

Pennsylvania GEOLOGY



COMMONWEALTH OF PENNSYLVANIA

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ON THE COVER

Slope failures at the U.S. Route 22–522 Industrial Drive Interchange (see article on page 2). Failures occurred after heavy rains associated with Hurricane Ivan had passed through the area. Construction for the Lewis-town Bypass appears in the background of the photograph, and construction for the off-ramp to Industrial Drive appears in the foreground. The view is to the northeast from the southwest edge of the off-ramp roadcut. Photograph by Thomas A. McElroy, 2004.

PENNSYLVANIA GEOLOGY

PENNSYLVANIA GEOLOGY is published quarterly by the Bureau of Topographic and Geologic Survey, Pennsylvania Department of Conservation and Natural Resources, 3240 Schoolhouse Road, Middletown, PA 17057–3534.

Editor: Caron E. O'Neil.

Contributed articles are welcome. Guidelines for manuscript preparation may be obtained at www.dcnr.state.pa.us/topogeo/pub/pageolmag/pageolguide.aspx or by contacting the editors at the address listed above.

VOL. 36, NO. 2/3

SUMMER/FALL 2006

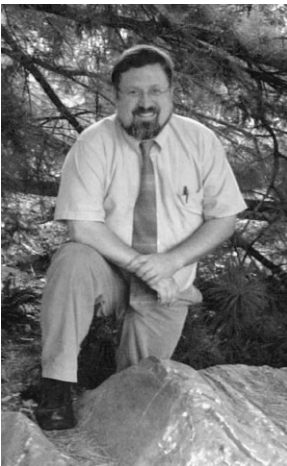


Simple, Right?

Sometimes the simple things turn out to be complex, as you will see in this issue. Tom McElroy started mapping in an area, which at first glance looks simple—lots of nicely folded beds that are obvious as you drive by. But every time I asked Tom about his mapping project, he would regale me with stories of some unexpected complication. He was aided in the mapping of the Belleville quadrangle by Don Hoskins, who you all know as the *real* State Geologist (i.e., my predecessor). Don has graciously volunteered his time to map with Tom in this seemingly ever more complex area. You, as taxpayers, should give Don a personal thanks, next time you see him.

But back to the simple being complex. You might think that we have a finite job here, mapping the geology of the state. But, as you will see, there are always surprises, and sometimes they result in costly fixes for those who want to build in an area. So our job is never really ever done. Each year, new technology, new drill holes, and new roadcuts help us do a better job of defining just what lies beneath our feet. There is always one more outcrop to visit and a new map to produce, and 100 years from now, a geologist will be saying to himself or herself “Well, they did pretty well considering they didn’t have this Star Trek gizmo.”

For another example, at one point people thought the oil and gas boom was over in Pennsylvania. Today a new boom based upon the Trenton-Black River play has brought explorationists to our state once more. As they acquire new seismic data and drill, the picture will be a little less like a layer cake and more like a lasagna that has been folded and faulted—hot tomato sauce popping to the surface at weak points in the pasta like a bunch of kimberlites. From the surface, lasagna looks simple. But it is really very complex once you dig in.



Jay B. Parrish
State Geologist

Geology of Oz aka the U.S. Route 22–522 Industrial Drive Interchange¹



by Thomas A. McElroy
Bureau of Topographic and Geologic Survey

INTRODUCTION. In July 2003, Tom McElroy and Assistant State Geologist Sam Berkheiser first entered the portion of the U.S. Route 22–522 Lewistown Bypass where it cuts deeply into Big Ridge in Granville Township, Mifflin County, Pa. (Figure 1). This area lies in the Appalachian Mountain section of the Ridge and Valley physiographic province. At the time, excavation was underway for an exit ramp to the Mifflin County Industrial Park, which is located to the southeast of the area, and Tom and Sam had come to investigate the new exposure. They were surprised to see from a distance a broad band of black rock. It had to be the black shale of the Marcellus Formation, but only formations older than the Marcellus were shown on the existing geologic map for the area (Berg and others, 1980). The site was a jumble of blasted rock that made contact and attitude determinations difficult. As Tom and Sam scrambled up the steep slope, they found more surprises. In the Old Port Formation, they noted the following: (1) a pod of black, deeply weathered rock that appeared to be a consequence of a fuel spill; (2) Shriver Chert having anomalous purple and yellow bands; and (3) three distinct variations of the Ridgeley Sandstone. These strange appearances caused Tom to remark “Are we in Oz?” As blast-

