Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc., meeting in State College, Pennsylvania
Contact information on back page

April, 2016 **Visit our web site: www.nittanymineral.org** *Editor (see page 8): David C. Glick*

April 20th meeting:

How Drinking-Water Quality is Effectively Protected in the Spring Creek Watershed

by

Todd Giddings, Ph.D., P.G.

Our April meeting will be held Wednesday the 20th in room 114 (larger auditorium) of Earth & Engineering Sciences Building on the west side of the Penn State campus in State College, PA. Maps are available on our web site.

***6:45** to 7:45p.m.: Social hour, refreshments in the lobby*
***7:45** to 8:00 p.m.: announcements, questions, answers*
about 8:00 p.m.: featured program

*The event has free admission, free parking, and free refreshments, and is open to all; **parents/guardians must provide supervision of minors.** Bring your friends and share an interesting evening!*

The Spring Creek Watershed (Watershed) has an area of approximately 175 square miles and encompasses all or part of State College, Bellefonte, Milesburg, and Centre Hall Boroughs, and Potter, Harris, College, Ferguson, Patton, Halfmoon, Benner, Spring, and Walker Townships. The approximately 120,000 residents living in the Watershed are 99.9% dependent on groundwater for their drinking water. Many of the public water-supply systems have developed and implemented Source Water Protection Plans that meet the standards of the Pennsylvania Department of Environmental Protection. These plans are specific to each municipal well or well field, and the source-water protections areas include the areas that provide both the direct and indirect groundwater flow to each municipal well or well field. The source-water protection area for the Big Spring in Bellefonte extends for more than 16 miles past the village of Gatesburg to the southwest.

See the complete, illustrated article on pages 3-7.

ATTENDING THE APRIL MEETING?

Donations of **a few high quality, labeled door prize specimens** are invited.

Your donated snacks and drinks will be welcomed.

Bring a friend!

Minerals Junior Education Day Successful on a Snowy Day

Our 2016 Minerals Junior Education Day took place on Saturday, April 9, at the CPI vo-tech school in Pleasant Gap, PA. The snow came through overnight, providing a challenge especially for those volunteers driving in from the mountains to the west, but the event still went smoothly. There were 161 students attending, plus a similar number of parents, and about 40 volunteers. Among those volunteers were groups from The Bald Eagle Chapter of Gold Prospectors Association of America, Penn State's student Geosciences Club, and The Penn State Earth and Mineral Sciences Museum and Art Gallery, as well as individual NMS members, families and friends, and non-members. NMS is extremely grateful to all the volunteers for their time and effort, and for communicating both knowledge and their passion for various aspects of science and our hobbies. Likewise we are grateful for many donations of materials for sales, station handouts, and food for snacks and lunch for the volunteers.

Fred Marschak discusses many types of meteorites with young students visiting his station. *J. Sicree photo*

Continued on page 2

JUNIOR ROCKHOUNDS
Monthly Meetings for Kids

We are actively working on setting up monthly Junior Rockhounds meetings at 4:00 p.m. on Friday afternoons in State College this season. Please watch our web site for announcements, or e-mail Dave Glick <xidg@verizon.net> to be put on an e-mail list to receive news directly. ❄

Minerals Junior Education Day

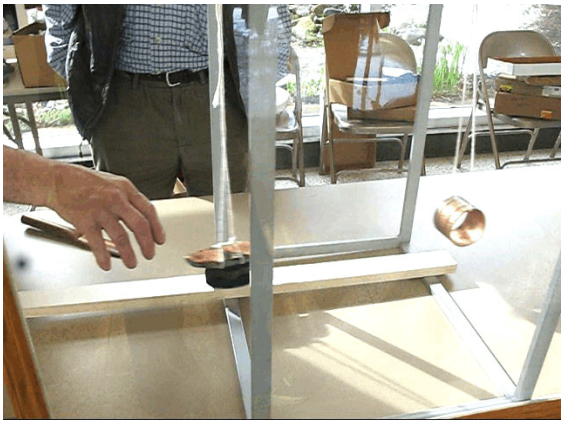
continued from page 1

We had nine stations this year: gem cutting & polishing (lapidary), gold panning, grinding and polishing rock spheres; fluorescence with ultraviolet light, crystals and angles, electricity and magnetism, meteorites, vertebrate fossils, invertebrate (shell) fossils.

