A tor in the Devonian Ridgeley Member of the Old Port Formation. This feature is in an area mapped by Tom McElroy (see page 9) and was part of Stop 11 of the 2007 Field Conference of Pennsylvania Geologists.

—Photograph by Gary M. Fleeger
EDITORIAL

Friends and Colleagues
George E. W. Love, State Geologist
Pennsylvania Geological Survey

As practitioners of the earth sciences, we are all well aware of the ever-changing environment around us. We understand that “time and tide wait for no man.” While that is true intellectually, it is hard to accept on a visceral level. Change that makes our lives interesting, that challenges us to keep learning, that assures us the sun will rise tomorrow, sometimes is unwelcome when it robs us of the familiar. This issue of *Pennsylvania Geology* is a bittersweet testimony to that type of change.

Our profession has lost two practitioners of geology, Tom McElroy and John Way, two men who spent the best parts of their adult lives sharing their insights into geology. A brief memorial to each is contained within these pages. I hope that those of you who knew them will remember them fondly and smile from time to time at some good recollection; those of you who did not know them are unfortunate. Perhaps the best thing one can say is to enjoy those around you, no matter their profession or position. Everyone brings a story to the table; something can be learned from everyone if you listen. These were two gentlemen worth listening to.
Stellar Geologist—
Dean B. McLaughlin

Stuart O. Reese
Pennsylvania Geological Survey

The Pennsylvania Geological Survey has a long history of employing exceptional geologists who have served the state with their science skills and abilities to synthesize geologic data into practical reports. In addition, the Survey has been assisted over the years by superb cooperating scientists who helped map the geology of the commonwealth. Dean B. McLaughlin (Figure 1), one such field geologist, last worked at the Survey more than 45 years ago.

Two-Sport Star

What’s unusual about Dean McLaughlin is that he was not a geologist by training. His main vocational field was stellar spectroscopy, which is a fancy term for the study of stars, planets, and other astronomical bodies using the compositions and properties of light waves. McLaughlin was a well-known University of Michigan astronomer and author of the 1961 textbook *Introduction to Astronomy*. This astronomy text stands out to geologists with its many references to geological processes. It’s obvious that geology was his favorite “hobby.” Survey geologist John Barnes remembers his surprise the first time he heard that McLaughlin, author of the textbook John had recently used for his college astronomy class, had mapped geology for his new employer. At last, John had an explanation for why there were so many geology photographs in the astronomy text.

Dean B. McLaughlin was the son of Michael and Celia McLaughlin and was born in Brooklyn, N.Y., in 1901. He spent most of his academic career in the Department of Astronomy at the University of Michigan in Ann Arbor, first as a student who earned B.A., M.S., and Ph.D. degrees (1919–27), and then in various capacities as an instructor from 1922 to 1924 and from 1927 until his death in 1965 (Hockey, 2007). He also spent three years (1924–27) teaching at Swarthmore College in Delaware County, Pa. There, he became interested in the Triassic redbeds that were located about 15 miles north of Swarthmore (Hoskins and Jordan, 1999). Beginning in 1951, he did cooperative work for the Pennsylvania Geological Survey and devoted significant time to mapping Mesozoic sedimentary rocks in southeastern Pennsylvania.

Dr. Charles Cowley, University of Michigan Astronomy Professor Emeritus, remembers speaking to an old professor from the geology department (Eberhardt Heinrich, Emeritus Professor of Mineralogy and of Geological Sciences) who told him that McLaughlin was as good a geologist as he was an astronomer. Retired Pennsylvania State Geologist Don Hoskins, who started at the Survey in 1956, remembered him, but said, “You didn’t see him much—he was always out in the field.”
Take Note

I first came across McLaughlin’s work as I initiated research for a new assignment: reexamining the bedrock geology of the Middletown 7.5-minute topographic quadrangle. I first confused McLaughlin’s name with that of another bureau geologist, David B. MacLachlan, who served as a staff geologist from the 1960s to 1996. Both names, D. B. McLaughlin and D. B. MacLachlan, show up on geologic maps of areas in central and southeastern Pennsylvania. One publication, Atlas Report 177d, Geology and Mineral Resources of the Sinking Spring Quadrangle, Berks and Lancaster Counties, Pennsylvania (MacLachlan, Buckwalter, and McLaughlin, 1975), bears both names.

