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ON THE COVER: Wolf Rocks on the Appalachian Trail, described by J. Peter Wilshusen on page 13 of the popular book Geology of the Appalachian Trail in Pennsylvania. “Pete,” who retires this month after 25 years of state service, described this quartzite outcrop as Shawangunk Formation at a site that marks the southernmost limit of continental glaciation along the Trail.

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Pete Wilshusen Retires

In an old newsletter about the Appalachian Trail in Dauphin County are these lines from Richard Hovey's poem "Spring":

... I will up and get me away where the hawk is wheeling,
Lone and high,
And the slow clouds go by . . .

It was with this spirit that John Peter Wilshusen, "Pete" to his friends and colleagues, proposed to the Pennsylvania Geological Survey in 1979 that we should prepare and publish a guide to the Geology of the Appalachian Trail. Published in 1983, this book has brought pleasure and knowledge to countless hikers on Pennsylvania's part of the Trail. It is but one of many well-known products of a quarter century of public service, now officially ended with Pete's retirement. The Appalachian Trail guide was a labor of love for Pete, for he had long been associated with the Trail as he hiked on it, and in his quiet and selfless style, volunteered his time to maintain the Trail for others.

Throughout two and a half decades, Pete has served the Commonwealth in many capacities. Working hard and giving of his own time through lengthy field days, Pete produced many other well-known publications, such as the popular Educational Series 9, Geologic Hazards in Pennsylvania, and several Environmental Geology Reports, including EG 6, Environmental Geology of the Greater York Area, York County, Pennsylvania. Pete was author of Park Guide 1, Trough Creek State Park, the first guide issued in the Survey's Pennsylvania Trail of Geology series.

During 15 years as a member of the Environmental Geology Division of the Survey and as its Chief since 1985, Pete daily responded to many citizens' requests for information and assistance. He patiently explained complex geological and hydrogeological ideas to homeowners, well drillers, engineers, and elected officials so that he unfailingly aided them in resolving problems relating to Pennsylvania's complex geology. Prior to this, Pete served as Chief of the Editing Section and was instrumental in saving priceless manuscripts and drafted copy that became waterlogged when the Survey's offices were destroyed in the 1972 Hurricane Agnes flood.

The Commonwealth of Pennsylvania, his colleagues, and Pennsylvanians have all benefited from Pete's many endeavors. Pete plans to continue geological writing and research on a volunteer basis for the Pennsylvania Geological Survey. Whether it is at his farm in New Hampshire, or at a familiar desk writing about the geology to be seen in Pennsylvania's state parks, we wish Pete fulfillment and the opportunity to get "away where the hawk is wheeling."

Donald M. Hoskins
State Geologist
The recent passing of M. N. Shaffner at the age of 92 has deprived the Pennsylvania geological community of one of its most memorable personalities. Known universally as “Mike,” he was born in Harrisburg, Pennsylvania, a few blocks from the site of the present Governor’s Residence, on October 21, 1897. He attended the city schools and remained a lifelong resident of the Harrisburg area.

Mike was employed briefly by the Pennsylvania Geological Survey in 1922 and 1923 and rejoined the Survey in December 1927, where his talents were employed for the next 35 years. He was that rarest of geologists, one who learned the profession on the job from independent study and close association as an assistant to others. It is clear from his later publications that Mike received a great deal of his instruction from the eminent coal specialist and State Geologist of the Fourth Geological Survey of Pennsylvania, George H. Ashley. Recognizing a latent talent, Dr. Ashley arranged for Mike to receive a complete set of lecture notes from the famous professor and field geologist of the Second Pennsylvania Geological Survey, J. J. Stevenson.

Mike was first employed as a draftsman and clerk, and, in 1930, was promoted to geological assistant. In the course of the next several years, while serving as office and field assistant to many of the staff geologists, he acquired an understanding of the basic geology of Pennsylvania and the principles of field mapping. He became so conversant with the geology of the coal fields of western Pennsylvania that in 1937 he was assigned the mapping of the Smicksburg 15-minute quadrangle in Jefferson, Indiana, and Armstrong Counties.