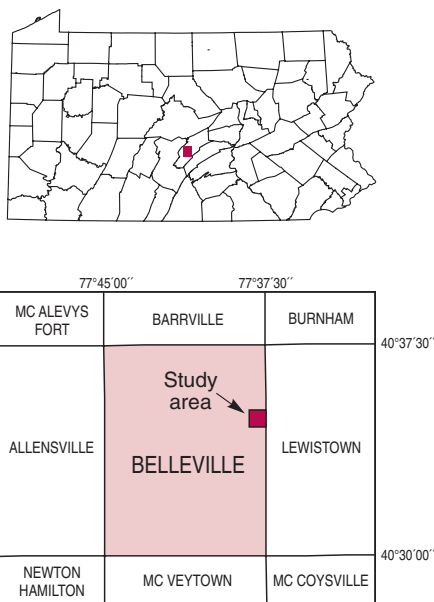


Figure 1. Location of the study area in the Belleville 7.5-minute quadrangle, Mifflin County, Pa.

¹Modified from McElroy (2006).

ing and removal of rock continued, the geology became clear, but the nickname stuck.

The construction project posed numerous geotechnical challenges, including, but not limited to, hillside failures in the clayey shales, old mine workings in sandstones and shales, and acid drainage generated by pyritic black shales. Perhaps the most costly of these challenges were the hillside failures, which necessitated laying back the slope above the roadway from the original 1.5:1 to a 2.25:1 horizontal-to-vertical ratio.

STRATIGRAPHY. The stratigraphic relationship of rocks and their thicknesses at the Industrial Drive Interchange and surrounding area are shown and described in Figure 2. The oldest formation exposed at the bottom of the roadcut is the Lower Devonian Old Port Formation, the underlying formations being covered by colluvium and construction materials. The youngest unit exposed at the site is the Middle Devonian Marcellus Formation.

The Old Port Formation consists of the limestones, shales, cherts, and sandstones overlying the Keyser Formation and underlying the Needmore Shale Member of the Onondaga Formation (Conlin and Hoskins, 1962). The dominant lithology of the Old Port Formation occurs in the lower part of the formation and consists of limestone with interbeds of very fine grained sandstone, black chert, and shale. Almost all of the lower Old Port is covered by construction material at the excavation site. Above the limestone are the Mandata Shale and the Shriver Member. The Mandata is olive black, thin bedded, and non-calcareous. In this area, it is not continuous, and thickness ranges up to about 20 feet. The pod of black, deeply weathered rock mentioned in the introduction is the Mandata Shale. The Shriver Member is a fossiliferous, dark-gray to black chert that typically weathers to light gray to white or yellow brown. At this location, the weathered chert has striking thin purple and yellow bands. Typically, however, the Shriver Chert in this area has brown and yellow banding. The Shriver is continuous at the site, and its thickness varies from about 30 to 50 feet in the surrounding area. The Ridgeley Member is at the top of the Old Port Formation. It consists of white to very light gray, weathering to grayish-orange, quartz sandstone. It is about 70 feet thick. Robust brachiopods are common in this unit (Figure 3).

Cementation of the Ridgeley Member is highly variable at the site. Going up the slope of the excavation, the Ridgeley is exposed three times (Figure 2). The sandstone at the southeasternmost exposure is very friable and was deep mined as a source of glass sand some-

