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MESSAGE FROM THE PRESIDENT

HELLO AND HAPPY AUTUMN!

I am proud to say that PCPG's 25th anniversary is coming up, and we plan to celebrate at our 2014 Annual Meeting in Harrisburg on January 21. As this major milestone approaches, I'd like to share with you a look back at the last 25 years to see where we started as an organization and some of the highlights of what we've accomplished along the way.

PCPG was founded as a non-profit corporation on July 12, 1989, and at that time the goal was to facilitate professional licensure of geologists in Pennsylvania. Thanks to the efforts of many, including the 20 charter member companies, licensure became a reality on December 16, 1992 (Act 151), and the first geologist was appointed to the State Board of Professional Engineers, Land Surveyors, and Geologists in 1993.

Since that time, PCPG has evolved far beyond the original purpose for its inception. Included here is an abbreviated list of accomplishments over the years. Lobbying efforts by PCPG helped facilitate the enactment of Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2 of 1995), which standardized remediation criteria, allowed for site-specific, risk-based cleanups, and encouraged Brownfields redevelopment, which plays an important role in PA's economy. In 1996, PCPG and PADEP developed guidance on the use of the Professional Geologist seal to improve the quality and provide consistency in report submittals. In 1997, PCPG urged the state legislature to repeal state copyright requirements to allow the Pennsylvania Geologic Survey to more easily publish maps, reports, and other documents. One result of this legislation (Act 139) is the web version of Map 61 that is so widely used today.

PCPG's efforts to amend PA's Procurement Code (Act 57) allowed for Geologic Consulting Services to become a distinct professional design service for which the state could contractually procure. PCPG also launched a member-driven, grass-roots campaign to defeat a proposed sales tax on professional consulting services as part of the PA Property Tax Relief Measure. In 2007, PCPG published a position paper

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PRESIDENT *Continued from Page 1*

in support of statewide water well construction standards in Pennsylvania. This topic has come up again (HB343), and PCPG gave testimony in favor of this bill to the PA House of Representatives Committee on Environmental Resources and Energy in April 2013. In 2009, PCPG was successful in having the Geologist-in-Training provision amended to the Engineer, Land Surveyor, and Geologist Registration Law. More recently, PCPG published a position statement on the responsible development of the shale gas plays in PA, and has continued to be outspoken in support of the exploration and development of this resource.

When you consider the fact that PCPG's Board of Directors and Executive Committee are completely volunteer, the dedication of the individuals through the years who have contributed to this organization is staggering. Starting with Richard E. Wright as the organization's first president, through 14 more presidents and many more Directors on the Board, PCPG is now approaching 800 members. Speaking of our members, a large part of PCPG's continued success is because of our membership, through dues revenue and committee involvement during the past 25 years. Thanks to the efforts of many, we maintain our vision as the premier organization for the advancement of the ethical and professional practice of geology and the allied sciences.

We are always looking for new Board members with fresh ideas and insights to help keep PCPG moving forward. I welcome your feedback and comments, and invite you to join us in celebrating PCPG's 25th anniversary on January 21, 2014! Please feel free to email me at joreilly@gesonline.com, and check out our website for more information at www.pcp.org.

Very Truly Yours,



Jennifer L. O'Reilly, P.G.
PCPG President

GROUND-SOURCE HEAT PUMPS: EVERYBODY'S GEOTHERMAL

Martin F. Helmke, PhD, PG, West Chester University of Pennsylvania

Ground-source heat pumps (GSHPs) are sweeping the nation as an energy-efficient means of heating and cooling buildings. To date, over 1 million GSHP systems have been installed in the U.S., representing 12 gigawatts of thermal capacity. Typical household systems cost \$25k to install and reduce annual heating and cooling costs by \$1,000 to \$2,000. Even greater savings may be realized for larger commercial systems. The combination of the Federal Residential Renewable Tax Credit of 30 percent (available through 2016), low-interest loans, and energy rebate programs make installing GSHP systems economically attractive with a payoff of 4 to 8 years.

