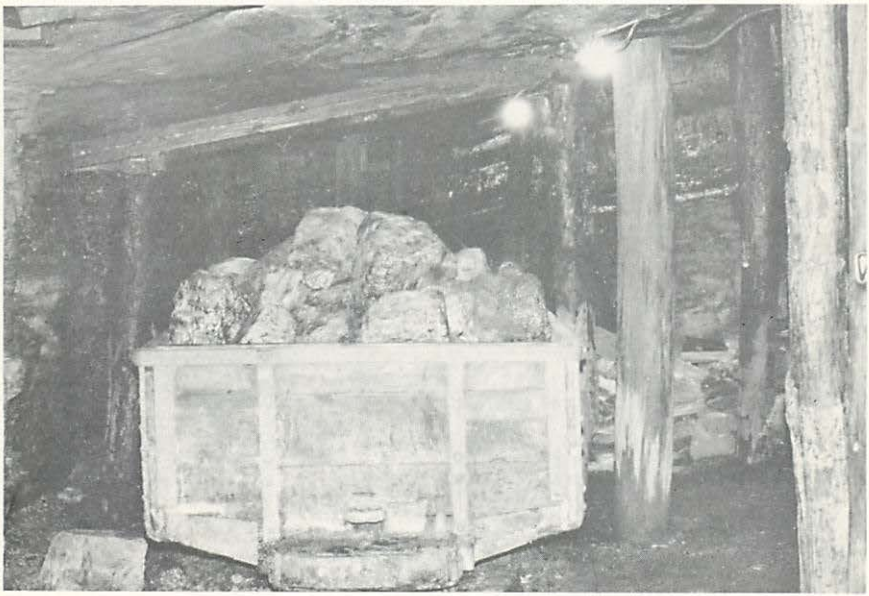

Fig. 4. Interior view of the Brooks Model Coal Mine in Nay Aug Park near the Everhart Museum.

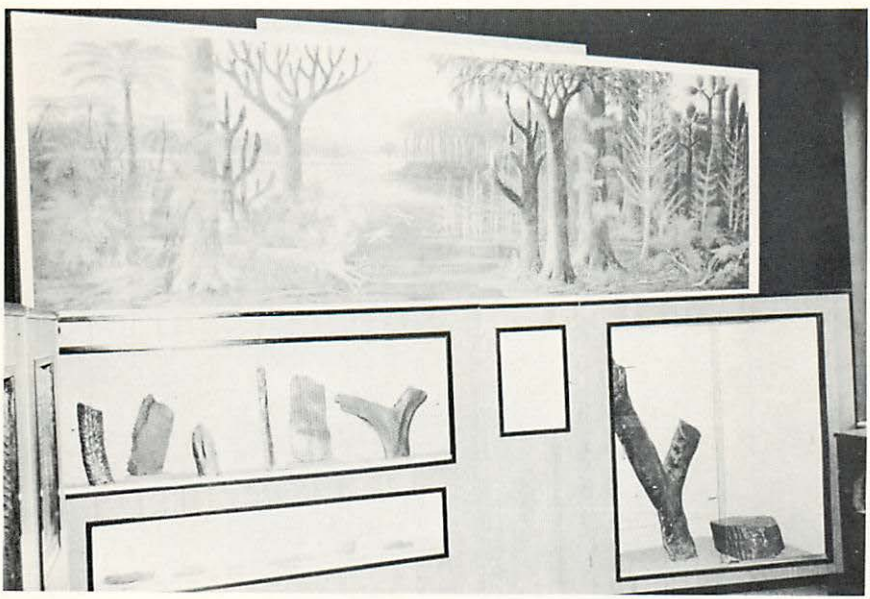

Fig. 5. View of the coal room in the Everhart Museum, Nay Aug Park, showing the origin of coal deposits.

The mining of coal escalated the area's industry, and in 1866 Scranton was incorporated as a city. The population grew from 30,000 in 1866 to 130,000 in 1910.

The Everhart Museum in Nay Aug Park contains a "coal room" where the local mining methods are shown as well as the origin of the area's coal deposits. A small mineral specimen display is located in the basement of the museum and about 1000 specimens are in their collection. The Brook's Model Coal Mine is located directly behind the museum and is open to the public daily from 10:00 AM to 6:00 PM.