I am fortunate to see firsthand McLaughlin’s field observations that fed into geologic maps and reports, in that I have access to his field notebooks (Figure 2). Through McLaughlin’s field notes, I have become acquainted with his work. He and others determined that the bedrock of the Middletown quadrangle is dominated by Triassic-age rocks, underlying about 94 percent of the quadrangle. I am using a new framework of contemporary geological studies, concepts, and tools such as lidar coverage of topography at 2-foot contour intervals. This framework allows a fresh look at the mapping that was done 50 to 60 years ago.

Reach for the Stars and Keep Your Feet on the Ground

McLaughlin had a prominent role in astronomy that earned him an entry in The Biographical Encyclopedia of Astronomers (Hockey, 2007). It is noted that McLaughlin “participated in the discovery that stars in general rotate like the Sun and that members of close binary systems are often rapid rotators” (Hockey, 2007, p. 759). The “Rossiter-McLaughlin effect” was named after a discovery that he and older colleague Richard Rossiter made regarding the way light behaves as companion stars in close binary systems transit or eclipse one another. He made an impact in astronomy and has craters named after him on both the moon and Mars.

His geologic interests were intertwined with the heavens. In the 1950s, he presented a series of papers at geological and astronomical society meetings that postulated that Mars was actively volcanic (for example, McLaughlin, 1956). This argument attracted the negative comments of the astronomer Gerard Kuiper of Kuiper belt fame. McLaughlin argued that the patterns of dark sediments were in fact volcanic ash recently blown out of volcanic vents. More than 50 years later, the jury is still out on whether Mars is in fact “actively volcanic.” However, in 2010, NASA released new data gathered by the Phoenix Mars Lander that provided additional evidence “that volcanic activity has persisted on the Red Planet into geologically recent times, several million years ago” (NASA, 2010). Research on Mars may ultimately tell the story of how recent is “recent,” but McLaughlin was at least more right than wrong on this topic.

Triassic Trek

In the meantime, through a work agreement with the Survey, McLaughlin began in the early 1950s to map in the Triassic basin (Figure 3). He spent most of the next 15 years doing fieldwork
during summer recess, semester breaks, and at other opportune times. This was not introductory work with the Triassic rocks. As early as 1933 he had authored a paper on the Triassic Brunswick Formation (McLaughlin, 1933). In 1939, he wrote a 15-page article on “a great alluvial fan in the Triassic of Pennsylvania” (McLaughlin, 1939).

His field books show him mapping seven days a week in the summer, even when days hit 100°F. Here is a July 1, 1963, field book entry:

Temperature reached 101 according to report—humidity very high too

On July 3, 1963, even he had his limits, and he was nearly 62 years old, writing:

Too hot to continue. Went to Survey office in Harrisburg & worked on MS [manuscript] copy of Hummelstown quad

The bedrock geology of the Mesozoic had been mapped at 1:62,500 scale or smaller in the 1920s and 1930s, mostly by combinations of George Stose, Anna Jonas (whose name changed to Stose after she married George Stose in 1938), and Florence Bascom. Starting in the 1920s, McLaughlin began his study of Triassic rocks. In the 1950s, his Survey work provided detailed and systematic mapping at 1:24,000 scale. His field area extended from the Susquehanna River in Dauphin County to the Delaware River in Bucks County. He eventually covered more than 1,000 square miles of the Gettysburg and Newark basins east of the Susquehanna River.

By 1964–65, he was working in the Middletown and Elizabethtown areas of Dauphin and Lancaster Counties. His work was used in numerous publications, and current geologic maps that cover the Gettysburg and Newark basins reference his work as follows: “file manuscript maps by D. B. McLaughlin.”
In 1966, the bureau released General Geology Report 43—Provenance, Dispersal, and Depositional Environments of Triassic Sediments in the Newark-Gettysburg Basin (Glaeser, 1966). Geologist J. Douglas Glaeser began his 168-page report with a tribute to Dean McLaughlin, as follows:

This volume is dedicated to Dean McLaughlin, astronomer and geologist. Without his intensive work carried out over the last twenty-five years in detailed field mapping of the Triassic Newark-Gettysburg basin, a study of the kind presented here would have been impossible. The writer has benefited from numerous discussions with Dr. McLaughlin and many of the ideas in this paper are reflections of his thinking.