Although colloquially known as "geothermal" systems, GSHPs bear little resemblance to the geothermal electric generating stations available in hydrothermally-active regions of California, Iceland, and New Zealand. A more descriptive term is "geoexchange" systems, because GSHPs function by exchanging heat between living spaces and the ground. GSHPs are a viable method of heating and cooling anywhere in the U.S., making them "everybody's" geothermal.

Ground-source systems utilize the following components: 1) a heat pump (which includes a heat exchanger, compressor, condenser, and evaporator), 2) an air handler or other means of transporting heat throughout the building, and 3) a means of exchanging heat with the ground. Almost all systems use water as a carrier fluid, often treated with methanol or propylene glycol as an antifreeze. "Open-loop" systems use injecting and pumping wells to exchange heat with the ground. Open-loop systems are highly efficient, but require additional maintenance to avoid well fouling and may introduce



Figure 1. A residential ground-source heat pump system utilizing three vertical, closed loops

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GEOTHERMAL *Continued from Page 2*

contaminants into an aquifer. In contrast, the more common “closed-loop” systems pass the carrier fluid through tubes of high-density polyethylene (HDPE) or cross-linked polyethylene (PEX) plastic inserted into vertical boreholes (Figure 1), horizontal trenches, or even ponds. In closed-loop systems, heat is exchanged between the carrier fluid and the ground through the plastic tubing, preventing actual exchange of the fluid with the geologic medium.

GSHP systems are efficient. Most buildings in Pennsylvania require heating in winter and cooling in summer. A GSHP system works by taking heat from the living space during the summer months and storing it in the ground. Due to the high heat capacity and relatively low thermal conductivity of geologic materials, the heat remains in the ground until it can be extracted in winter when it is used to heat the building. The system is highly efficient because it works by exchanging, rather than generating, heat. GSHP systems typically produce 3-4 units of heating (or cooling) per energy unit of electricity, making them 300-400 percent “efficient”.

Performance of GSHP systems is measured by heat energy, heat flux, and temperature. In the SI system, units of heat energy, flux, and temperature are joules (J, $\text{k m}^2 \text{s}^{-2}$), watts (W, J s^{-1}), and $^{\circ}\text{C}$ or K, respectively. In the U.S., most engineers use English units for heat, namely BTUs, BTU/hr, and $^{\circ}\text{F}$. One BTU, or British Thermal Unit, is the amount of heat energy required to raise one pound of water 1°F . For comparison, 1 BTU is 1 kJ, or approximately equivalent to the amount of heat energy released by a lit match. HVAC technicians refer to the capacity of heat pumps in “tons”. One ton is equivalent to 12,000 BTU/hr, the amount of heat energy required to melt 2,000 pounds of ice in a 24-hr period. Most households in Pennsylvania require a 3- to 5-ton geothermal heat pump.

Geologists are particularly well-qualified to work with the ground component of GSHP systems because they appreciate the 3-dimensional complexity of the subsurface. Moreover, heat transport is mathematically identical to groundwater flow and contaminant transport. Contemporary groundwater flow, transport, and aquifer test software may be used to evaluate, simulate, and predict performance of GSHPs. Thermal properties of geologic materials are quite different than hydraulic properties, however. Thermal conductivity and volumetric heat capacity of typical geologic materials range from 1 to 5 W/m K and 1.5 to $2.5 \times 10^6 \text{ J/m}^3 \text{ K}$, respectively. In stark contrast, hydraulic conductivity and storativity of these same materials range many orders of magnitude from 10^{-10} to 10^{-1} m/s and 0.00001 to 0.3 . In summary, thermal properties of rocks and soil are characterized by low conductivity and high storage compared to their hydraulic counterparts, which means that heat is stored very efficiently in the subsurface and tends to dissipate slowly.

To maintain long-term sustainability of a GSHP system, the heat added or removed from the ground should be balanced. Continually adding or removing heat year after year will begin to heat or cool the ground. Numerous case studies have demonstrated that unbalanced systems can bring ground temperature well below freezing or can increase temperature above 100°F . Contemporary heat pumps will continue to function under these temperature extremes, but system efficiency will be significantly reduced unless more moderate temperatures are restored.