All of these locations should be of interest to teachers and students in the study of local history and geology. With the renewed interest in coal as an energy source this local resource may again prove to be a boon to the Scranton area as well as the entire anthracite region.

GEOLOGY FOR PUBLIC USE

The U. S. Geological Survey has issued three new Professional Papers on applied aspects of geology that are particularly timely and relevant to present-day needs.

Earth Science in the Public Service, Professional Paper 921, presents a series of papers identifying various ways by which geology is serving contemporary problems in our society.

Mineral Resources Perspectives in 1975, Professional Paper 940, defines in simple language the status of the nation's vital mineral resources, and the outlook for fulfilling our future needs.

The Logic of Geologic Maps, With Reference to Their Interpretation and Use for Engineering Purposes, Professional Paper 837, strips geologic maps of their scientific mystique and explains how such maps can be valuable tools for community needs and decision making.

Professional Papers 921, 940, and 937 sell for $2.15, $.95, and $3.50 respectively, and may be purchased from the Branch of Distribution, U. S. Geological Survey, 1200 S. Eads St., Arlington, Virginia 22202.

The April 1975 issue of "Pennsylvania Geology," volume 6/2, pages 7 and 8, contain misspellings of the Devonian Echinoderm *Anomalocystites.* The correct spelling is Anomalocystites, not Anomolocystites.

AND THEN CAME ELOISE...

by
Arthur A. Socolow

For many residents of the Susquehanna River Basin the anguished memories of Hurricane Agnes' flooding of 1972 had only just begun to fade when along came the rains of Eloise in September, 1975. Little wonder, then, that with the early flood warnings while Eloise was in progress, one could look up and down the riverfront streets of Harrisburg and see the pitiful sight of residents desperately loading their precious possessions onto hauling vans, rented trailers, borrowed trucks, and station wagons. All this came so soon after the so-called "100-year" Agnes flood.

Fortunately, for most areas Eloise flooding did not reach the proportions of Agnes and much of the precautionary effort happily turned out to be unnecessary. But such was not true in all cases. Many

Along came Eloise and on September 27th Swatara Creek at Hershey decided to flow over the Sand Beach Road bridge, rather than under it!

At the Lyonsville Bridge north of Hershey, if you were following northbound route 743 you had better have an aquatic vehicle.

Paxton Creek in Wildwood Park near Harrisburg Area Community College; note mud-stained shrubbery marking flood level of the creek.

After the Eloise waters went down in the Shipoke area of Harrisburg, there remained the backbreaking job of debris cleanup, both inside and outside the homes.

The water impacts of Eloise extended to the subsurface, as well as the surface, as evidenced by this sinkhole development and resulting home damage.

of the tributaries of the Susquehanna River experienced water levels and flooding which equalled or exceeded Agnes. In the Harrisburg area, creeks like the Yellow Breeches, the Conodoguinet, and the Swatara each went on new rampages. Within the city, Paxton Creek again did its dirty work along Cameron Street. Fortunately, the Pennsylvania Geological Survey offices and labs are on the 8th and 9th floors in a center-city area untouched by flooding. As we of the Pennsylvania Geological Survey watched our former 1972 quarters again hit by Paxton Creek flooding, we had the satisfaction of having so wisely resisted the suggestion in 1972 that we reoccupy our once-flooded quarters after the Agnes debacle.

The agonies of flooding can never be totally eradicated. We can only hope that the public and its representatives at all levels of government will recognize that the problem will recur, and therefore such technological and procedural steps should be taken as to forestall and minimize the impacts.

OIL AND GAS, PENNSYLVANIA 1975

by
William S. Lytle

During the first nine months of 1975, there were 13 discoveries made in the Commonwealth. Of these 13, there were 4 deep gas, 8 shallow gas, and 1 shallow oil discoveries.

The shallow oil discovery was made in Vernon Township, Crawford County, where the No. 1-A Dwight L. Moody well had an initial production of 184 barrels of oil per day from the Second Venango sandstone at a depth of 622 feet. This well is in an area far from any other shallow oil or gas production. A couple of small fields had been productive of oil and gas in the early oil days, one 5 miles east and the other 5 miles south of this discovery. Although this small lens of sand will probably produce only a minor amount of oil and gas, it indicates that there are other possibilities of finding oil and gas in northwestern Pennsylvania beyond the known producing areas. Where there is one small lens of oil-bearing sandstone there can be much larger lenses in this area, where only a few wells have been drilled. The new field is not significant in itself, but it shows the potential for the area which is significant.

