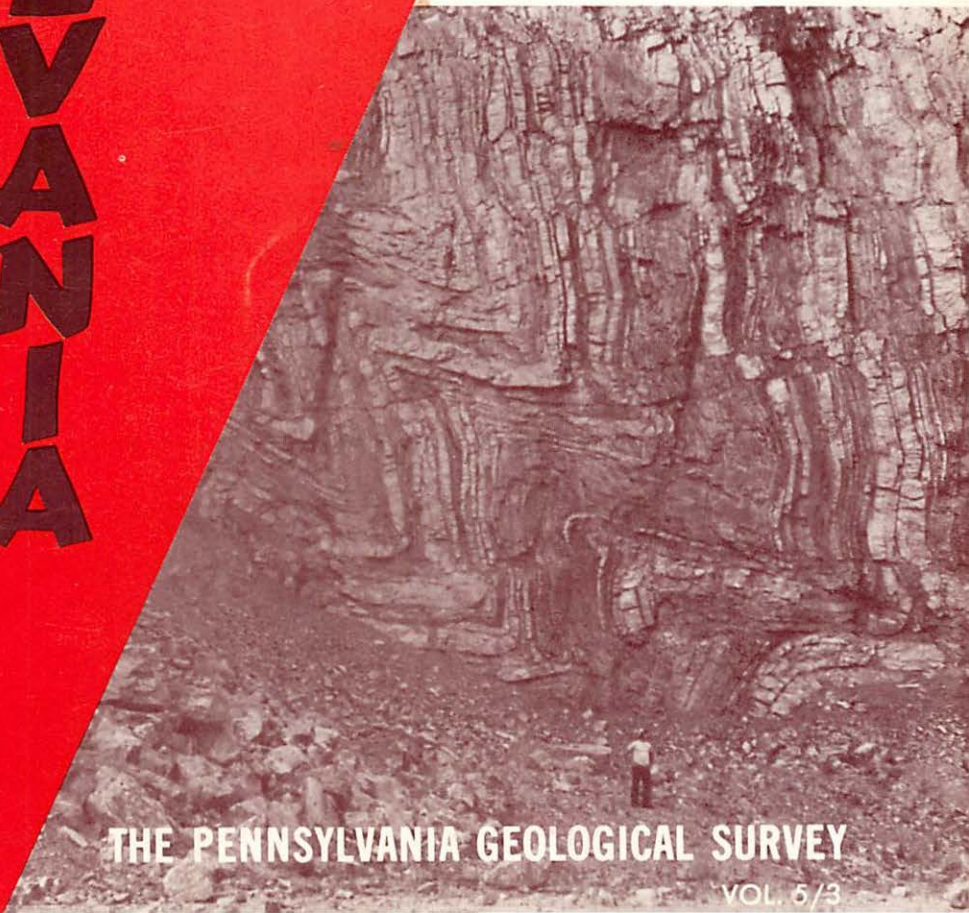
PENNSYLVANIA GEOLOGY



THE PENNSYLVANIA GEOLOGICAL SURVEY

VOL. 5/3

COMMONWEALTH OF PENNSYLVANIA
Milton J. Shapp, Governor

DEPARTMENT OF ENVIRONMENTAL RESOURCES
Maurice K. Goddard, Secretary

TOPOGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, State Geologist

CONTENTS

ON THE COVER — Faulted folds exposed near dam at Laurel Creek Reservoir, near Lewistown, Pa.

PENNSYLVANIA GEOLOGY is published bimonthly by the Topographic and Geologic Survey, Dept. of Environmental Resources, Harrisburg, Pennsylvania, 17120.

JUNE 1974

Correction:

The volume notation on the April 1974 issue of Pennsylvania Geology was in error. Instead of reading Volume 2/5, it should have read 5/2.

From the desk of the STATE GEOLOGIST . . .

Geologic data offers a striking contrast between the length of time it takes to develop the data and the urgency for its availability when needed. To carry out detailed mapping and laboratory studies of the geologic formations and mineral resources of an area, such as a county, requires a great many man years. Yet when a planner, engineer, contractor, highway department, or environmentalist needs the geologic and mineral resource data, he needs it in a hurry; their respective project schedules do not permit adequate time to carry out detailed, comprehensive geologic studies. Thus it is that the state geologic survey plays a critical role by anticipating future needs for geologic data and carrying out systematic investigations so that the information will be available when needed.

The Pennsylvania Geological Survey is pleased that the results of its investigations over the years are today providing a sound basis for land use planning, for engineering, and for evaluating environmental impacts. Our environmental geology reports have been widely used and acclaimed. The energy crisis created a great demand for our coal reserve calculations and coal area maps compiled over the years. Similarly, our oil and gas fields maps and sections experienced a spurt in demand.