In conclusion, GSHP systems are an efficient, cost-effective, and novel way to heat and cool buildings. Geologists have a unique role to play by characterizing and predicting ground response, especially for large, commercial systems. Balancing heating and cooling demand is critical to maintain system sustainability and efficiency. Tens of thousands of geothermal wells are being installed in Pennsylvania, and it's time the geologists get involved with “everybody's” geothermal.



Installation of closed-loop geothermal wells within the Baltimore Gneiss for the West Chester University GSHP system

Dr. Helmke is a hydrogeology professor at West Chester University. His research team is responsible for monitoring and simulating WCU's campus-wide GSHP system that will include 1,400 500-ft deep geothermal wells.

COLLEGES & UNIVERSITIES SPOTLIGHT: KUTZTOWN UNIVERSITY

Dr. Sarah Tindall and Dr. Adrienne Oakley, KU Geology Program

The Geology Program at Kutztown University (KU) is part of The Department of Physical Sciences, which includes Geology, Chemistry, Physics, Astronomy, and Marine Science. These programs and their related majors, including Geology, are undergraduate-only, which provides a huge advantage to our students because all science classes and labs are taught by faculty with advanced degrees, and student-faculty research opportunities cater to the skills and interests of undergraduate students.

We believe that hands-on field experience is one of the most critical teaching tools in geology. Class field trips to parts of Arizona, New York, Maryland, New Jersey, Virginia, West Virginia, and Pennsylvania provide diverse geological experiences.

KU offers two geology-intensive majors:

The B.S. Degree in Geology is designed for students anticipating graduate work in Geosciences or direct employment, ultimately as Licensed Professional Geologists (PGs). The degree requires a solid, traditional foundation in geology, as well as courses in chemistry, physics and mathematics. Courses in the B.S. Geology degree satisfy the education requirements for becoming a PG in Pennsylvania. KU currently has 54 B.S. Geology majors. We also host several non-matriculated students in the department while they acquire coursework required to sit for the FG and PG exams.

The B.S. Degree in Environmental Science/Geology is an interdisciplinary program for students seeking graduate work or employment in the diverse field of Environmental Science. This major requires greater depth in biology and chemistry, and fewer traditional geology courses than the Geology degree. KU currently has 22 B.S. Environmental Science/Geology majors.

KU has seven full-time, permanent faculty members that teach Geology and conduct student-faculty research projects. The faculty members include:

Dr. Edward Simpson, Ph.D. Virginia Polytechnic Institute, Chair of the Department of Physical Sciences: Dr. Simpson specializes in sedimentology and stratigraphy, and he teaches Paleontology and Dinosaurs. Dr. Simpson's research takes him from Devonian bug footprints in Pennsylvania to Cretaceous earthquake processes in southern Utah, and even into the deep Archean geologic history of South Africa.

Dr. Kurt Frieauf, Ph.D. Stanford University: Dr. Frieauf is an economic geologist who teaches mineralogy, petrology & geochemistry, and economic geology courses, among others. His recent student-faculty projects have examined rare-Earth elements in Inner Mongolia, porphyry mineralization in Namibia and Alaska, and the Mid-Atlantic Iron Belt in Pennsylvania.

Dr. Erin Kraal, Ph.D. University of California, Santa Cruz: Dr. Kraal is a planetary geomorphologist who conducts 'field work' on Mars, in the Atacama Desert of Chile, and in the Salton Sea, California. Dr. Kraal teaches courses that bridge geology and planetary science, including classes titled Planetary Surface Processes and Mission to the Planets.

Dr. Adrienne Oakley, Ph.D. University of Hawaii, Manoa: Dr. Oakley specializes in marine geology, marine geophysics, and plate tectonics, and she teaches courses in geology and the physical and geological aspects of marine science. Dr. Oakley's students participate in research projects examining sediment transport, barrier island migration, and beach replenishment on NASA's flight facility located on Wallops Island, Virginia. Five KU students also accompanied Dr. Oakley on an NSF-funded marine geophysical research cruise in the western Pacific in 2011.