The first reported shale gas well in Pennsylvania was drilled in 1975 in Beaver County, on the Metropolitan Industries property. The well after fracturing of the Upper Devonian shale, had an initial production of 150,000 cubic feet of gas per day in the interval from 3500 to 4700 feet in depth. Shale gas wells generally fall off rapidly from their initial production but have very long lives. Currently interest is high for shale gas, and in the next few years we will see a number of wells testing the Upper Devonian shale section in search of gas in commercial quantities. From the blowouts encountered when drilling through this shale, we know there is considerable gas in the section. The question is—can a shale gas well be completed to produce in commercial quantities for several years? We know that shale gas wells in other states have been economically productive and we hope areas can be found in this state where the wells will be profitable.

The No. 1 R. J. Lambert well was drilled in Somerset County, discovering gas in the Oriskany sandstone at a depth of 8636 feet. This well discovered the Shanksville field with an initial production of 2500 MCFPD natural. As yet, no additional wells have been drilled in the field, but it could be developed into a fair-sized field.

The discovery of commercial gas-bearing Medina sandstone as far south as southern Venango County opened up all of northwestern Pennsylvania to the possibility of obtaining gas production from the Medina. Since then several manufacturing companies have been successful in drilling for Medina gas to supplement the gas they buy from the public utility companies or to be used in an emergency situation. N-Ren Corporation, a fertilizer manufacturing company, has taken over some wells drilled by Kebert Development and has launched on a many well drilling program of their own in an attempt to find enough gas to satisfy their requirements so they can build a new plant in the Meadville area. Many other companies outside of northwestern Pennsylvania have been active in trying to find gas to supply their needs when their supply is cut back this winter by the public utilities.

A well in McKean County, the No. 2 Minard Run Tract Wt. 2279 has discovered commercial gas in the Cambrian Little Falls Dolomite. The open flow was estimated at 500,000 cubic feet of gas per day at a rock pressure of 3000 psi in 48 hrs. The total depth of this well is 10,478 feet. An attempt was made to fracture this well, but the operators were not successful even with a fracturing pressure of almost 10,000 psi. Experimental work will continue with this well. The only other Cambrian production in Pennsylvania was from the Gatesburg sandstone in northwestern Pennsylvania, where two small fields produced a little gas before abandonment.

New Uranium-Thorium Occurrence in Northampton County

by Bob C. Smith II

As part of continuing activities of the Bureau of Topographic and Geologic Survey aimed at locating metamorphic type zinc deposits in Pennsylvania, the Easton area Chestnut Hill talc-serpentine quarries were recently examined. Only traces of zinc and lead were found, but uranium-thorium minerals were found to be common in an abandoned serpentine-talc quarry, located on the west side of Bushkill Gap through Chestnut Hill, 2000 feet N18°W of the 13th Street exit of U. S. Route 22 (latitude: 40° 42′ 00″, longitude: 75° 13′ 59″). The quarry is owned by Pfizer, Inc., 640 North 13th Street in Easton. Study of the unusually good exposures in this quarry may help locate other uranium occurrences in areas more favorable for mining.

Bedding in the contact-metamorphosed Precambrian Franklin marble trends N85°E, 42°S. Phlogopite-rich beds appear to be the richest in uranium and thorium. A 36-inch channel sample across a phlogopitic bed near the quarry floor assayed 0.1% U_3O_8 plus appreciable but undetermined amounts of Th. This bed is mineralized for at least 15 feet along the quarry face. Additional digging at a later date indicated that mineralization with a gamma activity greater than 0.3 mR/hr continues for at least an additional 12 inches into the quarry floor. Other mineralized zones in the quarry and on the north upper rim have surface activities from 0.12 to 1.3 mR/hr. Typical of many uranium occurrences, the exposed rock was found to be leached of uranium. Serpentine group minerals, phlogopite, tremolite, talc, thorian uraninite, thorogummite, and traces of zircon, chalcopyrite, galena, and pyrite have been identified. The occurrence is similar to those described by Montgomery (Am. Min., v. 42, p. 804–820).