The data and studies we have compiled on ground water over the years, with the cooperation of water well drillers, today is providing valuable input into regional water planning, water resource development, and water conservation.

We now find that the Survey's interests and studies of Pennsylvania's uranium occurrences, carried out in 1961, are beginning to bear fruit. With increasing demand for fuel to power nuclear reactors, there is now an influx of uranium producing companies looking at Pennsylvania's uranium occurrences, as spelled out in our Bulletin M 43, Uranium in Pennsylvania.

We are pleased that the results of our past efforts are widely received and utilized today. Currently we direct our energies toward providing the geologic data which will continue to serve Pennsylvania's needs as they arise.

Arthur A. Socolow

IS A GEOLOGIC EVALUATION OF A DEVELOPMENT SITE NEEDED?

As an environmental geologist, I am frequently asked to explain what causes a home to crack or why there are long, large openings at the top of a particular hillside around Pittsburgh. In all cases reviewed, upon close investigation, geologic hazards existed and a problem could develop if proper planning and design procedures were not used when developing the site. In most cases, man had been modifying the surface on or near the site of the problem. In some of the cases, the geology of the site had indicated that no development should ever take place at that site.

Looking southeast from northwest end of slide area. Two houses occupied the empty rubble strewn area and were demolished two years ago. The cracks visible in the house started developing in December, 1973.

An excellent case in point started on February 12, 1974, when the Pittsburgh Press carried an article describing a landslide in Baldwin Borough in Allegheny County. A development consisting of ten single family homes was involved. Information as to the exact location of the housing development was obtained by phone from the Allegheny County Planning Department.

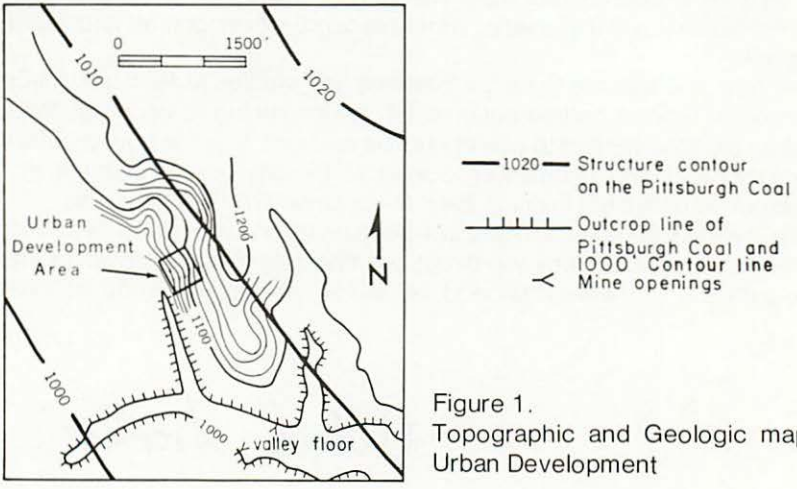


Figure 1.
Topographic and Geologic map of Urban Development

View of slide area looking northwest from southeast end of slide.

When the location of the housing development was plotted on a standard 7½' topographic map, the site was found to be about 100 feet above the valley floor at the top of a relatively steep east slope (see Fig. 1) and the distorted contour line configuration at the site and to the northwest along the slope indicated that there was some slope movement in this area in the past.

Where a house once was — note undercutting of concrete platform behind house.

Foundation and other rubble, all that remains of a house.