Dr. Jacob Sewall, Ph.D. University of California, Santa Cruz: Dr. Sewall is an earth systems modeler. His research uses geological, paleoecological, and observational data in combination with numerical models to study the climate history and dynamics of Earth. As an expert in Earth history and paleoenvironmental change, Dr. Sewall teaches courses including Historical Geology and Environmental Geology.

Dr. Laura Sherrod, Ph.D. Western Michigan University: Dr. Sherrod's research focuses on environmental geophysics and hydrogeology. She uses geophysical techniques to conduct archaeological and paleontological investigations and to do geologic mapping. Dr. Sherrod teaches Physical Geology, Hydrogeology, and Geophysics.



Ground penetrating radar research

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KUTZTOWN *Continued from page 4*

Dr. Sarah Tindall, Ph.D. University of Arizona: Dr. Tindall specializes in structural geology and tectonics. Her research interests range from crustal-scale mountain-building processes to tiny cracks in sandstones that influence fluid migration in petroleum reservoirs.

Dr. Tindall teaches Structural Geology and Field Geology courses for majors as well as an Introduction to Geology course that serves the larger KU population.

Undergraduate Research

Every Geology faculty member has an active research program involving KU undergraduate geology students. Over the last five years, KU Geology faculty have received over \$280,000 in research grants to support projects with students. In addition, students apply for and receive their own grants for research and travel to conferences through the KU Undergraduate Research Committee and the NEAG Fellowship. In 2013, KU undergraduates are involved in projects in New York and South Africa as well as within Pennsylvania, and at our Marine Science Consortium on Wallops Island, VA. KU Geology students also do research in our structural geology and climate modeling labs on campus. Our students frequently present their research results at national professional conferences like the American Geophysical Union, Geological Society of America, and the Symposium on the Application of Geophysics to Engineering and Environmental Problems.



Mineralogy students on Giant Mountain in the Adirondacks of New York

Examples of current student-faculty research projects:

- High resolution climate simulation to aid in the development of comprehensive wildlife conservation plans
- Beach formation and modification on the Salton Sea, California
- Grain size distribution and sediment transport patterns along Wallops Island, Virginia: pre- and post-beach replenishment, and post-Hurricane Sandy
- Investigating barrier island migration and storm over wash on Wallops Island, VA through Vibracoring
- Seafloor structure and uppermost sedimentation in the Jurassic seafloor of the western Pacific
- Geophysical surveying to aid in the remediation of streams impacted by Abandoned Mine Drainage
- Comparison of strain analysis techniques across major folds in the Valley and Ridge province of Pennsylvania
- Geochemical controls on gold distribution in the supergiant Grasberg deposit, West Papua, Indonesia
- Origin of explosive tourmaline breccias in a 2 billion year old, subduction-related copper deposit, Namibia
- Trace fossil and paleoenvironmental interpretation of Paleozoic rocks of eastern Pennsylvania
- Physical model experiments to understand the development of curved mountain systems

Beyond KU: Internships, Employment and Graduate School

Our students have undertaken numerous internships with local industries and governmental agencies in topics ranging from groundwater monitoring and cleanup, to acid mine remediation and other environmental and engineering geology projects. KU graduates work in Alaska, Nevada, and Arizona prospecting for gold and copper, and explore for oil and natural gas throughout the U.S. You probably know a KU graduate or two at the PA DEP or the Geological Survey. Recent KU graduates have gone on to graduate school at Lehigh University, University of Texas – El Paso, University of Utah, Southern Illinois University, East Carolina University, University of California-Riverside, Pennsylvania State University, and University of Kansas.