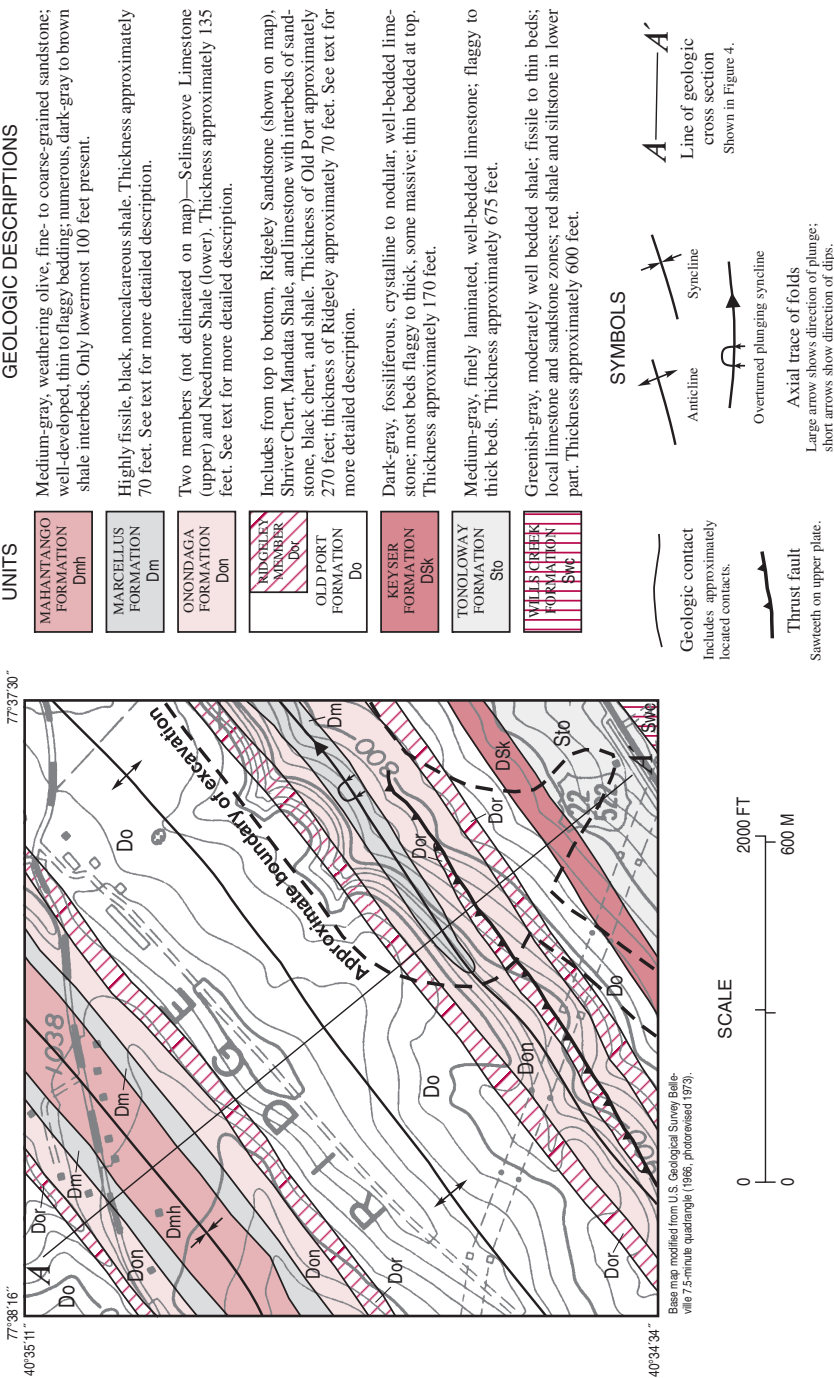


Figure 2. Bedrock geology in the Industrial Drive Interchange area (the study area shown in Figure 1). The Lewistown Bypass runs northeast-southwest through the area of excavation. Starting at the northeast end of the excavated area, the off-ramp swings northwest of the bypass, curving around to pass under the bypass and connect with old Route 22-522 and Industrial Drive in the southeast corner of the map. Modified from McElroy and Hoskins (2005).



Figure 3. Sandstone boulder from the Ridgeley Member containing brachiopods approximately 1 to 1.5 inches in size.

time in the nineteenth century. The mine's existence was not known to the contractors when they started excavation—they discovered the mine when a bulldozer fell into it! A fault-bounded, siliceous, and very hard sand-

stone of the Ridgeley Member is exposed 175 feet farther to the northwest. The northeastern extent of this sandstone is easily seen. The southwestern end of the mapped unit is inferred from float. The third exposure of the Ridgeley Member, this one of well-indurated fossiliferous sandstone, occurs higher on the ridge.

Overlying the Ridgeley Sandstone are the rocks of the Onondaga Formation. The Onondaga consists of two members, the Needmore Shale (lower) and Selinsgrove Limestone (upper) (Willard, 1935). At the excavation site, the Needmore Member is a medium-gray to medium-light-gray, fissile, generally calcareous shale. It commonly displays pencil cleavage and contains a few pyritized brachiopods. The Selinsgrove Member is a dark- to medium-gray, dense, microcrystalline to very finely crystalline, argillaceous limestone. Exposures of the Selinsgrove in the study area are limited. Bedding ranges from thin to thick. The Onondaga Formation is about 135 feet thick in this area.

Above the Onondaga lies the Marcellus Formation, a highly fissile, black shale. It is sparsely fossiliferous, noncalcareous, slightly silty, and pyritic. The formation contains several bentonite layers in its lowermost part. At the Mifflin County landfill, 7 miles to the northeast, the measured thickness of the Marcellus Formation is 70 feet.