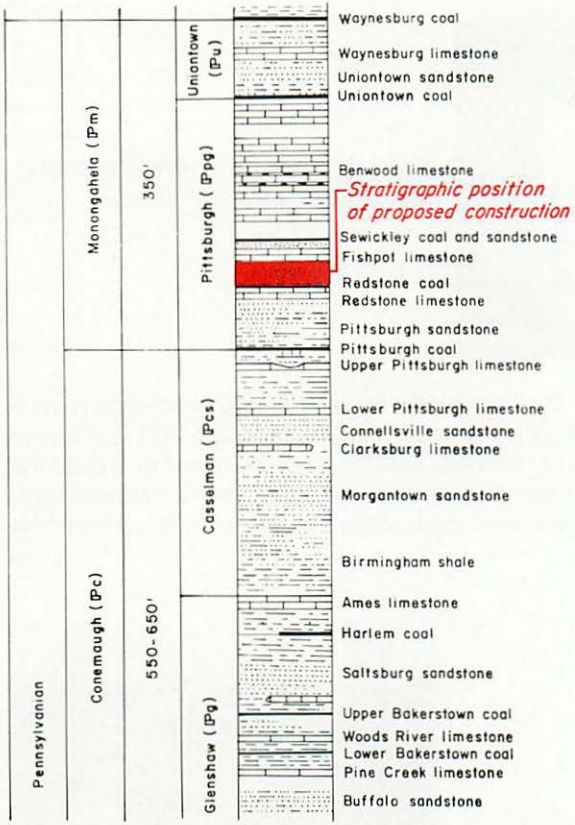


Figure 2.
Generalized stratigraphic section

The best determination of the stratigraphic position of the site placed it within the Redstone coal-limestone member and the Fishpot limestone of the Pittsburgh Formation (Fig.2). This portion of the stratigraphic section is composed of alternating layers of shale and claystone, with thin beds of fine sandstone. The rocks are dipping gently to the southwest (into an open valley) at about 40 feet to the mile. The Pittsburgh coal outcrops at an elevation of 1000 feet in the bottom of the valley (Fig. 1). Two deep mine openings are shown also on Figure 1.

These mines, although no longer active, can be assumed to extend beneath the hillside in question. Overburden thickness above the mined-out coal at the 1100-foot contour line therefore is approximately 100 feet maximum, decreasing down the slope.

One final comment that could be made is that groundwater should be encountered at the contact of the limestone and sandstone with the underlying impermeable shales and claystones. This groundwater will tend to flow towards the open valley due to the dip (inclination) of the rock layers.

Therefore, based on a simple, quick topographic and geologic evaluation of this site, the developer would know he must exercise extreme care in foundation design and in the placing of any fill. The mined out Pittsburgh-coal lies less than 100 feet below the site. The main potential problem on the hillside throughout the area would be mine subsidence.

The southwest facing slope has the potential of mine subsidence and slope instability. The rock layers dip very gently towards the open valley. Even though the inclination is slight, it establishes an inherent weakness in the rocks and even more important, water will migrate down this dip-slope. Land fill should be kept at a minimum; fill should be keyed into the hillside and where groundwater is encountered, drains should be installed to carry the water out of the fill. Storm runoff should be carried away from the site in a controlled storm-drain system. French drains in the fill material should be connected to the storm system to remove the water.

Obviously, the answer to our title is "YES".

Jesse L. Craft

WOMEN AND MINORITIES IN THE PHYSICAL SCIENCES

A recent manpower (person-power?) survey was conducted by the national Bureau of the Census, based on 100,000 scientists and engineers from the 1970 census. Some of the results are interesting, particularly those that apply to the physical sciences of which geology is a part. In general, there has been a 50% increase over 1962 in the total number of persons working in science and engineering.

Woman's role in physical science has increased, although the increase in mathematics is the most pronounced. For example, the number of female Ph.D. degree-holders has almost tripled in the physical sciences. Although the greatest number of workers are in the 25-49 year age bracket, considered to be most productive, women in the physical sciences generally are younger than men. Perhaps this reflects a recent influx of women into our profession. Also, women apparently do not proceed as far as men in the pursuit of the Ph.D. degree. The men greatly outnumber the women in Ph.D. status, but the number of women with a master's degree is much closer to the number of men. This ratio too should change with time.

Racial minorities, still rather scanty in geology, comprise only 17% of the people working in the physical sciences. Currently, the Geological Society of America is trying to increase the minority participation in geology.

According to a new release of the U. S. Geological Survey, the center of Pennsylvania is located in Centre County, two and a half miles southwest of Bellefonte.

MINERAL HERITAGE STAMPS

The annual Gem and Mineral show in Tucson, Arizona, is traditionally one of the largest and best attended in the United States. This winter thousands of mineral enthusiasts attending the 20th Annual Show were part of an historic event.

The United States Postal Service unvailed designs of four new stamps to be issued as a set commerating America's Mineral Heritage. The designs represent a new U. S. treatment of subject and in format. Never before has the Postal Service portrayed minerals. In addition, the mineral paintings are so arranged on the classic square stamp format that by rotating the stamps 45 degrees the designer achieved a diamond shape for the individual stamps as well as for the complete set of four stamps.

The stamps depict amethyst, rhodochrosite, tourmaline, and cut and polished petrified wood. All of these minerals have been found in Pennsylvania, although only amethyst and tourmaline are rather common (see Gordon, 1922; Montgomery, 1969; Lapham and Geyer, 1972). The stamps printed in eight inks (yellow, blue, brown, gray, green, purple and red) will be 1.075 x 1.075 inches in size with 48 stamps to a sheet.

The Mineral Heritage stamps will be issued June 13, 1974 at the National Gem and Mineral Show in Lincoln, Nebraska. First day ceremonies will be at the State Fair Grounds with the Lincoln Gem and Mineral Club as hosts.

These Mineral Heritage stamps will call attention to the great contribution minerals have made to mankind. Many people are beginning to appreciate this nation's mineral heritage. We must evaluate the relative importance of wealth, employment, physical comfort, and a declining mineral abundance. Today, more than at any time since colonial days, we realize that our mineral resources are not infinite and must be used wisely. The mineral industries, the professional mineralogists and the growing ranks of mineral hobbiests are all contributing a positive force in this direction.