Although he was frequently diverted to strategic resource studies during World War II and to other projects, the Smicksburg atlas was completed in 1947. Mike was next assigned mapping investigations of the western part of the Allegheny Mountains, covering parts of Fayette, Somerset, Westmoreland, Indiana, and Cambria Counties. Field work in this area continued until 1960 and resulted in two major publications: the New Florence atlas in 1958 and the Donegal atlas in 1963. Mike was a meticulous observer of the highly variable geology in the areas where he worked, and his lengthy reports are thorough and carefully crafted.
Mike Shaffner in the field near Coudersport, Pennsylvania, August 1931. Photograph by Bradford Willard.

Mike closed his professional career in December 1962, when he retired, having seen the Fourth Pennsylvania Geological Survey through most of its first four decades. A few years later, Mike and his wife, the late Hattie Shaffner, moved from Camp Hill, Pennsylvania, to their retirement home in Stony Creek valley, north of Harrisburg.

Gregarious and personable, Mike had a wide circle of friends and was at ease with people from all walks of life. In the course of his work, he dealt with miners and industry executives with equal facility. During the many seasons of field work in the Allegheny Mountains, Mike came to consider Ligonier, Pennsylvania, as his second home. For many years thereafter, it was possible to find people from that area who remembered Mike. An inveterate humorist and spinner of yarns, he was a veritable storehouse of anecdotes about his years with the Pennsylvania Geological Survey. As often as not, Mike would be the butt of his own stories. When Mike died on June 7, 1990, Pennsylvania geologists lost a colorful and vital friend, as well as the last link to the early years of the present Pennsylvania Geological Survey.

by William E. Edmunds
Symbiosis is the intimate association of two dissimilar organisms in a mutually beneficial relationship. At Bradys Bend Corporation in Armstrong County, underground limestone mining has created two dissimilar commodities that share a symbiotic relationship: aggregate and "space." The beneficial relationship is that mining creates secure storage space, and the revenue from renting the space makes mining possible. As an added bonus, the environmental impact of surface mining is avoided.

As is the case with many of Pennsylvania's mining operations, Bradys Bend Corporation is steeped in tradition and has roots extending back to the nineteenth century. The original quarry workings were initiated by a Mr. Frazier to produce lime and fluxstone for the local iron industry in the 1890's. By 1911, when Pennsylvania was producing 25 percent of the nation's lime, there were 76 active lime producers in Armstrong County (Hice, 1911). The grandfather of Ken Vogt, the current superintendent at Bradys Bend, worked for Mr. Frazier as a blacksmith and napper (the napper assured that all hand-won quarry stone could pass through a 22-inch-diameter steel hoop). Around the turn of the century, the Pittsburgh Limestone Company, a subsidiary of the United States Steel Corporation, purchased the operation and began to develop the area into an approximately 2,000 acre resource with three extensive underground adit mines. Ken's father worked his way up to assistant mine foreman for the operation. U.S. Steel operated these mines for 57 years, producing a high-calcium fluxstone for its furnaces. Today, Ken's son is in charge of the storage aspect of this unique enterprise.

LOCATION AND SETTING. The plant and main storage entrance of Bradys Bend Corporation (Figure 1) are located about one-half mile west of Bradys Bend in northwestern Armstrong County, on the west side of Cove Run, a small tributary to Sugar Creek. This is about 65 miles north of Pittsburgh and about 1 mile west of Pool 9 on the Allegheny River.