For more information about the Geology Program at KU, please contact one of the KU faculty. Our contact information is easily accessible on our Web page at: <http://www.kutztown.edu/acad/geology/>

PCPG PRESIDENT SPEAKS AT 2013 SHALE INSIGHT™ CONFERENCE

PCPG President Jennifer O'Reilly was one of the speakers at the Marcellus Shale Coalition's third annual SHALE INSIGHT™ conference, held during September 25 – 26, 2013, in Philadelphia. Ms. O'Reilly participated in the panel for the session "Drinking Water Quality: Examining the Past and Charting a Future Course." Her presentation, entitled "Managing Private Drinking Water Supplies," covered the basics of aquifer types found in Pennsylvania, the characteristics of proper water well construction, the consequences of poor well construction, and typical sources of residential well contamination. The presentation highlighted the fact that although Pennsylvania ranks #2 in the United States for population size serviced by private water supplies, it is one of only two states that do not have statewide regulations concerning private water well location, construction, testing, and treatment.

State Representative Ron Miller (Majority Chairman, House Environmental Resources and Energy Committee) followed up with a review of the legislative history of water well construction standards in Pennsylvania. Representative Miller indicated that the original attempt to create water well construction standards in PA was introduced in 2001 (HB 1591), which passed the House by a vote of 189-7 that year. It was referred to the Senate Environmental Resources and Energy Committee on December 3, 2001, but fears that PA would tax private residential water well usage prevented the bill from passing in the Senate. Act 220 of 2002, known as the Water Resources Planning Act, specifically prohibits PA Department of Environmental Protection or the PA Environmental Quality Board from requiring the metering of private drinking water wells. The current house bill concerning statewide water well construction standards in PA (HB 343) was approved by the House Environmental Resources and Energy Committee on June 11, 2013 by a vote of 20-5, and the legislation is now under consideration in the House Rules Committee.

Johnny Mitchell of TestAmerica Laboratories rounded out the panel with a discussion on water testing programs, including baseline testing (pre-drill surveys), analytical components, and post-activity testing in his presentation titled, "Water Testing Programs." Mr. Mitchell indicated that in some areas of PA, there is not only a lack of water well construction standards, but also a lack of regular water quality testing and a lack of understanding of naturally occurring analytes in groundwater. As an example, Mr. Mitchell indicated that methane is found in >25% of private water wells tested during pre-drilling programs nationwide. He went on to emphasize the current trend of baseline testing in PA and other states with shale gas plays provides a greater understanding of general water quality in a geographic area and provides a baseline of water quality for comparison post-drilling if there are any questions or concerns.



Save the Date!

*PCPG 25th Anniversary
Celebration and Annual Meeting*

Email announcement will be sent when registration opens

When: January 21, 2014, 11:30 – 8:00 pm

**Where: Holiday Inn Harrisburg East
4715 Lindle Road, Harrisburg PA**

See [PCPG website](#) for more details.

UPCOMING EVENTS

December 9-11, 2013

Pennsylvania Brownfields Conference

King of Prussia, PA

January 21, 2014

Pennsylvania Council of Professional Geologists 25th Anniversary Celebration and Annual Meeting

Harrisburg, PA

January 23-24, 2014

Pennsylvania Ground Water Association Winter Field Conference

Grantville, PA

See ad on Page 11

March 23-25, 2014

Geological Society of America Northeastern Section 49th Annual Meeting

Lancaster, PA

Don't forget to check the "Courses & Events" link on PCPG's [home page](#) frequently for up to date information on upcoming educational opportunities.

MEMBER SPOTLIGHT: MEISER & EARL, INC.

In March 1976, Tom Earl and Ed Meiser decided to make a go of it on their own as consulting hydrogeologists. Both men hold Ph.D.s in groundwater geology, and they had worked together for two years at a State College firm, consulting in this field. So with some serious persuasion from Ed, and some serious skepticism from Tom, they started Meiser and Earl Hydrogeologists, and managed barely to eke out a few thousand dollars in their first year. They spent a fair amount of time fishing (Ed's idea) in those days when things were slow at the office, which was often. Work did pick up, and 37 years later, the company is still going strong.



Meiser & Earl, Inc.'s logo, which includes a peach stick (from Pequea, Lancaster County) is a tongue-in-cheek response to water witching versus fracture-trace analysis for locating wells.