Alan R. Geyer
Davis M. Lapham

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Gordon, Samuel G (1922), *The Mineralogy of Pennsylvania*; Spec. Pub. No. 1, The Acad. Nat. Sci. of Philadelphia, 255 pp.

Lapham, D. M. and Geyer, A. R. (1972), *Mineral Collecting in Pennsylvania*; Pa. Geol. Survey Bull. G-33, 164 pp.

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GEOLOGY OF PENNSYLVANIA SUPPORTS MAR'S THEORY

Dr. Dean McLaughlin, an astronomer turned geologist, who for many years before his passing mapped the Triassic rocks of southern Pennsylvania for the Pennsylvania Survey, is the focus of an article in the January-February issue of American Scientist, the magazine of Sigma Xi, the Scientific Research Society of North America, Inc.

His combined work as geologist in Pennsylvania and astronomer at the University of Michigan led him to formulate a theory for markings on the planet Mars, as seen through telescopes, suggested a volcanic and aeolian (wind) origin. The Mariner 9 photographs have, in large part, provided support for his theory, one of the few that have stood the test of time and addition of evidence. Mariner 9 photos show that aeolian transport is one of the dominant causes of albedo markings as McLaughlin suggested. The photos also show that McLaughlin's theoretical wind patterns are reasonably correct. McLaughlin's suggestion that volcanic materials would be found on Mars is also correct.

For anyone who wishes to read the article, it is "McLaughlin and Mars" by J. Veverka and C. Sagan, pages 44-53, American Scientist, vo. 62, no. 1.

INTERESTING MINERALS FROM PENNSYLVANIA'S ZINC-LEAD OCCURRENCES

While examining sphalerite and galena occurrences in Pennsylvania, an attempt is being made to note all accessory minerals. Accessory minerals can often furnish valuable clues to ore genesis, economic byproducts, and "pathfinder" elements useful in geochemical exploration. Arsenic is one element which has recently been recognized in various mineral forms at several zinc-lead occurrences in Pennsylvania. The greatest concentration to date was found in a previously unreported, but substantial limonite — quartzite gossan from Bald Eagle Mountain, Centre County. A representative sample of the many tons of float lying about contained 0.5% arsenic as well as 0.6% lead and 0.1% copper.

Listed below are some accessory minerals recently identified with a brief discussion of each. The author's visual identifications have been verified by X-ray diffraction by John Barnes and Les Chubb. For the minerals acanthite, apatite, mimetite, and native sulfur the first identifications were by X-ray diffraction by John Barnes. Credit is also due to the staff of the X-ray laboratory of PennDOT's Bureau of Materials, Testing and Research. They have graciously allowed the Survey to use their facilities for the prolonged period following the Agnes Flood during which the Survey has been in temporary headquarters without a laboratory.

Acanthite, Ag_2S (silver sulfide), the low temperature dimorph of argentite, was found as a single black grain with tetrahedrite in quartz from the Billmeyer quarry, Lancaster County. Freedman (1972) reported that argentite (probably acanthite because the old X-ray data for argentite was actually from an acanthite specimen) could be detected by X-ray diffraction of sphalerite from the Bamford mine, also in Lancaster County.

Albite variety cleavelandite, $NaAlSi_3O_8$ (sodium aluminosilicate), occurs with galena in quartz veins in the Pequea and Burnt Mills silver mines, Lancaster County. A few galena crystals from Burnt Mills contain sphene crystals, whereas rutile, another titanium mineral, is common at the Pequea mine.

Descloizite - mottramite, $PbZn(VO_4)(OH)$ - $Pb(Cu,Zn)(VO_4)(OH)$ (lead zinc vanadate hydroxide-lead copper zinc vanadate hydroxide), was verified in a sample with tiny brown crystals furnished by Joseph Varady of Spring City. It was found in a dump from the Chester County mine, Phoenixville district, Chester County. From X-ray data, Barnes believes that this specimen is not close to either end member of this solid solution series. Professor Raymond Grant of Lafayette College (personal communication, 1974) has arrived at the same conclusion for another sample from the same district.

Enargite, Cu_3AsS_4 (copper arsenic sulfide), first identified by its striated, prismatic crystal habit, occurs with sphalerite and galena in calcite

at Lime Bluff, Lycoming County. A few pseudomorphs of lime-green cornubite, $Cu_5(AsO_4)_2(OH)_4$ (copper arsenate hydroxide), after enargite were observed, and a few millimeters father from the eneragite, bluish-green conichalcite, $CaCu(AsO_4)(OH)$ (calcium copper arsenate hydroxide), has been found on calcite. This location, previously unknown to us, was kindly brought to our attention by Tom O'Neil of Montoursville.