STRUCTURE. The U.S. Route 22–522 Industrial Drive Interchange is located in an area of northeast-southwest-striking, third-order folds. The third-order fold exposed at the excavation site is a structurally complex syncline (Figures 2 and 4). The northwest limb of the syncline is overturned, and the southeast limb is faulted. Both limbs have steeply dipping beds. The syncline, which begins about a mile southwest of the excavation area, plunges to the northeast. The fault is in-

terpreted as a north-dipping thrust fault. It is hypothesized that the Ridgeley Member exposed adjacent to the fault is siliceous because of hydrothermal fluids circulating through the fault zone.

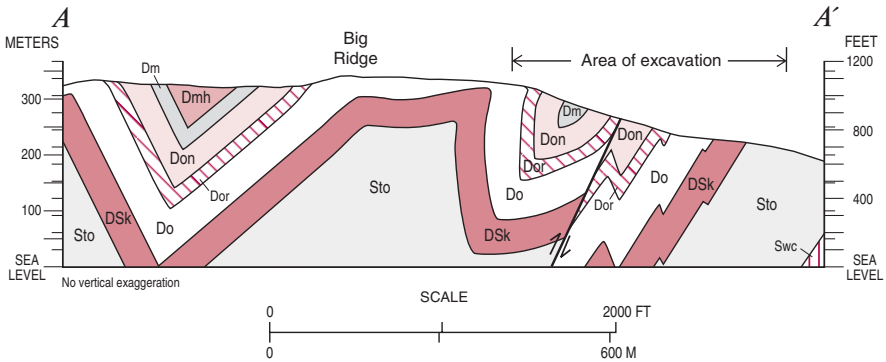


Figure 4. Northwest-southeast-trending geologic cross section for the area surrounding the U.S. Route 22-522 Industrial Drive Interchange. See Figure 2 for the location of the cross-section line and a key to the units.

GEOTECHNICAL CHALLENGES

Slope Failures. Heavy rains from remnants of Hurricane Ivan in 2004 caused extensive slope failures at the Industrial Drive Interchange (front cover). Numerous scarps parallel to the off-ramp roadcut developed on the northwest limb of the third-order syncline. The top-most scarp was about 20 feet high and was in the Shriver Member of the Old Port Formation. Failures extended downward (up section) through the Ridgeley Member, the Onondaga Formation, and into the Marcellus Formation, which is at the toe of the cut. At the time of the failures, the slope had a horizontal-to-vertical ratio of 1.5:1. In the spring of 2006, the hillside was benched and cut back to a 2.25:1 slope (Figure 5).

Acid-Water Generation. The roadcut exposed the pyritic Marcellus Formation along the hinge of the third-order syncline, and as such, the exposure is quite broad. Shortly after excavation, acidic, iron-rich water began to flow out of the exposed Marcellus (Figure 6). Pyrite, an iron sulfide formed under reducing (no oxygen) conditions, is the source of the acid drainages at the site. When it is exposed to air and water, pyrite breaks down and forms sulfuric acid and iron hydroxide. At the site, a catch pond that the acid drainage flowed into was drained. Testing showed that the sediments in the pond were not toxic, and the sediments were removed.



Figure 5. The U.S. Route 22–522 Industrial Drive Interchange after repair for slope failures (see front cover).



Figure 6. Acid drainage flows out of an old iron mine in the Marcellus Formation at the excavation site. Photograph by Fred Waldner, Site-Blauvelt Engineers, Inc., 2003.

The cutting back of the slope removed a large volume of the Marcellus Formation, which may ameliorate the acid-water problems at the site. Material removed from the hillside was mixed with limestone and sequestered. In addition, drains were installed above the remaining Marcellus Formation to decrease the volume of groundwater passing through it, and the outcrop was covered to reduce its exposure to atmospheric oxygen.

Abandoned Mines. Two abandoned underground mines were dug into during excavation. The first was an iron mine underneath the main roadway just east of the off-ramp (Figure 6). The ore was located in the top part of the Marcellus Formation. When discovered, the support timbers were still in place. The mine was filled in as construction work continued.

The second mine was a sand mine in the Ridgeley Member (Figure 7A). Collapses above the mine extend more than half a mile to the southwest of the mine opening. One of these, a collapse adjacent to the exposed opening, was repeatedly filling with water from storms. Several times, the pressure of this water blew out covers put



Figure 7. Opening to a Ridgeley sand mine encountered during excavation. A. Uncovered mine entrance. B. Mine opening blocked by a webbing of fabric and stone that was used to cover the entrance but blew out (see text).

over the mine opening (Figure 7B). The Pennsylvania Department of Transportation has since lined the collapse with clay and put a pipe in to drain storm water away from the mine.