**Starry Notes**

McLaughlin’s field books survived the tropical storm Agnes flood of 1972 that destroyed the Survey library. The notebooks are systematic descriptive fare of mostly red Triassic rocks, yet in the margins and open spaces there occasionally appear some comments that testify to Dr. McLaughlin’s other interest (some made late in the evening).

The following is an April 9, 1962, entry:

*L & L Motel, Monday evening. Saw Comet Seki-Lines, several (7 or 8) degrees N of Venus. Tail 8 or 10°—car lights interfering. Brilliant nucleus 3 d mag or so.*

This is in reference to the comet newly discovered almost simultaneously by American astronomer Richard Lines in Arizona and Japanese astronomer Tsutomu Seki in Kochi, Japan, in February 1962 (Porter, 1963).

An April 7, 1963, entry reads:

*April 7-8 at 12:15 am EST = Apr 8, 5:15 GCT Nova est mag 6.8*

A June 21, 1963, entry is:

*Nova Herculis 1963. June 22.08 UT 7.7? easily seen, but did not see comp * 7.9*

These entries refer to a nova—a star that rapidly increases in brightness, typically because of an accretion of matter from a companion star in a binary system (Figure 4). “Did not see comp * 7.9” means that he could not see a comparison star of the nova to estimate its brightness. The nova Herculis was discovered in February 1963 by American and Swedish astronomers. McLaughlin was one of the astronomers who measured the nova (Van Genderen, 1964).

While finishing up his last quadrangles, he also submitted a paper to The Astrophysical Journal on August 16, 1965, entitled *The Be Spectrum Variable 105 Tauri.* This was a paper regarding the beryllium emissions of a star named 105 Tauri (McLaughlin, 1966).
**Last Days in the Field**

McLaughlin’s last field day for the Survey was Friday, May 21, 1965, a day he spent mapping in the Elizabethtown quadrangle. From there he traveled eastward where he was one of the leaders on a weekend field trip conducted by the Philadelphia Geological Society. But all was not well. That weekend, he wrote two unusual personal notes in his field book:

1965 May 22

*Field trip of Phila. Geol. Soc.*

—Laura McLaughlin went along. [Laura was his wife of 38 years.]

—I had some pain but slept without using pill. Sunday May 23. Some severe pain, especially in evening at L&L Motel. 2 pills 4 h apart, only partial relief.

Later in June he returned to the Survey but again he did not feel well and did not make any more field book entries. He drove back to Michigan for an anticipated hospital stay. Then-Assistant State Geologist Alan Geyer wrote, “We at the Survey were worried about you driving home to Ann Arbor while not feeling well.”

Despite his ill health, McLaughlin continued that summer to labor on geologic reports based on his field mapping, while also doing astronomical work. As usual, once the school year started, he would resume his full-time role as an astronomy professor.

**So Much to Do. . .**

McLaughlin wasn’t satisfied with some areas of his geologic maps. His plan was to take a year-long sabbatical from the University of Michigan so that he could devote more time to geologic mapping.

McLaughlin’s name would probably be more familiar to those who use Survey publications had it not been for his untimely death in December 1965. His foundational work in Mesozoic rocks is referenced in numerous publications that covered southeastern Pennsylvania, and his name is on five different Survey publications as a coauthor, even an atlas report released 10 years after his death.

His appreciation and love of geology can be seen in the way he ended his argument in a paper regarding the volcanic controversy of Mars. He said, “This does not imply that a geologist’s interpretation will surely be correct. It does mean that without the application of geological thinking, there is scant hope of ever solving the problem.”