Jordanite, $(Pb, Tl)_{13}As_7S_{23}$ (lead thallium arsenic sulfide), occurs as late, metallic, gray rims on galena associated with sphalerite in limestone breccia. It was collected underground at the Keystone mine, Blair County, with assistance from John H. Way and Professor Arthur W. Rose of Penn State.

Mimetite - pyromorphite, $Pb_5(AsO_4)_3Cl$ - $Pb_5(PO_4)_3Cl$ (lead arsenate chloride - lead phosphate chloride), was found as acicular white crystals with hemimorphite underground at the Doughty mine, Northumberland County. Pale blue smithsonite has been collected from a different part of the same mine.

Native Sulfur, S, is common as thin, pale yellow coatings on sphalerite associated with galena and barite on the dumps of an old adit at Milesburg Gap, Centre County.

Posnjakite, $Cu_4(SO_4)(OH)_6 \cdot H_2O(?)$, and langite, $Cu_4(SO_4)(OH)_6 \cdot 2H_2O(?)$, both copper sulfate hydroxide hydrates), were found by Martin L. Anne of Wrightsville as microscopic, dark blue crystals with other secondary minerals on a sample from the Ecton mine dumps, Montgomery County (Barnes, 1973). The author noted hydrous copper sulfates on the sample, sent for identification of a more abundant copper mineral. The sample was donated by Mr. Anne to the William Penn Memorial Museum.

Pseudomalchite, $Cu_5(PO_4)_2(OH)_4 \cdot H_2O$ (copper phosphate hydroxide hydrate), was found by Gloria J. Smith, the author's wife, as mamillary green crusts with a slight bluish tint on quartz from the Whim shaft dumps, Montgomery County.

Tennantite, $(Cu, Fe)_{12}As_4S_{13}$ (copper iron arsenic sulfide) occurs as small, metallic gray grains associated with galena, chalcopyrite, and pyrite in the Hares Valley area, Mapleton, Huntingdon County. Similar occurrences elsewhere in the Hares Valley area have yielded muscovite, probably $2M_1$, on quartz crystals and apatite in fluorescent orange sphalerite.

References

Barnes, J. H. (1973) Three new minerals for Pa., *Pennsylvania Geology,* v. 4, no. 4, p. 30-31.

Freedman, Jacob (1972) Geochemical prospecting for zinc, lead, copper, and silver, Lancaster Valley, Southeastern Pennsylvania, U. S. Geological Survey Bull. 1314-C.

Robert C. Smith, II

SINKHOLES AT HERSHEY

Newly developed sinkholes continue to appear in many areas. These two recently appeared over The Epler Formation. The Hershey Medical Center is in the background. Photo taken in March, 1974 by W. H. Bolles, Pennsylvania Department of Education.

PA. MINERAL TRAVELS TO FRANCE

Recently the Pennsylvania Geological Survey received a request from Dr. C. Guillamin at the Ecole des Mines de Paris where the national mineral collection of France is kept. They requested philadelphite, chrome-antigorite, lansfordite, and colerainite from Pennsylvania to complete their systematic collection. Not only were we able to supply information and locations for these minerals, partly from our files and partly from our Bulletin G-33, Mineral Collecting in Pennsylvania, but we also were able to supply them with a specimen of colerainite from Nottingham, Chester County donated to us in 1960 by Francis Kunkle. We were glad to be of assistance to such a famous museum, but perhaps more important, this is an excellent example of one function of the Survey and of the generous help of many amateur collectors throughout the Commonwealth.

D. M. Lapham

URANIUM IN THE HARDYSTON FORMATION

During a study of some rare minerals in the gneisses of the Durham-Reading Hills of Lehigh and Northampton Counties, the following observations of the Hardyston Formation were made. These observations, presented in chronological order, suggest that a modern, instrumental study of the uranium content of the Hardyston should be undertaken.

In 1956 it was noted that the base of the lower Cambrian Hardyston Formation, composed of conglomeratic, medium-grained sandstone, was slightly radioactive at an exposure in an abandoned building-stone quarry along River Road, one mile west of the Hill to Hill Bridge, Bethlehem, Pa. The radioactivity was detected just above a pinite (a rock which resembles serpentine, but is actually composed of fine-grained muscovite and strained quartz) layer described by Miller (1941, p. 460). The pinite layer, which contains euhedral zircon crystals, is the sheared contact rock between the base of Cambrian conglomerate and the top of Precambrian granitic gneiss.