Here in the Appalachian Plateaus physiographic province, the Vanport Limestone, formerly termed the Ferriferous limestone (Platt, 1880), crops out in nearly flat lying beds along stream drainages. The Lower Kittanning coal typically occurs about 20 feet above this marine limestone, and the Clarion coal typically is present about 40
feet beneath the mine floor. The Buhrstone iron ore (sometimes cherty—accounting for the "buhr" in buhrstone), extensively mined in the last part of the nineteenth century for a siderite iron ore bed less than 2 feet thick, locally rests on top of this limestone but was not observed at Bradys Bend. Similarly, a thinner ore bed can occur beneath this limestone (Platt, 1880).

MINING. "Ore" consists of the Vanport Limestone (Allegheny Group), which locally can reach a maximum thickness of about 20 feet, and a total of 2,300 motor homes, recreational vehicles, boats, and vintage automobiles (Figure 2).

The Vanport Limestone is a dark-gray to brownish-gray carbonate mudstone to grainstone containing common fossil fragments of brachiopods and crinoids. Typically, the basal 11 to 12 feet of limestone was extracted, leaving 28 to 32 inches of carbonate overhead to support the roof. The roof follows a well-developed stylolitic plane (a suture-like interpenetration along which insoluble constituents have accumulated, presumably caused by dissolution). Another conspicuous stylolite marker occurs throughout the mine about 4 feet above the floor. Calcium carbonate content is high, generally between 92 and 96 percent.

Shortly after acquiring the property, U.S. Steel started conventional underground mining, generally as alternating 30-foot rooms with 30-foot pillars. This, of course, provided an approximately 50 percent extraction ratio. This is quite a contrast to other Vanport Limestone strip-mining operations in the Appalachian Plateaus province, where up to 150 feet of overburden is removed by earth movers and draglines to yield a nearly 100 percent extraction ratio (Pennsylvania
Geological Survey, 1986). It is reported that U.S. Steel pioneered a blasting technique here known as horizontal "V" drilling. An estimated 70,000,000 tons of virgin high-calcium limestone remained when U.S. Steel sold the property in 1964.

Bradys Bend Corporation produces less than 100,000 tons of limestone per year, mostly for the construction industry. About 5,000 tons per year of this is pulverized in a cage mill for agricultural limestone. Most production comes from trimming pillars in the No. 3 mine. Three 15-ton customized side-load haul trucks and one rubber-tired high lift keep the roller and hammer mills supplied with raw materials.

**STORAGE.** Over 30 million square feet of underground space is potentially available for many uses, including light industry and manufacturing. Ken and his son have developed a virtual underground city complete with model offices and restrooms. About 70 acres has been developed for storage, and nearly all of this is presently being utilized. Another 30 acres is under development. Converting the mine into secure storage or office space involves installing lighting, partitions, and subfloor drainage. Although natural, year-round temperatures range between 50° and 55°F, approximately 350 units of the 2,300 spaces available are heated to 68°F and kept at an average relative humidity of 55 percent. Most of the storage areas have a minimum clearance of 10.5 feet, but some 16-foot-high sites were prepared by excavating the floor deeper. The advantages of such underground storage include a constant year-round temperature, low maintenance, safety and security, fire resistance, and adaptability (custom-designed facilities are available).

Bradys Bend Corporation has shown resourcefulness and creativity in providing employment and useful services for the people of Armstrong County by using a symbiotic approach to free enterprise. Ken
Vogt's emphasis on safety in the operations is highly apparent, as demonstrated by his efforts as a founder and continuing member of Pennsylvania's Mine Rescue Team.

REFERENCES


1:100,000 Metric Topographic Map Series Complete for Pennsylvania

In April 1984, a new series of topographic maps at a scale of 1:100,000 was announced in Pennsylvania Geology (volume 15, number 2, page 7). With the recent publication of the topographic edition of the Ashtabula (Ohio-Pennsylvania) quadrangle, the series is now complete.