The University of Michigan (1965) memoir contained this about McLaughlin: “He will long be remembered for the perfection of his scientific studies and will long be beloved for his unstinting generosity. . .whereby he made his knowledge and talents available to students, colleagues, and the worldwide community of astronomers.”

The Survey was fortunate to tap into his geologic passion for a number of years, though it was basically McLaughlin’s “spare time.”

In 1965, in his last letter back to the Survey from Michigan, McLaughlin lamented that his work on the Elizabethtown quadrangle was in “such a sloppy state. . .” His last words in his letter were, “time is running short!” In a letter dated the next day that crossed McLaughlin’s last letter in the mail, then-Assistant State Geologist Alan Geyer was not of the same mind: “You have done the impossible—you have completed the mapping of the Triassic.” McLaughlin’s health complications from prostate cancer were severe; he died on December 8, 1965, in Ann Arbor, Michigan, at the age of 64.
Although the field of astronomy fittingly has a claim upon the work of Dean B. McLaughlin, his geologic work in Pennsylvania was impressive in its own right. He was truly a “stellar geologist.”

Acknowledgments

Information and references contributed by Ann K. Smith, Department Administrator, and Dr. Charles R. Cowley, Professor Emeritus in Astronomy, both of the University of Michigan Department of Astronomy, were greatly appreciated. The author also thanks staff geologists Mark Brown and John Barnes of the Pennsylvania Geological Survey for their beneficial reviews of this article; Dr. Donald Hoskins, retired State Geologist, who had actually met Dean McLaughlin, for his helpful comments; Dean B. McLaughlin, Jr., the son of Dean B. McLaughlin and a science fiction writer, for conversing about his extraordinary father; and Anne Lutz, who improved this paper with thoughtful edits and some restructuring of the text.

References


IN MEMORIAM

Thomas A. McElroy
1949–2012

On February 8, 2012, we lost one of our former Survey colleagues, Thomas A. McElroy, to cancer at age 62. Tom passed away at home that evening after a battle with the disease that lasted for several years. He is survived by his wife, Deirdre (Dede).

Tom was born in Olean, N.Y. He served in the U.S. Air Force, including a tour of duty in Vietnam. After returning home with an honorable discharge from the military, Tom obtained a B.S. degree in geology from Harpur College of the State University of New York at Binghamton and an M.S. degree in geology from the University of Massachusetts at Amherst.

Tom came to the Survey in 1980 and worked for most of the time until his retirement in October 2010 as a hydrogeologist. He completed a number of major groundwater investigations and reports in the Allegheny Mountain section of the Appalachian Plateaus physiographic province. His countywide summaries for Fayette (1988), Cambria (1998), and Somerset (2001) Counties were published by the bureau. Tom also coauthored the county summaries of Indiana County (Williams and McElroy, 1991, 1997), which were published by the U.S. Geological Survey. In all of these reports, Tom not only characterized the hydrogeology of the counties, but he also compiled and updated the mapping, with others, of the bedrock geology. The Somerset County report included a completely new geologic map. For this project, Tom was responsible for mapping the Mississippian Period rocks.

Tom’s last hydrogeologic project was to help produce a statistical compilation of the hydrogeologic and well-construction characteristics of the geologic units of the state geologic map, and he was a coauthor of the resulting report, Water...
Resource Report 69. For that project, Tom reviewed each of the approximately 50,000 well records used to determine the appropriate geologic formation and physiographic section in preparation for the statistical analysis, probably his earliest foray into the use of GIS as an analytical tool.

After having done bedrock geologic mapping as part of his hydrogeological studies, it was not a major change when in his last few years with the Survey, he transferred to the Mapping Division. He first mapped the Great Bend 7.5-minute quadrangle in northeastern Pennsylvania (2002). Then he began mapping the complexly folded and faulted bedrock in the Ridge and Valley province, in collaboration with retired State Geologist Don Hoskins. Together, with Tom as principal geologist, they prepared new detailed bedrock geologic maps for a number of topographic quadrangles in the Ridge and Valley province of central Pennsylvania—Lewistown (2004), Belleville (2005), Allensville (2007), Newton Hamilton (2008), McVeytown (2010), and McCoysville (2011). Each was published as a digital report and full-scale map.