Photographs from video by J. Sicree

Students screen weathered rock to recover loose fossils

Testing electrical conductivity of various minerals



A new demonstration of electromagnetic braking, using eddy currents in copper.

This year's vertebrate fossil station, by the volunteers from The Penn State Earth and Mineral Sciences Museum and Art Gallery, was about teeth and skulls.

Yes, it's real gold! Kids get to pan for it and keep a little, thanks to volunteers from GPAA - Bald Eagle Chapter.

Jim and Pat Garthe demonstrated the many steps in grinding and polishing spheres of rocks using a homebuilt machine.

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How Drinking-Water Quality is Effectively Protected in the Spring Creek Watershed

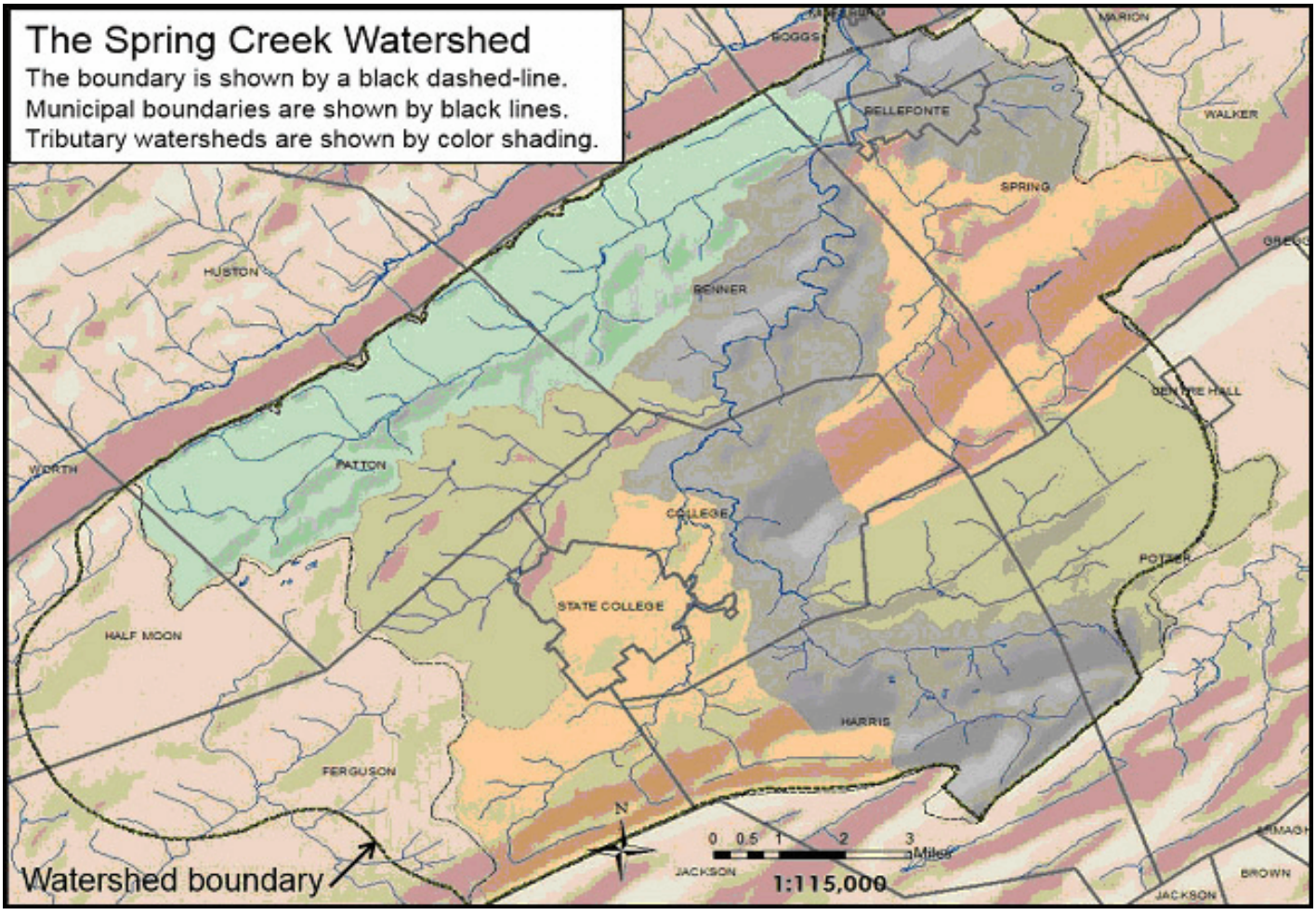
by

Todd Giddings, Ph.D., P.G.