These intermediate-scale maps are useful as regional base maps because each covers approximately 1,836 square miles (the area covered by thirty-two 7.5-minute topographic maps). To obtain complete coverage for Pennsylvania at the 1:100,000 scale requires 35 of the new maps. Contours and spot elevations on these maps are in metric units. One centimeter on the map equals 1 kilometer in distance scale, or about 0.6 mile on the ground. One inch on the map equals about 1.6 ground miles.

The maps are multicolored and show political boundaries, highways, man-made structures, cultural features, and topographic contours. The contour interval is 20 meters. Each map covers 1 degree of longitude and 30 minutes of latitude.

The 1:100,000-scale maps are available for $4.00 each from the U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225. A $1.00 handling charge should be included for orders of less than $10.00. Prepayment is required, and checks should be made payable to U.S.G.S. For more information, contact the Pennsylvania Geological Survey library, telephone 717-783-8077, or the Earth Science Information Center (ESIC), U.S. Geological Survey, telephone 1-800-USA-MAPS.
In order to do their jobs effectively, petroleum geologists need to understand the rocks that have been penetrated in drilling a well—that the rocks look like, how deep and how thick they are, what fossils, minerals, and other constituents they contain, and how they correlate with the rocks found in other wells. To this end, many geologists spend a considerable amount of time looking at drill cuttings and making or studying strip logs. A strip log is a graphic representation of the rocks in the well combined with a description of the lithology, mineralogy, fossils, and any other characteristics of note printed alongside. Although strip logs are an essential part of their business, very few petroleum geologists are aware that the strip log was invented in the oil fields of Venango County, Pennsylvania, in the 1870's by John F. Carll (Lytle, 1957) (Figure 1). Figure 2 illustrates the earliest known surviving example of one of Carll's strip logs.

But the strip log was only one small contribution to the geology of oil and gas made by this remarkable man. "It is not too much to say that, however much was previously guessed at, or suspected to be true, the Geology of Petroleum has been virtually created by him..." (Lesley, in Carll, 1883, p. xii). Such high praise from a person of the caliber and esteem of J. Peter Lesley, Director of the Second Geological Survey of Pennsylvania, is noteworthy indeed. As State Geologist of the then most productive oil state in the world, Lesley was regarded as one of the more knowledgeable and influential men of science at the time. Carll, an assistant state geologist for the Second Survey, was charged with the task of investigating the geology of oil and natural gas in the producing areas of Pennsylvania. He was also one of the first geologists to make a concerted effort to compile, organize, and interpret the numerous available data on the geology of oil and gas reservoirs.

John Franklin Carll was born on a farm in what is now Brooklyn, New York, on May 7, 1828. Although he received a basic education at Union Hill Academy on Long Island, and studied some civil engineering, he was essentially self-taught. His background was extensive, however, because he had a great deal of experience working as a farmer, newspaper editor, surveyor, civil engineer, and wire manufacturer before he finally moved to Venango County, Pennsylvania, in 1864.
to try his luck in the oil business (Lytle, 1957). Over the next nine years he followed the oil industry, becoming familiar with drilling and production methods, making careful observations of the different rock layers penetrated in drilling, and collecting records on numerous wells. Because of his extensive knowledge of the various subsurface formations in the areas around Oil City and his general habit of close observation, he soon received widespread acknowledgement as a geologist. Local oil men eagerly sought his advice on where and to what depth they should drill. He even invented and patented some oil-field equipment during this period (Coberly, 1961).