Later, in 1965, the author searched for allanite (rare earth-bearing epidote) localities in the gneisses of the Durham-Reading Hills where the Hardyston also occurs. A Bethlehem Steel Company employee noted radioactivity at a possible locality at Camp Mizpah on Dutch Hill (Allentown East 7½' topographic map), 1.8 miles west of the pinite locality mentioned above. No allanite was found here, but one piece of Hardyston float found in the woods south of Camp Mizpah weighed about 100 lbs. and the radioactivity on contact was about twenty times that of background. The heavy accessory minerals in this sample were studied at Lafayette College by means of X-ray diffraction. Most of the radiation was attributable to an orange-brown, translucent mineral visible in hand specimen. Thirteen d spacings were obtained by X-ray diffraction: 4.75 A (very strong), 3.60 A (v.s.), 2.86 (medium), 2.68 (strong), 2.23 (weak), 2.02 (w), 1.98 (w), 1.84 (m), 1.60 (w), 1.50 (w), 1.43 (w), 1.36 (w), and 1.28 (w). Ten of the d spacings were consistent with those uranothorite, ten with those of synthetic thorite, and no spacings remained unidentified. Rutile and brookite were also identified by X-ray diffraction, whereas quartz, microcline, and zircon were identified in thin section. No allanite was found in these samples and further study of the occurrence was dropped at that time.

However, in 1967 a representative sample of the same 100 lb. block was assayed for gold and silver in the belief that heavy metals might be present. Only the slightest trace of Ag was detected. Professor Arthur W. Rose at Penn State kindly analyzed the same sample pulp by emission spectrography and found that Ti and Zr were "high"; La, Y, and Yb were "intermediate"; and Ag, Be, Ga, Mo, and U were "low but detectable" by visual estimates. By quantitative emission spectrographic procedures, Professor Rose found 50 ppm (parts per million) Zn, 35 ppm Cu, 160 ppm

Ni, 15? ppm Co, 42 ppm Cr, 430 ppm V, 210 Mn, 8 ppm Pb, 6.7% Fe, a trace of Ag, and uranium not determined. Except for slightly high Ni and V, however, none of these quantitative determinations are anomalously high.

Aaron (1969, p. 25) reported that "Monazite, an unusually common *accessory* (present author's italics) in the Hardyston, is second in abundance only to magnetite and limonite." In each of the three Hardyston arkose and arkosic sandstone samples from the Nazareth 7½' quadrangle (the next quadrangle to the northeast) examined by Aaron, monazite (a rare earth and thorium phosphate) was found to be a common accessory mineral. Aaron's mineral identifications were by thin section only (John M. Aaron, personal communication, 1974) and conceivably the mineral identified as "monazite" by Aaron could instead be a uranium-bearing mineral. If so, there may be detrital uranium over a significant area.

Using a resolving gamma ray spectrometer, spectra obtained for whole rock samples from the original 100 lb. Hardyston block from Camp Mizpah show anomalous intensity in the 1.6 to 2.5 MeV (uranium) range but only background in the 2.5 to 3.1 MeV (thorium) region. Comparison with spectra obtained from samples with known thorium (Th) and uranium (U) contents showed that the lack of Th counts was not just a function of the normally lower intensity of the Th peak (with respect to the peak from an equal amount of uranium) nor a poorer detection efficiency for the higher energy Th gamma rays. Commercial analyses show that the original sample contained about 1 ppm Ag, 500 ppm La, 10 ppm Mo, 100 ppm Nb, 200 ppm Ni, 7 ppm W, 300 ppm Y, 1000 ppm Zr, and 380 ppm U_3O_8. At present, 0.1% (1000 ppm) U_3O_8 is about the minimum ore grade for uranium. If uranium follows the trend of many other metals, this grade will decrease in the future.

Although the author's thin sections were destroyed in the Agnes Flood of 1972, chips saved elsewhere suggest that the original sample was a medium-grained (0.25 to 0.5 mm) sandstone composed of about 80% quartz, 10% feldspar, and 10% non-magnetic Fe-Ti oxides plus heavy minerals (visual estimates). Although rock of such composition would be expensive to grind because of its hardness, grinding and physical removal of quartz and feldspar would yield a product containing about 0.15% U_3O_8, 0.2% La, 0.1% Y, 0.4% Zr, and perhaps significant Ti. Further separation of Fe-Ti oxides could possibly double the above concentrations prior to recourse to chemical separation.

Over a dozen occurrences of rare earth, Th, and U minerals were observed in the Precambrian rocks of Lehigh and Northampton counties during the few days of field work for the allanite study. It thus seems likely, as Aaron (1969) concluded, that the rare elements of detrital origin in the Hardyston Formation have originated from the Reading Prong itself.

The constructive comments of John M. Aaron are gratefully acknowledged.