Introduction

The Spring Creek Watershed (Watershed) has an area of approximately 175 square miles and encompasses all or part of State College, Bellefonte, Milesburg, and Centre Hall Boroughs, and Potter, Harris, College, Ferguson, Patton, Halfmoon, Benner, Spring, and Walker Townships. The approximately 120,000 residents living in the Watershed are 99.9% dependent on groundwater for their drinking water. Many of the public water-supply systems have developed and implemented Source Water Protection Plans that meet the standards of the Pennsylvania Department of Environmental Protection. These plans are specific to each municipal well or well field, and the source-water protections areas include the areas that provide both the direct and indirect groundwater flow to each municipal well or well field. The source-water protection area for the Big Spring in Bellefonte extends for more than 16 miles past the village of Gatesburg to the southwest.

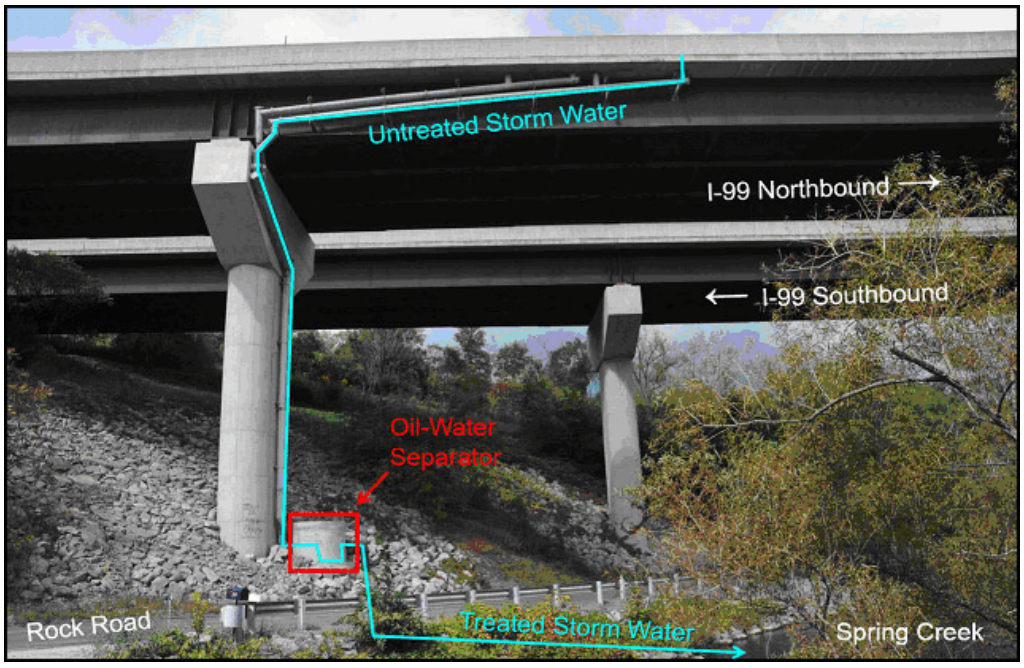
Source-water protection for large areas has been accomplished by enacting municipal ordinances and by creating overlay zones. On individual properties, source-water protection is accomplished by constructing devices such as detention ponds, porous pavement, infiltration basins, level-spreaders, and oil-water separators.