FIELD CONFERENCE GUIDEBOOKS NEEDED

The Field Conference of Pennsylvania Geologists still needs copies of many years' guidebooks for its archival files. Original copies will be accepted with many thanks for the following years:

1 – 1931	7 – 1937	13 – 1947
2 – 1932	8 – 1938	15 – 1949
3 – 1933	9 – 1939	16 – 1950
4 – 1934	10 – 1940	23 – 1958
5 – 1935	11 – 1941	33 – 1968
6 – 1936	12 – 1946 (need only "Stratigraphic Sequence of Allegheny Front," by Swartz)	

SURVEY ANNOUNCEMENTS

GREATER PITTSBURGH REGION GEOLOGIC CONDITIONS AND RESOURCES

The surface and subsurface geologic conditions of the six county Greater Pittsburgh region, as well as the oil and gas fields of the area, are delineated and evaluated in four new sets of maps issued by the Pennsylvania Geological Survey. Together, these four packets of maps offer the most comprehensive assemblage of geologic data ever put together for the six heavily populated, industrialized counties centering on Pittsburgh: Allegheny, Washington, Beaver, Butler, Armstrong, and Westmoreland. This mapping program was supported in part by the U.S. Geological Survey.

Map #42 is "Greater Pittsburgh Region Geologic Map and Cross Sections," by Walter Wagner and associates. This full-color geologic map is accompanied by three large plates showing cross sections, coal formations, and drill hole data. The accompanying text and legend describes the environmental aspects and groundwater characteristics of each formation in the area; the economic potential landslide susceptibility and engineering characteristics are itemized. Map #42 sells for $8.60.

Map #43 is the "Greater Pittsburgh Region Structure Contour Map," by Walter Wagner and colleagues. This map shows by contour lines the configuration (or warping) of the rock layers in the six-county area. This enables engineers, mineral developers, subsurface water seekers, and planners to know where at depth is the formation of their respective interests. Map #43 is priced at $1.75.

Map #44 is the "Greater Pittsburgh Oil and Gas Fields Map," by William Lytle and Lajos Balogh. While most people think of the Drake Well in Crawford County and Oil City in Venango County when Pennsylvania oil is mentioned, the six-county Greater Pittsburgh area is an old, established producing area with 245 named oil and gas fields and pools. Some of these have also been used as secondary gas storage reservoirs. At this time of energy shortage, with increased oil and gas exploration and development, it is essential that the Pittsburgh area fields be identified for proper planning and protection. Map #44 sells for $3.70.

An important contribution to engineering and construction design is offered by Map #45, "Greater Pittsburgh Region Maps of Mined-

Our Areas and Thickness of Rocks Over the Pittsburgh Coal," by Mr. Sam Cortis and colleagues. Much of the six-county area is underlain by the world-famous Pittsburgh Coal Seam, and large portions of this coal seam have been removed by deep, underground mining. The two large maps in this packet show (1) where the Pittsburgh Coal Seam has actually been mined out, and (2) what the thickness of rock is between the surface and the mined-out zone at depth. This combined information is vital when planning any surface or subsurface construction; it enables the engineer to evaluate the subsidence potential over a mined-out location, and, thus, plan whatever engineering steps are needed to cope with the situation. Planners, zoners, and residents of the area will all benefit from this information. Map #45 is priced at $1.85.

These important four map packets may be ordered at the indicated prices (plus 6% sales tax for Pennsylvania residents) from the Pennsylvania Bureau of Publications, P.O.Box 1365, Harrisburg, Pa. 17125.

NEW REPORTS ON CARBON AND MONROE COUNTY GEOLOGY

Major progress has been achieved in defining the geology and mineral resources of Carbon and Monroe counties with the release of three new Atlas reports by the Pennsylvania Geological Survey. The new reports provide critical environmental data for an area of growing population and increased recreational facilities. It is an area where protection and wise use of the environment call for all possible basic data.

Authored by Staff Geologist Dr. William D. Sevon, the three new geologic reports cover six quadrangles as follows:

Atlas 194 cd, Geology and Mineral Resources of the Hickory Run and Blakeslee Quadrangles.