When the Second Geological Survey of Pennsylvania was established in 1874 under the direction of Lesley, John Carll was appointed assistant geologist in charge of the oil districts of western Pennsylvania. Lesley, who had done some petroleum consulting work in 1865 (Owen, 1975), was familiar with the industry and the geological problems requiring attention in the oil fields. He understood that the oil “boom” occurring in western Pennsylvania afforded a great opportunity to study the subsurface geology of the area, something that could not be done previously, as well as to determine the nature of the petroleum resources of Pennsylvania. Carll’s engineering background, his practical oil field experience, and his insistence on acquiring large quantities of reliable data stood him in good stead for his new position as the Survey’s expert on subsurface geology and the petroleum industry.
Carll's first Survey report was published in 1875, only one year after his appointment. Before joining the Survey, he had already demonstrated that the oil sandstones of the Oil City area persisted throughout most of the region, and had made great strides in defining the stratigraphic and lithologic characters of the "Venango Oil Sand Group" (Venango Formation of present usage). Carll's first volume was only a preliminary report, but it contained an enormous amount of information, most of which he and others had collected over the previous 10 years. It contained logs and surveyed elevations of numerous wells, elevations relative to sea level for the major reservoir sandstones, and discussions on many aspects of the chemistry, geology, and engineering of petroleum. Carll covered, among other topics, the origin of petroleum, the correlation of reservoir sandstones, and the importance of subsurface geologic structure in the oil fields, presenting the first structure maps of subsurface formations.

Carll's second report was a compendium of well logs for 1,654 wells throughout northwestern Pennsylvania. In addition, it contained precisely surveyed elevations along the railroads of that area.

His third report, published in 1880, is considered by many to be his magnum opus and one of the most remarkable books on early petroleum geology ever written. It covers the geology of the Pennsylvania oil regions of Warren, McKean, Venango, Clarion, and Butler Counties, and includes both a survey of the Upper

Figure 2. The earliest known example of a strip log, constructed by John Carll around 1877.
Devonian Garland and Panama Conglomerates and a discussion of the pre- and post-glacial drainage of Erie County. The volume also contains descriptions and illustrations of drilling rigs and tools and discussions of drilling and production methods.

At a very early stage in his career in the oil fields, Carll recognized the necessity of keeping accurate driller's records, and he spent considerable time and energy trying to convince the oil producers of this during his tenure with the Survey. One chapter in the 1875 report and two in the 1880 report were devoted in part to preaching about well records, attempting to show their value beyond mere record keeping.

It is said that about four thousand well-shafts were sunk in the oil fields of Penna. and New York during the one year of 1877. . . . What a broad field for geological study would their records have afforded if they had been properly kept and were now accessible to us. But unfortunately for the interests of the survey, the oil producer is drilling solely to benefit himself and cares very little for the advancement of science or the financial welfare of those who may drill after him. Of this large number of wells, probably there has not been preserved a special record of one in a hundred, and but few of those that have been preserved can be obtained in a shape to be of any use to the Survey [Carll, 1880, p. 165-166].

His persistence paid off in part. Many of the records he collected for oil and gas wells drilled in western Pennsylvania are still available and can be used by geologists looking for precise subsurface information in areas of limited control.

Some of Carll's more important ideas and initiatives have been substantiated and used in the industry for years. He documented the importance of gas in the movement of oil through a reservoir, a fact that was "discovered" in 1912 (Johnson, 1912; actually, Lesley first proposed a form of this idea in 1865 in a report to the U.S. Commissioner of Agriculture). He postulated that flooding an oil reservoir with water would stimulate production. Waterflooding is now a standard industry practice used extensively the world over, but it only began to be used in the 1920's, more than 15 years after his death. He documented a method of collecting drill cuttings and declared that they could be used to supplement, and even improve upon, the drillers' records. And his hypotheses on the shapes and geological origins of the reservoir sandstones of the oil regions have been substantiated by more recent geological investigations (for example, Dickey and others, 1943).

Carll gave the petroleum industry seven reports packed with raw data and the geological and engineering interpretations based on those data, all the result of conscientious investigation and scientific description made throughout western Pennsylvania. He took ex-
treme care to insure the accuracy of his information, and made sure it was published as useful products suitable to the average oil man. But as so often happens with brilliant men of science, the petroleum industry ignored his pleas and most of his ideas. Even though he inaugurated many of the subsurface geological methods employed today, they came into general use only after a 40-year hiatus, "... and then by geologists who either had never heard of him and his work or chose to ignore him" (Owen, 1975, p. 106).