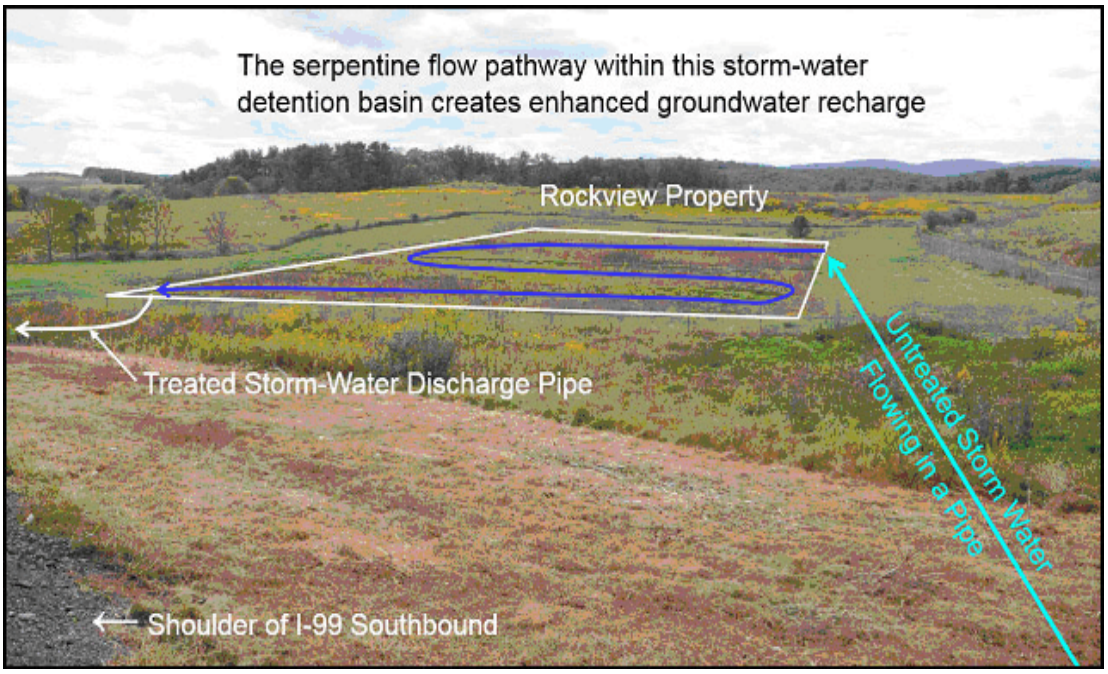
This 1981 cartoon created 35 years ago by graphic artist Jim McClure portrays the many sources of groundwater contamination as discharges from metaphorical shower heads into the groundwater in the old cast-iron bathtub that represents the boundaries of the Watershed. Each municipality and large institution is represented by a cartoon character. This presentation will take you on a virtual bus-tour throughout the Spring Creek Watershed, and at each virtual-tour stop, you will see how the protection ordinance or the protection device works to protect groundwater quality and/or groundwater quantity from various types of contamination.

Examples of source-water protection devices

In a freezing-rain storm, ice will often form on a highway bridge deck before it will form on the adjacent roadway surface because the bridge deck is exposed to cold air beneath its surface and the roadway is not. If ice on a bridge deck were to cause a heating-oil truck to skid and wreck on the bridge, the heating oil leaking from the wrecked truck would flow with the storm-water runoff into the bridge deck drains, and pipes would carry the oil-contaminated storm water into the creek below the bridge.