As a result of their mapping work, Tom and Don organized and led the 72nd Annual Field Conference of Pennsylvania Geologists in 2007, Geologic Mapping—“Walkabouts” in central Pennsylvania—1st-to-5th-Order Appalachian Mountain Folds; Folded Thrusts; Ordovician and Silurian Carbonates; Silurian Quartzites and Sandstones (Harper, 2007).

Tom’s mapping in both the Plateaus and the Ridge and Valley provinces resulted in articles in Pennsylvania Geology highlighting interesting and/or rare features that he discovered. Notable of these was Tom’s article on recently exposed rocks on the west side of Lewistown, whose complicated geology led him to denote the area as “Oz” (McElroy, 2006).

Tom was also a long-time participant in the annual Field Conference of Pennsylvania Geologists. In addition to being a co-leader at the 2007 conference, he also co-led trips in 1993 (Somerset County) and 2002 (Tunkhannock). As a volunteer as well as a participant, he helped with the logistics of the trips.

Tom retired in October 2010, partly to concentrate on his health issues. He continued to participate in geologic activities until his health no longer permitted it. All of us who knew and worked with Tom miss his presence in our ranks.

**Bibliography of Thomas A. McElroy**


Additional References


—Gary M. Fleeger and Donald M. Hoskins
IN MEMORIAM

John H. Way
1943—2012

John H. Way, a former staff geologist at the Pennsylvania Geological Survey and later a professor of geology at Lock Haven University, died on February 21, 2012, in Williamsport following a brief illness. He joined our staff in 1971 and stayed for 15 years, making lasting contributions both as a field geologist and as a geological editor, before accepting a position on the faculty at Lock Haven University (LHU) in 1986.

John was born in Philadelphia in 1943 and grew up in the nearby community of Yeadon. His love of nature and geology was aroused early during visits to the Delaware County Institute of Science in Media, Pa. There, under the mentorship of curator Harold W. Arndt, John developed an interest in mineralogy and geology. In addition to unique specimens which John was able to view there, John was inspired by Harold’s stories of his field experiences with Sam W. Gordon’s mineral collecting excursions in Pennsylvania, on which Harold had been the unofficial photographer. John started his own collection, and some of his favorite mineral-collecting areas are believed to have been Bancroft, Ontario; Herkimer, N.Y.; and the Keystone Trappe rock quarry at Cornog, Chester County, Pa.

John majored in geology at Franklin and Marshall College and earned an A.B. degree in 1965, followed by an M.S. degree in 1967 from the University of Pennsylvania and a Ph.D. in 1972 from Rensselaer Polytechnic Institute in Troy, N.Y. His master’s degree research was a study of the sedimentary rocks that preserve a Carboniferous fossil forest that is exposed in cliffs along the Bay of Fundy near Joggins, Nova Scotia. His doctoral research was a study of the depositional environment and the potassium, uranium and thorium content of Middle and Upper Devonian rocks in the Catskill Mountains of New York. While studying in Troy he met Roberta (Bobbie) Seibert, who became his wife of over 40 years. John and Bobbie raised a daughter, Mary.

During his years at the Survey, John was responsible for completing several major publications, most notably a major study of the geology of Pennsylvania...

John’s contributions to understanding the geology of the Ridge and Valley physiographic province and the economic geology of Pennsylvania were, and continue to be, significant. For example, the “strat chart” helps to define the framework of the Marcellus and Utica shale gas horizons. The Survey’s Tioga Ash Bed study provided information on the base of the Marcellus play zone, but also delineated the correct direction of time transgression relative to lithologic facies. His careful work on volcanic ash beds in the Middle and Upper Ordovician Union Furnace section helped establish that exposure as Pennsylvania’s de facto type section for those beds and the basis of the bentonite nomenclature used in Pennsylvania. His work on the lowermost Devonian Bald Hill Bentonites arose from the hypothesis that termination of extended periods of carbonate deposition would be marked by volcanic ash beds. The ashes marking the end of the Silurian Wills Creek, Tonoloway, Keyser, Coeymans, and New Scotland carbonates were found within an hour of searching in the transition to the lowermost Devonian Mandata black shale at Bald Hill, Blair County. Weekend trips with family eventually extended the known range of surface exposures of the Bald Hill Bentonites from near the Adirondack Mountains in New York to McDowell, W. Va. In the process, the resulting detailed stratigraphic sections disproved a then-current assumption that punctuated aggradational cycles (PACs) were time-stratigraphic surfaces.