Carll resigned from the Survey in 1882, frustrated by what he considered a lack of understanding or interest in his ideas and methods. Even his former colleague, I. C. White, described him as "an old county surveyor with no imagination and unable to generalize on the data he collected" (quoted in DeGolyer, 1961, p. 29). This statement was patent nonsense, but it conveys the general feelings of the industry at the time. He had not discovered the simple method for finding great quantities of oil in undrilled areas that the industry was expecting from him, so they ignored him. His writings were largely unread and his pleas for better records unheeded. He returned to the Survey in 1885, but left again in 1888 to pursue a career in consulting geology. He died in Arkansas in 1904, largely forgotten by his fellow scientists and oil men.

Today, historians regard John Carll as a visionary, the man who almost single-handedly invented the sciences of petroleum geology and petroleum engineering. But, as so often happens, the prophet had no honor in his own country and in his own time.

REFERENCES


NEW PUBLICATIONS

MINERALS TODAY
A New Magazine About the Mining Industry—and More

The damage caused by last October's California earthquake may have been worsened by poor maintenance of the Bay Area's infrastructure, over 40 percent of all bridges in the nation should be repaired or replaced, and much of the interstate highway system needs repairs; yet during the past two decades public-works construction has declined by almost one third.

New technologies, as well as everyday consumer products, depend on new materials—plastics, metals, ceramics, and combinations—that outperform traditional materials. The United States is the largest market for these materials, but is falling behind in their development and production.

Those were among the topics discussed in the first issue of the magazine Minerals Today, published last January by the U.S. Bureau of Mines. This lively magazine offers feature articles that explore the ramifications of such matters on everyday life. Contributing authors examine proposed solutions and document the ways in which the mineral-producing industry is responding to the challenges of the 1990's.

As an example of the latter, the focus of the May issue is "Minerals in the Environmental Decade." The author of the
cover story, David S. Brown of the Bureau of Mines, presents arguments that are rarely heard elsewhere. For example,

There should be a reasonableness in how to go about dealing with the natural environment. Public policy making should not be driven by fear or sensationalism . . . . Mankind should strive to balance realistic environmental goals with other competing societal goals, such as creating jobs, homes and hope for the millions in the world who are jobless, homeless, hungry and despairing. The environment cannot be considered in isolation from these kinds of human needs. Nor should a single-minded concentration on health risks of pollution blind decision makers to the health risks associated with joblessness, poverty and despair when economic growth is stymied . . . . Good stewardship means making decisions on the use of natural resources for the common good, as well as for resource preservation.

At first glance, this argument might be taken as an excuse to pollute and despoil the land, but he goes on to say,

Economic growth provides the wherewithal to protect the environment. Only economically progressive nations can be good stewards of the natural environment. Where there is economic deprivation, environmentally devastating practices abound. Nations where economic growth is supported and innovation encouraged are the most willing and able to allocate significant resources to protect the environment. While developed nations may make impressive strides in cleaning up pollution within their respective borders, improving the global environment will require strong economic growth in the developing world.

If strong economies and a healthy environment go hand-in-hand, then minerals are necessary for both to work together effectively. These minerals are the building blocks of . . . . civilization. Everything in the world that cannot be grown is taken from the earth, processed, refined, and used to make things, including so-called advanced materials which have become the key to international competitiveness. These new mineral-based materials promise improved product performance, decreased energy consumption, longer service lives . . . .

To further illustrate this point, the author cites examples of pollution-reduction technologies that depend on the availability of specific minerals.

Two additional points that Brown makes are that locking away our nation's land without knowing its resource potential is not good stewardship, and that many mineral resources that could be obtained through recycling are lost. Regarding the latter, he points specifically to the federal government's "superfund" program that treats hazardous waste sites solely as a pollution problem and not as a potential resource. Brown asserts that many of the sites contain materials that could be recovered and reused. If this were done, materials availabili-
ty would be increased, environmental goals would be realized, and, in some cases, a profit might be made at the same time.