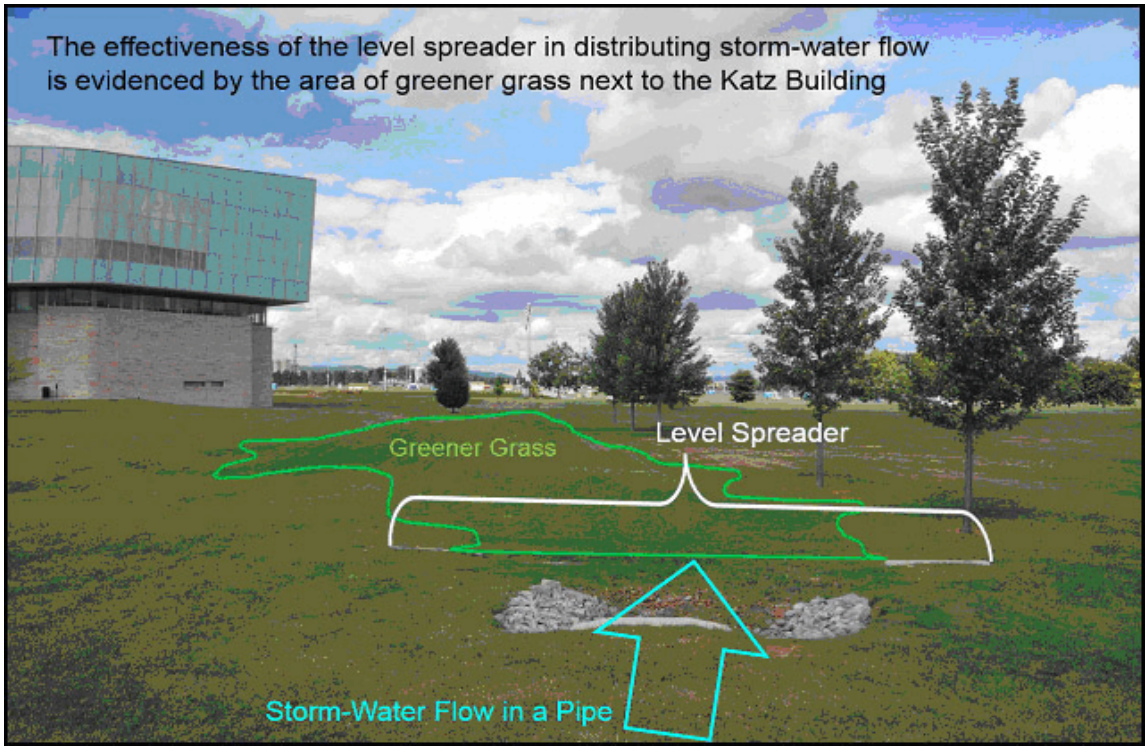


The bridges that carry the northbound and southbound lanes of Interstate Highway 99 over Spring Creek have oil-water separator tanks installed to treat the storm water by separating and trapping the oil, and thereby protecting the aquatic life in Spring Creek. The photograph of the twin bridges is annotated to show the oil-contaminated storm-water flow pathway from the bridge deck into the oil-water separator, and it shows the pipe that carries the oil-free storm-water discharge to Spring Creek. Several of these innovative and effective oil-water separators treat the storm water flowing from all of the drains in the bridge deck area.



Further east on I-99 where this highway is located on State Correctional Institute at Rockview land, some of the storm-water detention basins that are located right along the highway have an innovative design component. Low earth berms on the detention basin floor cause the storm water entering the detention basin to follow a long, serpentine flow-pathway within the basin. The longer flow pathway increases the detention time for the storm water within the basin, and thereby enhances the quantity of storm water that becomes groundwater recharge. The vegetation and the soil on the detention basin floor filter sediment and highway dirt out of the storm water and protect the quality of the groundwater within the aquifer below.

On the Penn State Campus, storm water that runs off from Bigler Road and the parking lots and impervious areas around the Katz Building flows east in storm-water pipes and discharges across level spreaders onto the lawn next to the Katz Building. The level spreaders cause the of storm water flowing out of the pipes to slow down and spread out across the lawn area. The grass blades further slow the flow velocity, and the soil filters any sediment out of the infiltrating water. During a dry summer period, the grass area that receives the discharge from the level spreaders is noticeably greener than the adjacent lawn.