Atlas 195 ab, Geology and Mineral Resources of the Christmans and Pohopoco Mountain Quadrangles.

Atlas 204 ab, Geology and Mineral Resources of the Tobyhanna and Buck Hill Falls Quadrangles.

Each Atlas report includes a text and two detailed, full-color maps, one of the bedrock geology and one of the occurrence of unconsolidated glacial deposits. Particular attention is given on the maps and in the text to enumerate the environmental characteristics of the geological formations, including their potential as mineral resources, their properties which affect excavation and construction, and their utility for water resources and waste disposal.

The three new reports will be of interest to Northeastern Pennsylvania planners, engineers, developers, sportsmen, and area residents with an interest in their geologic environment. Geologists will benefit from the new knowledge of geologic processes and events of the area.

The reports are available from the Pennsylvania Bureau of Publications, P.O. Box 1365, Harrisburg, Pa. 17125. The prices are: Atlas 194 cd $9.10; Atlas 195 ab $11.20; Atlas 204 ab $10.10. Pennsylvania residents should add 6% sales tax.

MONROE COUNTY SAND AND GRAVEL STUDY ON OPEN FILE

The Pennsylvania Geological Survey is placing on open file the results of a preliminary study by Joseph P. Fox on the sand and gravel resources of Monroe County. Sampling and analyses of thirty sand and gravel deposits, mostly of glacial origin, were carried out while Mr. Fox was a student intern with the Survey, during the spring of 1974. This open file report includes gradations of the naturally-occurring materials, along with several physical tests including Los Angeles abrasion tests and freeze-thaw tests. Complete pebble counts were done on the gravels, and compositional estimates were made on the sands. The report includes a 1:62,500 sample location map and one hundred ninety-eight text pages with polaroid photographs, colored pie diagrams, histograms, and original field and lab notes.

Because of the complexity of this report, it is not readily reproducible, but may be examined at the Harrisburg offices of the Pennsylvania Geological Survey, Room 914, Executive House, 101 S. Second Street, Harrisburg, Pennsylvania.

New From the U.S. Geological Survey

Professional Paper 924 Hurricane Agnes rainfall and floods June-July, 1972. by J. F. Bailey, J. L. Patterson and J. L. Paulhus. 1975. $9.10

Hydrologic information is given on the June-July 1972 floods in New York, Pennsylvania, Maryland, Virginia, North Carolina and West Virginia resulting from the passage of Hurricane Agnes. The

detailed life history of the storm is traced, and rainfall information is shown for selected sites. Peak stages and discharges, flood frequency, and sediment data are given for 989 stations.

Hydrologic Investigation Atlas HA-541 Flood of June 22-23, 1972 at Lock Haven, Pa., by H. N. Flippo, Jr. 1975. $1.00

The area inundated by the flood of June 22-23, 1972, is shown on the topographic base map. Flood-frequency relations are given for both natural flows and regulated flows of West Branch Susquehanna River and for natural flows of Bald Eagle Creek. Flood profiles are shown for the 1936 and 1972 floods.

Map I-917A Oil and Gas Data from the Upper Paleozoic Rocks in the Appalachian Basin by W. de Witt, Jr.

Map I-917B Oil and Gas Data from the Devonian and Silurian Rocks in the Appalachian Basin by W. de Witt, Jr., W. J. Perry, Jr., and L. G. Wallace.

The maps, charts, and cross sections contained in 917 A and B are a survey of the subsurface data on the oil and gas resources of the Appalachian Region (including Pennsylvania). They are intended to serve as summary materials to aid in the search for additional supplies of oil and gas.

Map I-801 Geologic Map of the Beans Cove and Hyndman Quadrangles and part of the Fairhope Quadrangle, Bedford County, by W. de Witt, Jr.