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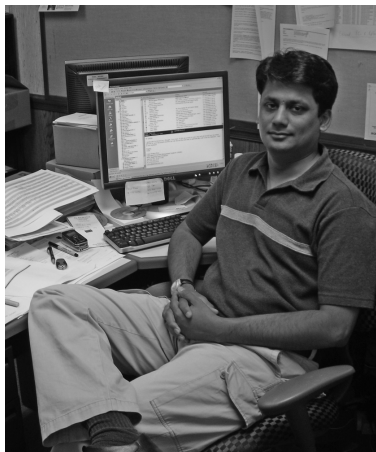
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Meet the Staff—Part 2

In Part 1 of this article (*Pennsylvania Geology*, v. 36, no. 1, p. 14–18), we introduced you to the Director, Assistant Director, Administrative Services, and Library Services areas of the Bureau. Now we will meet the staff who work in the Computer Services and Database Services areas.

COMPUTER SERVICES. The Computer Services area supports the day-to-day information-technology (IT) operations of the Bureau. This includes help-desk support, applications development, networking, and database administration. The Computer Services staff member also maintains the Bureau's networks and network-connected equipment and is responsible for computer and computer-related purchases and security. He is a liaison for the Bureau with other state IT personnel and outside consultants or contractors retained by the Bureau for IT services.

Sandipkumar P. Patel. Sandip is a newcomer to the Bureau, having been hired as an IT Generalist in our Middletown office in June 2005. He earned a B.S. in Computer Science in 1998, and his prior credentials include eight years of IT experience from various industries. Immediately prior to joining the Bureau, Sandip was an independent consultant responsible for designing, developing, and maintaining software applications and database solutions.



Sandip Patel

At the Survey, Sandip provides help-desk support for the Middletown office, maintains all the servers (file servers, printer server, backup server, and database servers) and network routers and switches deployed at that location, and recommends hardware and software to be purchased by the Bureau. In addition, he coordinates with other staff and consultants on the development of software applications used in the Bureau's databases and provides backup support in the Middletown office for Database Services.

An ongoing project that Sandip has been heavily involved in is a stratigraphic database for the Bureau. The Survey maintains stratigraphic data in a number of forms and in a large number of disparate locations. This application will coalesce the information into one centralized database depository so that whenever someone needs data, he or she will not have to obtain it from more than one source or data format. The stratigraphic database will provide a series of utilities for users to query, extract, and input data. To date, application requirements and a database design have been completed, and an outcrop-data module is in operation. Modules for surficial, thin-section, drill-hole, and sinkhole data are to be developed in the second phase of the application.

DATABASE SERVICES. The Pennsylvania Geological Survey has three interrelated oil and gas applications maintained by the Database Services section in our Pittsburgh office. These applications are the Wells Information System (WIS), Oil and Gas Base Maps, and the Pennsylvania Internet Record Imaging System (PA*IRIS). The WIS and Oil and Gas Base Maps are internal applications residing in the Pittsburgh

office, and PA*IRIS is an external Internet application. A detailed description of all three applications can be found in *Pennsylvania Geology*, v. 34, no. 2, p. 10–17. The staff of Database Services uses these applications to fulfill numerous IT contracts effectively and on time and to provide high-quality document-management, database, GIS, and Internet products.

Mitesh Patel. Mitesh was hired as the new IT Generalist Administrator of Database Services in January 2006. His prior experience included IT work with the U.S. Army, the Pennsylvania Securities Commission, and the Pennsylvania Department of Revenue. He received a B.S. in Computer Engineering in 1998 and an M.S. in Computer Information Systems in 2003.

Mitesh's primary duty is to manage the Bureau's oil and gas digital services, including WIS, Oil and Gas Base Maps, and PA*IRIS. The users of these applications include state and federal agencies, as well as 133 (as of October 27, 2006) oil and gas companies across the United States and Canada—in all, more than 300 users!

Currently, Mitesh is the lead worker on a project that will incorporate ESRI ArcIMS software to give users access to a “living” oil and gas base map. This interactive map will connect to WIS and provide up-to-the-minute well locations as they are entered into the database. In addition, users will have access to a number of geographic-information-system (GIS) layers that reside on the base-maps application, such as well type, quadrangle, hydrology, field, and pool.