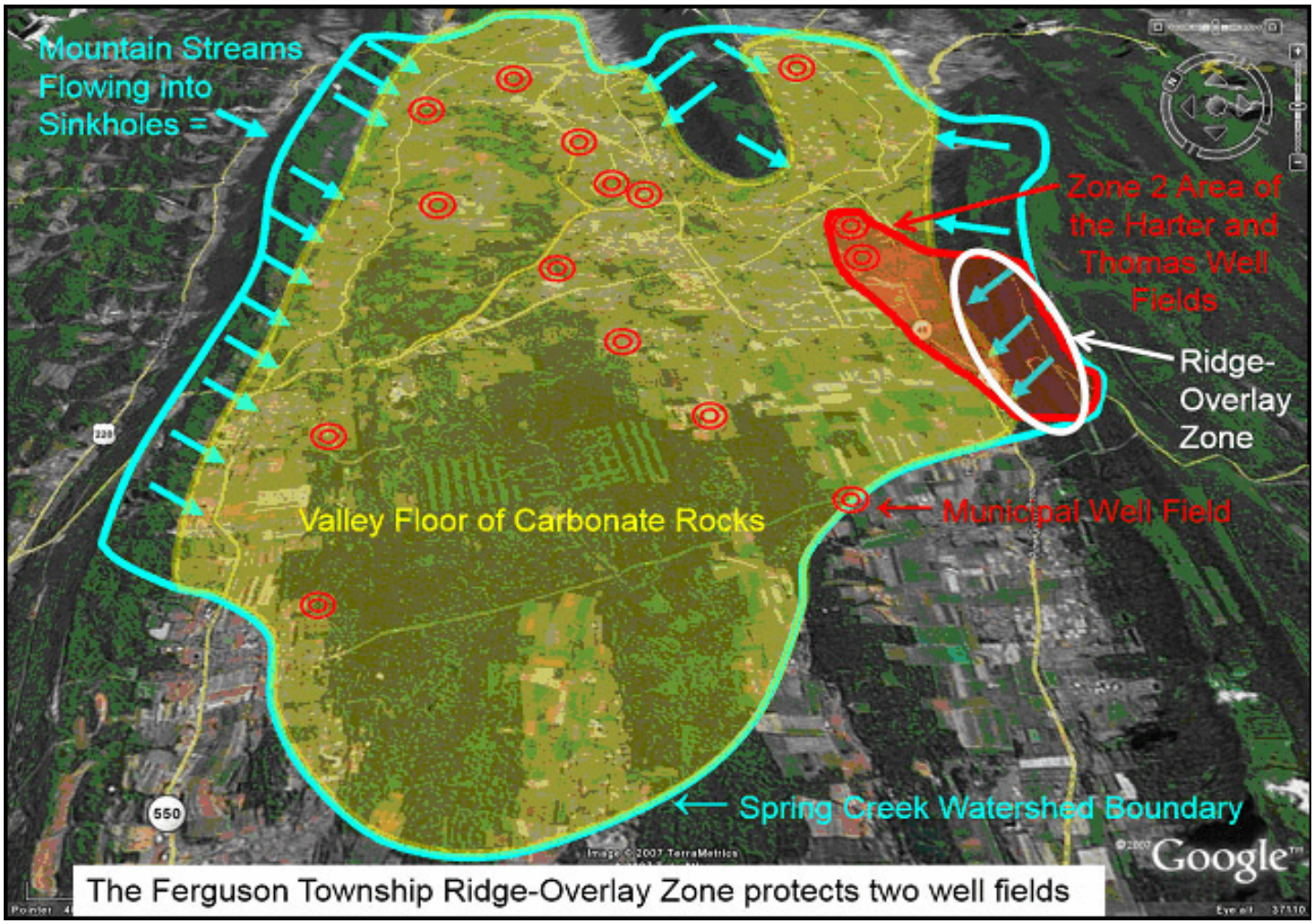
An example of source-water protection using an ordinance to set construction standards

In 2007 and 2008 homeowners were replacing their old and inefficient heating systems with closed-loop geothermal heat pump systems that take heat out of and put heat into the earth. The ground heat-exchangers consisted of three to five 6-inch diameter boreholes from 160 to 200 feet

deep. After the HDPE plastic loop pipes were installed in the boreholes, many installers were backfilling the boreholes with finely-crushed limestone. This finely-crushed limestone provided a high-permeability flow pathway for contaminants to enter directly into the drinking-water aquifers within the valley floor. Many of these flow-pathway borehole heat exchanges were being installed in the yards of homes located in the Zone 2 (area of direct groundwater flow to a well) source-water protection areas of many of the municipal wells and well fields.

Many of the water-supply wells that were being drilled for new homes being constructed beyond the municipal water-service area did not have a grout (impervious material) seal around their steel casings. The absence of the impervious grout seal around the casings allowed contaminated surface water and contaminated soil water to flow down the well bore and into the drinking-water aquifer.