Robert C. Smith, II

NEW OPEN FILE MAPS OF CARBON, NORTHAMPTON AND MONROE COUNTIES

The Pennsylvania Geological Survey is placing an open file bedrock and surficial geologic maps of the following 7-1/2 minute quadrangles:

Christmans and Pohopoco Mountain quads, Carbon County, Pa.
Hickory Run and Blakeslee quads, Carbon and Monroe Counties, Pa.
Tobyhanna and Buck Hill Falls quads, Monroe County, Pa.
Lehighton and Palmerton quads, Carbon and Northampton Counties, Pa.

Final publication will occur in late 1974. These maps may now be examined in the Survey office, Towne House Apartments, 660 Boas Street, Harrisburg.

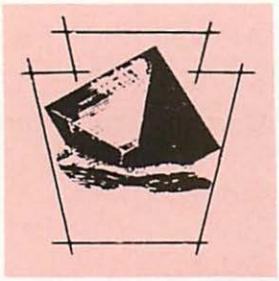
PENNSYLVANIA ENVIRONMENTAL CONFERENCE

Over 325 delegates met in Harrisburg on February 20 and 21 to attend the fourth annual Pennsylvania Environmental Conference and discuss "Creative Land Management for Pennsylvania." Sponsored by the Pennsylvania Environmental Council, the conference brought together environmentalists, planners, representatives of industry, labor and agriculture, government administrators, students and educators.

Delegates participated in 12 task forces, each aimed at developing a different aspect of a land use policy for the Commonwealth. Reports of each task force, along with over-all recommendations of the Conference, will be forwarded to the Office of State Planning and Development for use in helping to develop an effective land use policy for Pennsylvania. Recommendations stemming from the Conference will also be sent to the Governor, the Legislature, conservation groups across the State and to all Conference attendees.

Russell W. Peterson, Chairman of the President's Council on Environmental Quality, and former Governor of Delaware, was the highlight speaker at the Conference Banquet. Mr. Peterson spoke on Land Use and the Quality of Life, stressing the need for a de-emphasis on growth. He called land "our most irreplaceable resource" and ended his address with a "Declaration of Interdependence," emphasizing the need to work together and in harmony with our environment to enhance the quality of life everywhere. This outstanding declaration is presented here in its entirety:

> "We the people of planet Earth with respect for the dignity of each human life, with concern for future generations, with growing appreciation of our relation to our environment, with recognition of limits to our resources and with need for adequate food, air, water, shelter, health, protection, justice, and self-fulfillment, hereby declare our interdependence and resolve to work together in brotherhood and in harmony with our environment to enhance the quality of life everywhere."



EARTH SCIENCE TEACHERS' CORNER

new leaflets from the U.S.G.S.

"OIL SHALE—A POTENTIAL SOURCE OF ENERGY", 15 pages
When the nation's supply of conventional fuels dwindles, oil shale constitutes an immense source of energy; this pamphlet explains what oil shale is, its history, where it is found and products and uses.

"MAP, LINE AND SINKER", 6 pages
Are you a fisherman? Do you need help in determining bottom conditions of man-made water bodies in order to catch the "big ones"?

"PERMAFROST", 15 pages
A brief description of permafrost; environmental problems involved when human activities come in contact with permafrost; of particular interest since the Alaska pipeline must cross vast areas of permafrost.

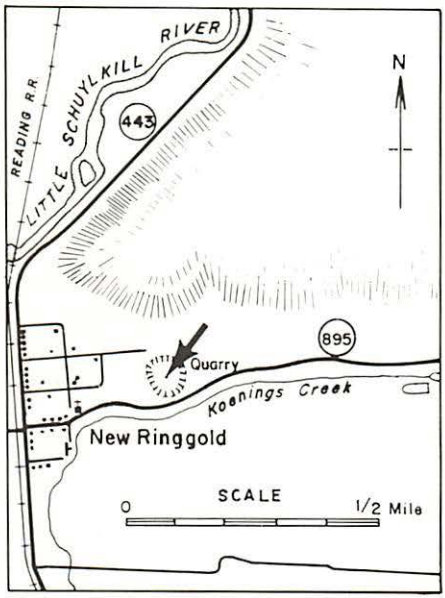
"THE EROS DATA CENTER", 19 pages
A description of this new U.S.G.S. data center, its location, its files, and its operation.

"NUCLEAR ENERGY RESOURCES—A GEOLOGIC PERSPECTIVE , 15 pages
Geological knowledge has been the most important factor in discovering uranium; this pamphlet explains the nuclear energy fuel, the occurrence of uranium and thorium, how nuclear resources are found and exploited and the potential reserves of uranium and thorium.