Our Bureau is a central repository for oil and gas documents filed with the commonwealth. The Pittsburgh office processes on average 5,000 location plats, 5,000 completion reports, and 2,000 plugging certificates per year. Prior to placing these documents in a central file, they are sent to up to 10 different staff members for processing. Under Mitesh's direction, Database Services has been instituting OnBase Workflow software (a product of Hyland Software, Inc.) to fine-tune and expedite the document-handling process. A Workflow application for location plats is already successfully running, and applications for completion reports and plugging certificates are in the works.



Mitesh Patel

Janice A. Hayden. Jan has been employed in our Bureau's Pittsburgh office as an IT Generalist since August 2001. She holds a B.S. in Computer Information Technology and came to the Survey with over eight years of experience in the computer field.



Jan Hayden

Jan provides IT support for the Pittsburgh office of our Bureau, and she assists visitors and PA*IRIS partners by giving training and support for the WIS and PA*IRIS applications. She is also responsible for hardware, software, and license maintenance contracts and purchases for PA*IRIS.

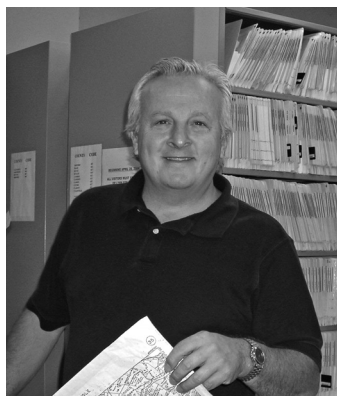
Jan is currently the project lead for an ongoing geophysical-logs scanning project, working with our West Virginia University contractor.

The images from this project are made available on PA*IRIS. Jan is responsible for data entry, quality assurance, and indexing of the log images. The geophysical logs are kept on file at the Survey's Pittsburgh office, and the collection numbers in the tens of thousands. Scanning was completed on the entire collection in April 2006 and is continuing on new logs, which are coming in at an average rate of 200 per month. As of October 26, 2006, a total of 43,294 geophysical logs have been scanned and included in PA*IRIS.

Joseph E. Kunz, Jr. Joe started at the Survey on August 23, 1984, coming to us after four years of service in the U.S. Navy.

Joe actually does multiple duties for the Survey. Inside the Database Services area, Joe operates an optical character recognition (OCR) program on scanned completion reports that will be imported into WIS and PA*IRIS. He also processes new well records for the geologists, sets up visitors on computers for PA*IRIS, and answers questions from clients or sends them information related to the PA*IRIS application.

In addition to his duties pertaining to oil and gas data, Joe greets visitors to our Pittsburgh office and answers the main telephone line for the office. He takes care of our Pittsburgh library and orders publications as needed. He also orders all of the supplies for the office and is in charge of the office credit card and all the reports and audits that go along with that responsibility. The two De-



Joe Kunz

partment vehicles for our Pittsburgh office are under Joe's care; he makes sure they are inspected and properly maintained. A special job Joe is currently working on is to reorganize the well-record files in order to generate a lot more room for the incoming well records, location plats, and geophysical logs.

Lynn J. Levino. Lynn celebrated 14 years at the Survey this October 2006, having been hired as part of the "Gas Atlas" project team back in the early 1990s. Before joining the Survey, Lynn was the secretary for the Director of the Governor's Veterans Outreach and Assistance Center in Greensburg, Pa.

Lynn is an integral part of the PA*IRIS partnership, scanning and key entering all documents and information for public Internet access. This includes completion reports, location plats, and plugging certificates for all oil and gas wells in the commonwealth. She handles all of the billing for PA*IRIS, including the billing for end-of-the-year subscription renewals, keeping accurate records of all monies received.

Lynn has become the key individual for introducing potential clients to PA*IRIS. She trains visitors in the kiosk area in the use of our digital products on a daily basis and sends companies interested in joining the partnership to Mitesh for the business side of the transaction.



Lynn Levino

ANNOUNCEMENT

Survey Atlas Reports on Sale

The Bureau of Topographic and Geologic Survey is putting 18 of its Atlas Series reports on sale until the end of December 2006. The sale publications are marked down more than 50 percent from their original prices. These technical reports include detailed, full-color geologic maps and descriptive texts for selected 7.5- and 15-minute quadrangles. A list of ab-

breviated titles and sale prices is given on the next page. Specific bibliographic information can be found on our web site at www.dcnr.state.pa.us/topogeo/pub/sale.aspx. Also, if any of the reports go out of print during the sale, their titles will be removed from the online list.

Atlas reports may be ordered from the State Bookstore, Commonwealth Keystone Building, 400

North Street, Harrisburg, Pa. Information about purchase and payment options, tax, and shipping and handling charges can be found on the Bureau's web site. Announcements for future publication sales will also be posted on our web site as each sale takes place.