The Centre County League of Women Voters held a public meeting on June 6, 2009 where I showed how the lack of proper grouting in the geothermal boreholes and in new household wells provided a direct flow pathway for contamination to enter the Zone 2 areas of the aquifers that are supplying our drinking water. Informed citizens and municipal officials demanded well and borehole construction standards that would protect the quality of our drinking water. In response to this need, the Spring Creek Watershed Commission formed a Workgroup that created an ordinance that required the proper grouting of geothermal boreholes and household water-wells. Within the Centre Region, the five townships and State College Borough implemented the ordinance as Chapter 10 of the Centre Region Building Safety & Property Maintenance Code in 2010, less than one year after the public meeting. Building Code inspectors were trained in how to properly inspect and permit the boreholes and wells. The other municipalities throughout the Watershed passed the same or a stricter ordinance, and trained their staff to do the inspections and permitting. These ordinances are effectively protecting our drinking-water quality today.



The Ferguson Township Ridge-Overlay Zone protects two well fields

An example of source-water protection using a zoning ordinance to set isolation distances

The Ferguson Township Supervisors understood that much of the area along the foot of Tussey Mountain was where surface-water runoff from the mountain slope flowed into sinkholes and became the Zone 2 groundwater that was produced from the Tomas and Harter Farm well fields of the State College Borough Water Authority. To protect the quantity and quality of this groundwater, the Supervisors enacted a Ridge-Overlay zoning ordinance that specified residential-construction setback-distances for ephemeral, intermittent, and permanent seeps, springs, and streams. These surface-water protection requirements applied to the ridge area and were an additional set of zoning requirements, called an overlay, because the water requirements were in addition to the usual residential zoning requirements dealing with the type, size, and location of buildings and their access roads.

This PowerPoint presentation will show where the various source-water protection devices are located and will explain how they work to protect our drinking-water quality. For the borehole and water-well construction standards ordinance and the ridge-overlay zone ordinance, this presentation will answer the question: "How did the municipal officials do that?" Given that we are 99.9% dependent on groundwater for our drinking water, it will be reassuring to learn how our drinking-water quality is effectively protected in the Spring Creek Watershed. ❄

Geo-Sudoku

by David Glick

This puzzle contains the letters BEIGLMRSU. One row or column spells one of the boroughs in the Spring Creek Watershed. As usual, if you've read this issue, you've seen the word. Each block of 9 squares, each row, and each column must contain each of the nine letters exactly once. The solution is on page 8.

G							L	
B			U		L		E	
M		L	E	S	B			G
						R		E
			B		G	M		
		U					B	L
	S	B	G		U			
U	L	G	I		M		S	
						G		R

NEWS FROM THE FEDERATIONS

Nittany Mineralogical Society, Inc., is a member of EFMLS, the Eastern Federation of Mineralogical and Lapidary Societies, and therefore an affiliate of AFMS, the American Federation of Mineralogical Societies. We present brief summaries here in order to encourage readers to see the entire newsletters.

The **EFMLS Newsletter** is available through the link on our web site **www.nittanymineral.org**, or remind Dave Glick to bring a printed copy to a meeting for you to see. The April issue starts with Steve Weinberger discussing the May 9-15 (sign up now!) and September 5-9 class sessions of lapidary, jewelry, and more at Wildacres in North Carolina. A list of classes is included. President Larry Heath announces that the EFMLS Honorary Scholarship recipient is Dr. Joel E. Johnson of the University of New Hampshire. He will select the two scholarship recipients for this year. The President also announces that Carolyn Weinberger will be the new Regional VP representing EFMLS on the AFMS Board beginning November 1. Ellery Borow's safety article encourages us to be aware of obvious dangers (overhanging rocks, using dangerous tools without safety gear, over-exertion) despite our enthusiasm, or tiredness, or other situations which may make us overlook the obvious.

The **AFMS Newsletter** is available by the same methods. The April issue opens with a reminder of the All American Club Yearbook contest for scrapbooks about our clubs. President Matt Charsky notes several of the "unsung heroes" who keep AFMS running, and invites more participants. The Juniors article is about the "middle ground" in age which seems to be most useful as the target audience for juniors programs (roughly 5-10 years). The AFMS Convention will beheld this July in Albany, Oregon; some additional attractions within driving distance are noted. Prizes newly received for the Endowment Fund Drawing are illustrated. There's news on limitations on accessing collecting sites on public lands, and much more. Finally, a memorial to Jon Spunaugle, who died March 5th, is presented. Jon had been president of the Northwest Federation, president of the American Lands Access Association, and perhaps most notably the Treasurer of the AFMS Scholarship Foundation from about 2003 to 2015.