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

A NEW FOSSIL COLLECTING LOCALITY

A new collecting locality in Schuylkill County for Devonian Period marine fossils was recently reported to the Pennsylvania Geological Survey by Mrs. Bernice Meredith, a resident of Tamaqua. We examined the locality for its suitability for amateur collectors and can report that it is a safe location with relatively abundant fossils and it is easily accessible. The locality is in a borrow pit used by local authorities for road fill and is on the north side of Pennsylvania Route 895, 1,500 feet east of the intersection of Pennsylvania Routes 443 and 895 in New Ringgold, Schuylkill County. The borrow pit is large, extending about 100 yards to the north and 200 yards east and west. Ample space is available at the opening for parking well off the highway. There are no steep walls so it is easy to visit all parts of the quarry.



The rock exposed in the borrow pit is the Middle Devonian Mahantango Formation, approximately 370 million years old. The rock is largely silty claystone which is easily broken and weathers to small fragments. Small, subrounded nodules of siderite, an iron mineral, are also present; they have the shape of hickory nuts.

We have identified the following fossils from this locality:

Pelecypods
- Paleoneilo
- Actinopteria
- Cypricardinia

Miscellaneous
- Trilobite fragments
- Crinoid columnals

Brachiopods
- Devonochonetes
- Mucrospirifer
- Protoleptostrophia
- Tropidoleptus

Sketches or photographs of these fossils may be found in Bulletin G40, *Fossil Collecting in Pennsylvania*, or G48, *Stratigraphy of the Mahantango Formation*, of the Pennsylvania Geological Survey. These may be obtained by sending $.50 or $2.40 respectively to: Department of Property and Supplies, Bureau of Publications, P.O. Box 1365, Harrisburg, Pennsylvania 17125.

The fossils are represented largely by molds and casts, the original shell material having been dissolved. Some specimens however retain some of the original material and stand out as white against the dark rock. Many of the specimens are distorted from their original shape due to internal movement in the rock during the folding of the rock layers to their present, nearly vertical, position.

Should you visit this locality to collect, remember that you are on someone's private property and permission should be obtained if you can do so. CAUTION: This locality is occasionally used by local residents for target practice.

U.S. GEOLOGICAL SURVEY ISSUES NEW MAPS

The U. S. Geological Survey recently published five geological maps covering parts of Pennsylvania. These maps are 7½ minute quandrangle with all text and illustrations on the map sheet.

GQ 1047 —Stroudsburg Quadrangle, Northampton and Monroe Counties, Pennsylvania and Warren County, New Jersey

GQ 1054 —Delano Quandrangle, Schuylkill County

GQ 1067 —Midway Quandrangle, Washington County

I 1734 —Shamokin and Trevorton Quandrangles, Northumberland and Columbia Counties

I 1743 —Masontown and Morgantown North Quadrangles, Greene County

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

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

PENNSYLVANIAN HEADS U.S. BUREAU OF MINES

We are pleased to extend our greeting to Dr. Thomas V. Falkie who has been appointed as the new Director of the U. S. Bureau of Mines. Dr. Falkie has been Professor of Mining Engineering and Head of the Department of Mineral Engineering at the Pennsylvania State University. He succeeds Dr. E. F. Osborn, another former Penn Stater who has left the Bureau of Mines to accept the position of Distinguished Professor at the Carnegie Institution of Washington.

We are pleased to see that the federal agency which is responsible for helping to solve some of the critical energy and mineral problems continues to be under the leadership of an outstanding Pennsylvanian.

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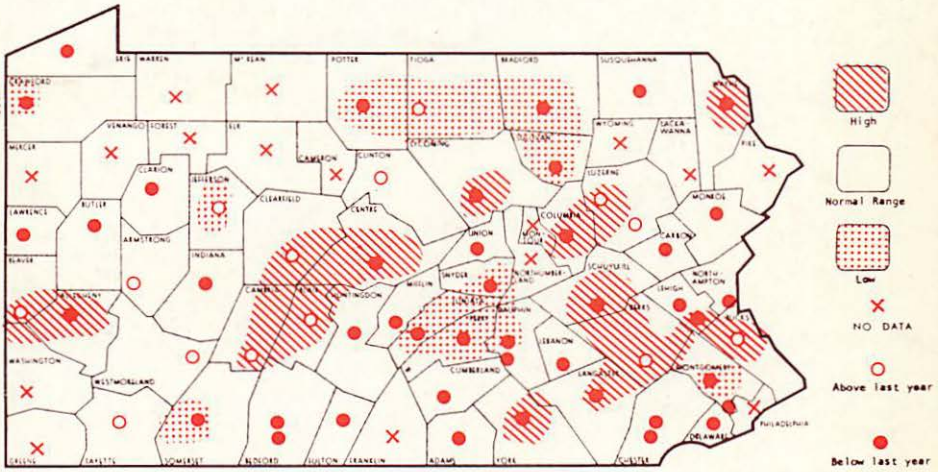
In Cooperation with The U.S. Geological Survey

GROUND WATER DIVISION

In Cooperation with The U.S. Geological Survey

MAY 1974

GROUND-WATER LEVELS



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