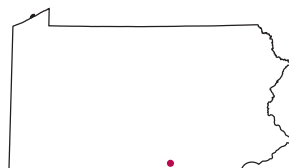
ATLAS REPORTS ON SALE

(except where noted otherwise, names are 7.5-minute quadrangles)

A 48. Donegal 15-Minute	\$1.60	A 85cd. Ramey, Houtzdale	\$8.80
A 64. Hazen, Falls Creek, Reynoldsville, DuBois	\$10.00	A 86. Blandburg, Tipton, Altoona, Bellwood	\$13.60
A 74cd. Luthersburg, Elliott Park	\$4.00	A 95a. Philipsburg	\$4.80
A 85ab. Northern Half of Houtzdale 15-Minute	\$3.20	A 119ab. Chambersburg, part of Scotland	\$5.40
		A 129a. Caledonia Park	\$7.60
		A 133cd. Salladasburg, Cogan Station	\$5.20
		A 134ab. Linden, Williamsport	\$6.20
		A 136. Millerstown 15-Minute	\$10.80
		A 143cd. Montoursville North, Huntersville	\$6.20
		A 144ab. Montoursville South, Muncy	\$6.80
		A 144cd. Allenwood, Milton	\$9.60
		A 154cd. Washingtonville, Millville	\$6.00
		A 177d. Sinking Spring	\$8.20
		A 187cd. Reading, Birdsboro	\$4.00

NEW RELEASES

Gettysburg Field Guidebook Now an Open-File Report

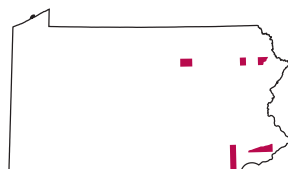


The Gettysburg, Pa., guidebook *Rifts, Diabase, and the Topographic "Fishhook": Terrain and Military Geology of the Battle of Gettysburg—July 1–3, 1863*, which was used for a field trip at the 2006 Annual Meeting of the Geological Society of America, is now available as **Open-File Report 06–02** on the Bureau's web site at www.dcnr.state.pa.us/topogeo/pub/openfile/of06_02.aspx. It was written by Jon D. Inners, Pennsylvania Geological Survey; Roger J. Cuffey, Pennsylvania State University; Robert C. Smith, II, John C.

Neubaum, Richard C. Keen, Gary M. Fleeger, Lewis Butts, and Helen L. Delano, Pennsylvania Geological Survey; Victor A. Neubaum, Wellsville, Pa.; and Richard H. Howe, Camp Hill, Pa.

In the 105-page guidebook, the authors review the topography, geology, military actions, historical consequences, and monuments of the battlefield. Eight stops are included: McPherson Ridge, Lee's Headquarters and Seminary Ridge, Longstreet Tower, Little Round Top, Devils Den, the Peach Orchard, Culps Hill, and Cemetery Ridge.

Open-File Geologic Maps for Eastern Pennsylvania



The Bureau of Topographic and Geologic Survey recently released nine online open-file reports for quadrangles in eastern Pennsylvania. The reports, which are in portable document format (PDF), include one 1:24,000-scale, full-color, surficial or bedrock geologic map. Surficial geologic maps are part of the five reports by Duane D. Braun of Bloomsburg University. These reports are for areas in the northeastern part of the state. The bedrock geologic maps are part of

the other four reports, which are by various authors and cover areas in the southeastern part of the state.

In addition to its map, each report includes text and data tables. Relevant geographic-information-system (GIS) data in the forms of ESRI shapefiles and an ESRI 9.x personal geodatabase and ArcMap document are provided as separate downloads. These reports are available on the Bureau's web site (www.dcnr.state.pa.us/topogeo/openfile/ofloc.aspx).

SURFICIAL GEOLOGY REPORTS

by Duane D. Braun, Bloomsburg University

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|---------------------|---|
| OFSM 06-07.0 | <i>Surficial Geology of the Scranton 7.5-Minute Quadrangle, Lackawanna County, Pennsylvania.</i> |
| OFSM 06-08.0 | <i>Surficial Geology of the Barbours 7.5-Minute Quadrangle, Lycoming and Sullivan Counties, Pennsylvania.</i> |
| OFSM 06-09.0 | <i>Surficial Geology of the Bodines 7.5-Minute Quadrangle, Lycoming County, Pennsylvania.</i> |
| OFSM 06-12.0 | <i>Surficial Geology of the Lakeville 7.5-Minute Quadrangle, Wayne County, Pennsylvania [supersedes report OF 99-02].</i> |
| OFSM 06-13.0 | <i>Surficial Geology of the Hawley 7.5-Minute Quadrangle, Wayne County, Pennsylvania.</i> |