Miscellaneous Field Studies Map MF-685-A Maps of rock types in bedrock of Allegheny County, Pennsylvania, by W. R. Kohn. 1975. (scale 1:50,000)

Miscellaneous Investigations Series Map I-809 Geologic map of anthracite-bearing rocks in the Tamaqua quadrangle, Carbon and Schuylkill Counties, Pennsylvania. by G. H. Wood, Jr. 1975. (scale 1 inch = 1,000 feet)

Maps 917 A and B are available for $2.00 each; Map I-801 and MF-685-A are available for $1.00, Map I-809 for $1.50, by writing to:

U.S. Geological Survey
Washington Map Distribution Section
1200 S. Eads Street
Arlington, Va. 22202

New Molybdenite Occurrence in Berks County

by Bob C. Smith, II

Molybdenite, a metallic bluish-gray sulfide ore mineral of molybdenum, has been found as flakes up to ¾ inch across in a roadcut near Reading. The occurrences are not of economic size, but identify the general area as one which may be mineralized with other important metallic elements. This occurrence was brought to our attention by a friend of the Survey for the benefit of mineral collectors.

Several molybdenite occurrences are scattered in a relatively new roadcut from 290 to 605 feet south-southeast of the breast of Ohlinger Dam for Antietam Reservoir, Stony Brook Mills, Berks County (latitude 40°21'20"N longitude 75°52'10"W). About 290 feet from the dam, a 2-4" wide molybdenite-bearing dike trends roughly N45E dipping 70°NE. The dike is composed of plagioclase and quartz, with minor amounts of biotite, hornblende and pyrrhotite.

The molybdenite is sparsely distributed along the dike margins. This molybdenite is of the 2H polytype and alters to sparse, pseudomorphs of powellite. The powellite is highly fluorescent (cream to yellow) with short-wave ultraviolet light. This is the first verified occurrence of powellite in Pennsylvania.

A larger, irregular, gray molybdenite-bearing pegmatite dike occurs from 445 to 495 feet southeast of the dam. Molybdenite flakes here range up to ¾ inch in size and were originally sufficiently abundant so as to be visible from a slowly moving car! About 605 feet from the dam, a pyrite-rich, finer-grained granitic rock is rich in disseminated molybdenite. A sample consisting of ten pounds of typical 1-inch chips from the outcrop was found to contain 0.15% molybdenum, 0.05% copper, 0.06% zinc, 270 ppm nickel, 110 ppm lead, 60 ppm cobalt, and traces of gold and silver. Weathering of the abundant pyrite has coated parts of this outcrop with yellowish-brown jarosite, a hydrous potassium iron sulfate.

In addition, a trace of molybdenite occurs in the roadcut northeast of the dam. D'Invilliers' 1883 report on the geology of Berks County listed molybdenite from the roadcut west of the dam and Valentine Hartman's mine north of the reservoir. The presence of minor amounts of molybdenite at several places near Antietam Reservoir suggests that this area should be checked for other high temperature hydrothermal minerals.

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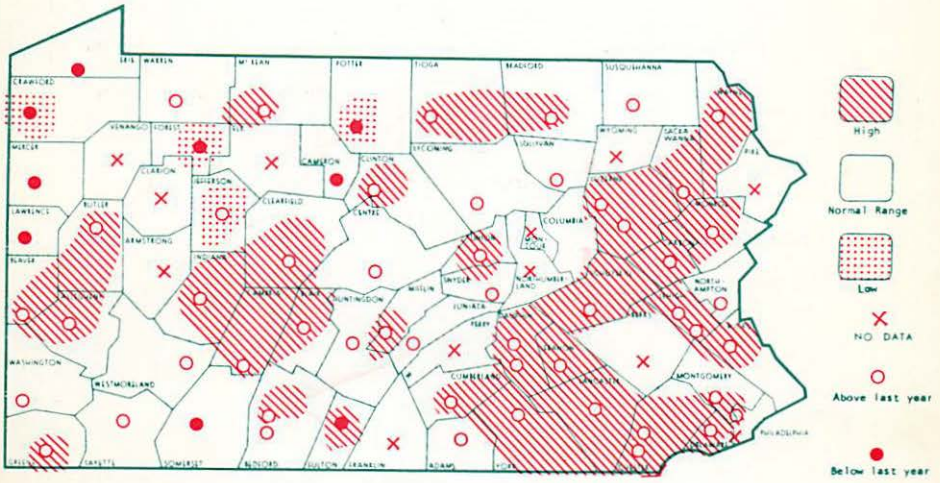
In Cooperation with The U.S. Geological Survey

NOVEMBER 1975

GROUND-WATER LEVELS



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