Despite John’s contributions that helped set the stage for the Marcellus gas development, he was concerned about its potential impact on the environment. John never profited from the Marcellus but, true to his principles, he volunteered countless hours to conservancies in central Pennsylvania seeking to protect watersheds.

John’s ability to write in a clear and interesting way for the nongeologist was amply demonstrated in his publication, *Your Guide to the Geology of the Kings Gap Area, Cumberland County, Pennsylvania*, published by the Survey in 1986. John also used his excellent communication and writing skills to advantage during a three-year stint as a geologic editor at the Survey, from 1974 through 1977, when he helped convert a number of Survey publications from rough manuscripts to finished products. He performed a similar task as a volunteer, spending many hours of his personal time as the editor of the 300-page book, *The Mineralogy of Pennsylvania, 1966-1975*, by Robert C. Smith, II, published by the Pennsylvania Chapter of Friends of Mineralogy in 1978. To this same work, John contributed more than 50 finely executed pen-and-ink sketches. From alloclasite to the back piece geologic time scale, all of the drawings were drafted by John.

At Lock Haven, John proved to be a very effective teacher, conveying to his students not only his technical expertise, but his love of nature and excitement about the geological processes that shape the earth. John received the Teaching and Learning Center’s Peers Choice Award at LHU in 2004. Through
papers published while he was there, he made significant contributions to understanding the regional and environmental geology of the Lock Haven and Williamsport areas. Among his contributions were four field guidebooks covering the geology of the Erie, Gettysburg, South Mountain, and Johnstown areas. He also made one additional contribution to the Survey while teaching at LHU, authoring the chapter on the physiography of the Appalachian Mountain section for the Survey’s *Geology of Pennsylvania* compendium.

John’s enthusiasm and energy were infectious. Anyone who came into contact with him was uplifted and energized by John’s positive outlook and the joy that he took in everything that he did. This extended well beyond his work to include his community, his church, and his family. Those of us who were privileged to know and work with John are the better for it, and we will miss him.

**Bibliography of John H. Way**


In 1965, the Pennsylvania Geological Survey issued the first edition of what was to become one of its better-selling publications, *The Directory of the Mineral Industry in Pennsylvania* (O’Neill, 1965). Because other compilations of sources of coal, oil, and natural gas already existed, this 85-page directory was limited to nonfuel commodities such as limestone, sandstone, sand and gravel, shale, and slate. These commodities have many applications, including road building, other forms of construction, agricultural soil conditioning, dimension stone, and various industrial processes. The directory also included the state’s metal mines, none of which remain open today. The main purpose of this publication was to provide a way of helping the consumers and producers of industrial minerals to find each other.

The directory was enough of a success that a second edition containing updated information was published six years later (Hoover, 1971), and a third six years after that (O’Neill, 1977). Other editions followed. Each time, attempts were made to make the directory easier to use. For the second edition, a simple map of the state was added that showed what commodities could be found in each county but that did not show any exact locations. The third edition included a 1:500,000-scale two-color map showing the location of each operation. The fourth edition (Berkheiser and others, 1985) had a similar map, and the fifth (Barnes, 1997) had smaller page-sized maps, each showing just a few counties at 1:500,000, supplemented by smaller-scale maps showing the distribution of each commodity across the state. Starting with Berkheiser and others (1985), the directory also carried a new title that was more appropriate for its limited scope, *Directory of the Nonfuel-Mineral Producers in Pennsylvania*. 