BEDROCK GEOLOGY REPORTS

- | | |
|---------------------|---|
| OFBM 06-01.0 | <i>Bedrock Geologic Map of the Oxford and Pennsylvania Portion of the Bay View Quadrangles, Chester and Lancaster Counties, Pennsylvania, by Joseph C. Hill, Bloomsburg University.</i> |
| OFBM 06-02.0 | <i>Bedrock Geologic Map of the Honey Brook Quadrangle, Chester and Lancaster Counties, Pennsylvania, by Carolyn H. Brown, STATEMAP cooperator, Pennsylvania Geological Survey [supersedes report OFBM 05-04.0].</i> |
| OFBM 06-03.0 | <i>Bedrock Geologic Map of the Parkesburg Quadrangle, Chester and Lancaster Counties, Pennsylvania, by Gale C. Blackmer, Pennsylvania Geological Survey, and Carolyn H. Brown.</i> |
| OFBM 06-04.0 | <i>Bedrock Geologic Map of the Chester Valley and Piedmont Portion of the Germantown, Malvern, Norristown, and Valley Forge Quadrangles, Chester, Delaware, Montgomery, and Philadelphia Counties, Pennsylvania, by Howell Bosbyshell, West Chester University.</i> |

GEOFACTS

The Peculiar Habits of Geologists

by James R. Shaulis and Gary M. Fleeger
Bureau of Topographic and Geologic Survey



Geofact 7

Coffee and donuts can be used to lure geologists into small confined areas where they can be subjected to intense lecturing.



Geofact 8

If properly trained, carbonivorous canines can be used to locate coal reserves.



Geofact 9

The arms of structural geologists involuntarily move into a position parallel to the S_0 plane.

**DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY**

Main Headquarters

3240 Schoolhouse Road
Middletown, PA 17057-3534
717-702-2017
FAX: 717-702-2065

Pittsburgh Office

500 Waterfront Drive
Pittsburgh, PA 15222-4745
412-442-4235
FAX: 412-442-4298

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Joseph E. Kunz 412-442-4235
Lynn J. Levino 412-442-4299

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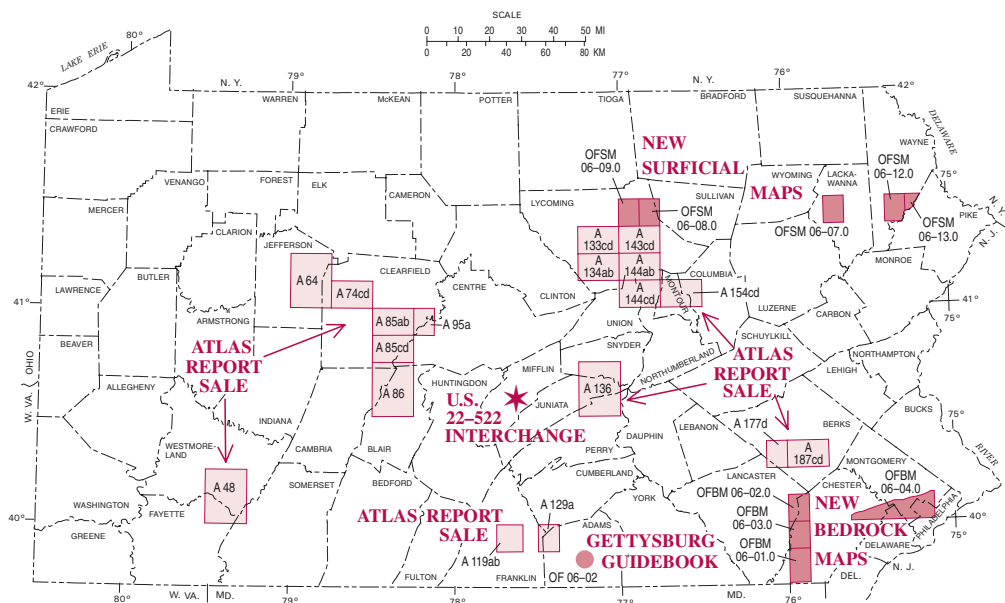
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Kristin M. Carter, P.G. 412-442-4233
Jaime Kostelnik 412-442-5828
Christopher D. Laughrey 412-442-4232
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