Please see the web sites for the complete Newsletters. There's a lot there! *-Editor*

Classifieds

Ads may be submitted to the Editor (see p. 8)

FOR SALE: Microscope & Accessories, Mineral Specimens, Crystal Models.
------- UPDATE - FEBRUARY 2016 -------

See the listing at www.nittanymineral.org/beall.pdf which has been **updated** to reflect the current list of specimens available. Those already sold since the 2014 listing have been removed, and some additional specimens and other items have been added. The Meiji binocular microscope set up for photomicrography with trinocular head, zoom, photo eyepieces, iris diaphragm to control depth of field, two-arm fiber optic illuminator with focusing ends, anti-vibration table, etc., is still available. Contact Frank & Gail Beall, 724-789-7290.

Some Upcoming Shows and Meetings

Our web site http://www.nittanymineral.org has links to more complete lists and details on mineral shows and meetings around the country. See www.mineralevents.com for more.

April 16-17, 2016: North Rocks! North Museum Gem, Mineral, Fossil & Jewelry Show. Farm & Home Center, 1383 Arcadia Rd., Lancaster PA. Sat. 10-5, Sun. 10-4. Three lectures on minerals or fossils each day. http://www.northmuseum.org/events/

April 30 - May 1, 2016: Gem & Mineral Show, by Mineralogical Soc. of Northeastern PA. Oblates of St. Joseph Seminary, 1880 Hwy 315, Yatesville, PA 18640 (just outside of Pittston, PA). Sat. 10-5, Sun. 10-4. http://www.msnepa.org/gem---mineral-show.html

May 14, 2016: South Penn Spring Rock Swap & Sale, by CPRMC & Franklin Cty RMC. South Mountain Fairgrounds, Biglerville, PA 17307. General admission $1.00/person.

May 14-15, 2016: World of Gems & Minerals Show, by Berks Mineral. Soc. Leesport Farmers Mkt, Rt 61, Leesport.

May 21, 2016: The Earth Science Show & Sale, by Rock & Mineral Club of Lower Bucks Cty. Fairless Hills, PA., 9 - 4

June 4, 2016: Spring Mineralfest, Macungie, PA Sat. only, 8:30 - 3:00. http://www.mineralfest.com/

June 17-18, 2016: Lancaster Cty. Club Show, Quarryville, PA

Geo-Sudoku Solution

G	U	E	M	I	R	B	L	S
B	R	S	U	G	L	I	E	M
M	**I**	**L**	**E**	**S**	**B**	**U**	**R**	**G**
L	B	M	S	U	I	R	G	E
S	E	R	B	L	G	M	I	U
I	G	U	R	M	E	S	B	L
R	S	B	G	E	U	L	M	I
U	L	G	I	R	M	E	S	B
E	M	I	L	B	S	G	U	R

Visit us at www.nittanymineral.org

INVITE A FRIEND TO JOIN THE SOCIETY

The Nittany Mineralogical Society prides itself on having among the finest line-up of speakers of any earth sciences club in the nation. Everyone is welcome at our meetings. If you'd like to be part of our Society, dues are $20 (regular member), $7 (student rate), $15 (seniors), $30 (family of two or more members, names listed). Those joining in March or later may request pro-rated dues. Your dues are used for programs and speakers, refreshments, educational activities, Bulletins, and mailing expenses. Please fill out a membership form (available at www.nittanymineral.org), make checks payable to "Nittany Mineralogical Society, Inc." and send them in as directed, or bring your dues to the next meeting.

We want to welcome you!

CONTACT INFORMATION

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Facebook & Publicity: John Dziak: jjd264@psu.edu

The **Bulletin Editor** will welcome your submissions of articles, photos, drawings, cartoons, etc., on minerals, fossils, collecting, lapidary, and club activity topics of interest to the members. Please contact:

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209 Spring Lea Dr. phone: (814) 237-1094 (h)
State College, PA 16801-7226

Newsletter submissions are appreciated by the first Wednesday of the month. Photographs or graphics are encouraged, but please do not embed them in word processor files; send them as separate graphics files (TIF, or good to highest quality JPEG files, about 1050 pixels wide, are preferred). Please provide captions and name of photographer or artist.