---

**NEW RELEASE**

**Nonfuel-Mineral Resources Directory**

**Gets a New Look**

John H. Barnes  
Pennsylvania Geological Survey

The directory was enough of a success that a second edition containing updated information was published six years later (Hoover, 1971), and a third six years after that (O’Neill, 1977). Other editions followed. Each time, attempts were made to make the directory easier to use. For the second edition, a simple map of the state was added that showed what commodities could be found in each county but that did not show any exact locations. The third edition included a 1:500,000-scale two-color map showing the location of each operation. The fourth edition (Berkheiser and others, 1985) had a similar map, and the fifth (Barnes, 1997) had smaller page-sized maps, each showing just a few counties at 1:500,000, supplemented by smaller-scale maps showing the distribution of each commodity across the state. Starting with Berkheiser and others (1985), the directory also carried a new title that was more appropriate for its limited scope, *Directory of the Nonfuel-Mineral Producers in Pennsylvania*. 

---


Khalequzzaman, Mohamed, Way, J. H., Marion, Shane, and others, 2010, Assessment of the impact of a passive-treatment facility to the recovery of an AMD-impaired tributary within the Beach Creek watershed, Clinton County, Pa.: Geological Society of America Abstracts with Programs, v. 42, no. 1, p. 185.


—John H. Barnes and Robert C. Smith, II
The 1997 edition of the directory was the first to be posted online as an Adobe Portable Document File (PDF). It was also the first to include map coordinates in the listings. As an experiment, the author used those data to create a rather simple digital mapping application that allowed users to view a searchable map that showed the locations of operations of interest. Viewing the map required the user to download and install special software, then download a specially formatted database and connect the software to the database, so it was not particularly user-friendly.

Now, we are very pleased to announce that, in addition to an Adobe PDF tabulation, the newest edition of the directory (Barnes, 2011) can be accessed as a user-friendly mapping application that runs on any modern computer that is equipped with a standard web browser (Figure 1). This was accomplished through the efforts of Carrie Tropasso, the Survey’s newly hired Natural Resource Specialist, who brings experience in the development of mapping applications to us.

The map can be used to locate operations by product and/or lithology as well as by county or the name of the operation (Figures 2 and 3). Information about a selected operation can be displayed on the screen, and driving directions to the quarry can be plotted (Figure 4). It is even possible to zoom in for a close look at the quarry (Figure 5).

We hope that the addition of this mapping application will improve the usability of the directory. Also, it is our hope that, now that the directory has been made into a fully digital product and formats have been established, future updates of the data can be made in a more timely fashion.

Figure 1. Mapping application for the Directory of Nonfuel-Mineral Producers in Pennsylvania. The orange dots indicate the locations of all the mineral producers included in the directory. Searches can be conducted by county, operation name, or product and/or lithology. The link “Map Tutorial” near the lower right corner of the map provides instructions in how to use it.
Figure 2. The results of a search for all quarries that produce coarse aggregate from limestone are indicated by the yellow dots.

Figure 3. Selecting Franklin County, we get a closer view of the quarries in that county. The yellow dots denote the quarries that were selected in the previous step (Figure 2) as producers of coarse aggregate from limestone.
Figure 4. Clicking on an orange or yellow dot reveals information about the quarry, such as its name; the name, address, and phone number of the operator; a link to the company’s website if they have one; and information about their products and the geological formations that they are mining. There is a space to enter a starting address for plotting a route to drive to the quarry.

Figure 5. Clicking on “Zoom to Area” (see Figure 4) provides a close-up view of the quarry.
References


RECENT PUBLICATIONS

Mineral resources open-file report: (April 2012)

- Directory of the nonfuel-mineral producers in Pennsylvania (PDF and new interactive map)

Fact sheet (February 2012)

- Topographic and Geologic Survey Local Government Services

Surficial geology open-file report: (February 2012)

- Surficial geology of the Christmans 7.5-minute quadrangle, Carbon County, Pennsylvania
- Surficial geology of the Weatherly 7.5-minute quadrangle, Carbon and Luzerne Counties, Pennsylvania
Department of Conservation and Natural Resources  
Bureau of Topographic and Geologic Survey  

Main Headquarters  
3240 Schoolhouse Road  
Middletown, PA 17057–3534  

Pittsburgh Office  
400 Waterfront Drive  
Pittsburgh, PA 15222–4745  
Phone: 412–442–4235 | FAX: 412–442–4298  