In addition to thought-provoking feature articles, *Minerals Today* contains short news items pertaining to the mineral industries of the United States and the world, news of government activities that affect those industries, and announcements of other publications of the U.S. Bureau of Mines.

*Minerals Today* is published six times per year. A yearly subscription costs $13.00 ($16.25 outside the United States), and is available by writing to the Superintendent of Documents, Government Printing Office, Washington, DC 20402-9371.

—J. H. Barnes

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**ROADSIDE GEOLOGY OF PENNSYLVANIA**

Readers of *Pennsylvania Geology* who are familiar with the state and have some general knowledge of geologic concepts might find a new book, *Roadside Geology of Pennsylvania*, by Bradford B. Van Diver, an interesting addition to their libraries. The most recent in a series of *Roadside Geology* books that now cover 15 states, this book can turn a journey down the highway into a journey through time as the geological features to be seen along many of the Commonwealth's major highways are pointed out and their possible origins are discussed. The book is organized by the major physiographic divisions of the state and, within each of those divisions, by highway. Maps show the route being discussed and the locations of some features that might be worth a closer look.

The primary emphasis of the book is on the Ridge and Valley province of central Pennsylvania and the Appalachian Plateaus province in the northern and western parts of the state. It is unfortunate that the author directs little attention toward the Piedmont Upland section of southeastern Pennsylvania, which includes the most populous part of the state and is one of the most geologically complex regions in Pennsylvania. Numerous errors also detract from an otherwise useful and worthwhile book.


—J. H. Barnes
In 1988, Pete Wilshusen and other Survey staff used SCUBA to examine the bottom sediments off the Lake Erie shore. Pete commandeered a van and inflatable boat from the Pennsylvania Fish Commission. SCUBA tanks, wet suits, masks, flippers, and three staff scientists were all packed off to the balmy Erie shore. The group noticed that the van had large Fish Commission logos on each front door and wished that their association with the Geologic Survey were more obvious. This identity crisis, however, was soon lost in the excitement of following in the finsteps of Jacques Cousteau and Robert Ballard. The geologists thought only about the Calypso, the Titanic, and Ashtabula! Yes, Ashtabula. One objective was to document how the huge jetty at Ashtabula, Ohio, interferes with the northeastward transport of sand to Pennsylvania's coast. Pete and crew navigated the harbor, dove all around the jetty, collected samples, made measurements, and returned safely to the dock.

While securing the gear, Pete noticed a large fishing boat tied to the dock. The fishermen on board were unloading a considerable catch of walleye—a popular game fish. Pete noticed the fishermen looking respectfully at him and his crew in their diving suits with all of their equipment. Always friendly, Pete walked over to the fishermen and admired their catch. "That's a nice catch of perch," Pete said, greeting his fellow mariners. Confusion clouded the fishermen's faces. They stared at Pete, then at their catch, then at the logo on the van. Bewildered, one of the fishermen replied, "Say what?" "That's a nice catch of perch," Pete repeated. "They're walleye!" the fisherman responded curtly; the rest shook their heads and directed their stares from Pete to the van and back to Pete. Pete then realized he had just misidentified the lake's prime game fish.

The group quietly returned to Pennsylvania. Pete is sure to this day he knows more about topography than tackle, more about petrology than Pisces, and more about water wells than walleyes. He's sure some Buckeye fishermen hope that Ohio Fish Commission scientists know more about fish than do their counterparts in the neighboring Keystone State.
GROUNDWATER LEVELS
FOR
AUGUST 1990

EXPLANATION

Above last year
Below last year

Above last year
Below last year

No data

Observation well
Observation well equipped with data-collection platform

High
Normal range
Low

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Address Corrections Requested