DIRECTOR'S OFFICE  

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Services</td>
<td>Connie F. Cross</td>
<td>717–702–2054</td>
</tr>
<tr>
<td></td>
<td>Elizabeth C. Lyon</td>
<td>717–702–2063</td>
</tr>
<tr>
<td></td>
<td>Jody L. Rebuck</td>
<td>717–702–2073</td>
</tr>
</tbody>
</table>

GEOLOGIC AND GEOGRAPHIC INFORMATION SERVICES  

<table>
<thead>
<tr>
<th>PAMAP and Public Outreach</th>
<th>Helen L. Delano, P.G.</th>
<th>717–702–2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS Services</td>
<td>Mark A. Brown</td>
<td>717–702–2077</td>
</tr>
<tr>
<td></td>
<td>Caron E. O’Neil, P.G.</td>
<td>717–702–2042</td>
</tr>
<tr>
<td></td>
<td>Carrie L. Tropasso</td>
<td>717–702–2053</td>
</tr>
<tr>
<td></td>
<td>Thomas G. Whitfield, P.G.</td>
<td>717–702–2023</td>
</tr>
<tr>
<td>IT and Database Services</td>
<td>Sandipkumar P. Patel</td>
<td>717–702–4277</td>
</tr>
<tr>
<td></td>
<td>Mark A. Dornes</td>
<td>717–702–4278</td>
</tr>
<tr>
<td></td>
<td>Pedro A. Forero</td>
<td>412–442–5826</td>
</tr>
<tr>
<td>Library Services</td>
<td>Jody L. Smale</td>
<td>717–702–2020</td>
</tr>
</tbody>
</table>

GEOLOGIC MAPPING  

| Stratigraphic Studies      | Gary M. Fleeger, P.G. | 717–702–2045 |
|                           | Rose-Anna Behr, P.G.  | 717–702–2035 |
|                           | Clifford H. Dodge, P.G.| 717–702–2036 |
|                           | Antonette K. Markowski, P.G. | 717–702–2038 |
|                           | James R. Shaulis, P.G. | 717–702–2037 |
| Groundwater and Environmental Geology | Stuart O. Reese, P.G. | 717–702–2028 |
|                           | Aaron D. Bierly        | 717–702–2034 |
|                           | Kristen L. Hand        | 717–702–2046 |
|                           | William E. Kochanov, P.G. | 717–702–2033 |
|                           | Victoria V. Neboga     | 717–702–2026 |

MINERAL RESOURCES  

|                          | Leonard J. Lentz, P.G. | 717–702–2040 |
|                          | John C. Neubaum       | 717–702–2039 |
|                          | Stephen G. Shank, P.G. | 717–702–2021 |
| Petroleum and Subsurface Geology | Kristin M. Carter, P.G. | 412–442–4234 |
|                            | Joseph E. Kunz, Jr.   | 412–442–4236 |
|                            | Lynn J. Levin         | 412–442–4299 |
|                            | Katherine W. Schmid   | 412–442–4232 |
PENNSYLVANIA GEOLOGY is published quarterly by the Bureau of Topographic and Geologic Survey Department of Conservation and Natural Resources 3240 Schoolhouse Road, Middletown, PA 17057–3534.

This edition’s editor: Anne Lutz.

Links to websites were valid as of the date of release of this issue.

Contributed articles are welcome.

Guidelines for manuscript preparation may be obtained at www.dcnr.state.pa.us/topogeo/pub/pageolmag/pageolguide.aspx.

To subscribe, send an email to RA-pageology@state.pa.us.

COMMONWEALTH OF PENNSYLVANIA
Tom Corbett, Governor
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
Richard J. Allan, Secretary
OFFICE OF CONSERVATION AND TECHNICAL SERVICES
Cindy Adams Dunn, Deputy Secretary
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
George E. W. Love, Director

Bureau website: www.dcnr.state.pa.us/topogeo/index.aspx
DCNR website: www.dcnr.state.pa.us/index.aspx
Pennsylvania home page: www.pa.gov