Lamenting the lack of recognition of geologists as professionals, Tom and Ed supported the earliest efforts of PCPG in establishing licensing of geologists, which finally won approval in 1992. Tom served as a founding board member of PCPG. Many aspiring geologists have enjoyed having Tom teach the hydrogeologic portion of the PCPG review course. Meiser & Earl, Inc. has remained a versatile, long-established firm providing hydrogeologic and environmental consulting services to clients in Pennsylvania and beyond.

Today, Meiser & Earl, Inc. is an employee-owned company comprising ten geologists and hydrogeologists, of which nine are PGs. The core Meiser & Earl, Inc. staff has remained intact for many years. Tom has retired, and Ed is trying to be retired, and beginning in 2001, Bob Hershey, Jim Eby, Chris Finton, and Jay Lynch have stepped up to lead Meiser & Earl. With more than 150 years of combined professional consulting experience, and our knowledge in hydrogeology, Meiser & Earl, Inc. prides itself on project experience in numerous specialized areas.

Through the last 37 years and the wide swings in environmental priorities and regulatory programs, Meiser & Earl, Inc. has provided accurate field observations, technically sound interpretations, and practical no-nonsense solutions. The cohesive group of experienced personnel at Meiser & Earl, Inc. realizes that field work is the basis of the project and is sensitive to proper execution, skilled observation, and accurate record keeping. Our small size allows for projects to be performed by, or directly supervised by, senior personnel. The technical staff has built their comprehensive understanding of hydrogeology upon a firm understanding of the basic principles of physics, chemistry, and mathematics. We take the time at the onset of projects to conceptualize the work, set realistic project goals, and develop the necessary rationale for decision-making.

During our history, M&E has:

- Developed over 100 municipal, industrial, and commercial water-supply wells and springs and over 130 private supplies, from the initial well siting to well construction, pumping tests, yield evaluation, and well rehabilitation. In addition, M&E has provided services for the development of surface-water and groundwater supplies for the natural gas industry, including permitting with PADEP and the Susquehanna River Basin Commission.
- Provided permitting, groundwater monitoring, groundwater quality assessments, and environmental litigation support for over 100 waste disposal sites.

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MEISER & EARL *Continued from page 7*

- Completed more than 100 environmental site assessments related to property transactions.

- Worked on numerous coal and non-coal mine sites throughout PA, WV, and MD, preparing and reviewing permit applications; evaluating sites for disposal of coal refuse; evaluating acid-mine drainage analyses and abatement; and completing watershed studies, dewatering plans, water-supply development projects, monitoring well design and construction, property evaluations, and assessments of damage to private water supplies.

- Worked on numerous groundwater and soil contamination studies related to hazardous waste; landfill leachate; leaking industrial lagoons; petroleum, pesticide, and chemical spills; leaking underground storage tanks; acid-mine drainage; radioactive waste disposal; barnyard runoff/manure pits; and on-lot sewage systems.

- Partnered with dozens of engineering firms in achieving success on their client's projects.

Through the years, groundwater protection, development, and management have remained at the core of Meiser & Earl's work, and will continue to be the focus in the future.

Meiser & Earl, Inc. is located at 1512 West College Avenue, State College, PA 16801. For more information, call us at: (814) 234-0813 or check our website at www.meiser-earl.com.

PCPG ANNOUNCES 2013 SCHOLARSHIP ESSAY TOPIC

Where do you think the most job opportunities for geologists and earth resource professionals will be found when you graduate: the Public Sector or Private Sector and why?

We will award \$1000 to the first place winner, and \$400 to the second place winner. Student essay due date is December 6, 2013.

Please be sure to visit the [Essay Announcement](#) web page and review all details found on that page. Next, enter the [Student Member Essay portal](#) (login required) for essay transmission details.

Questions? Telephone Rose Jeffries by dialing 717-730-9745.

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2013 FIELD CONFERENCE OF PENNSYLVANIA GEOLOGISTS

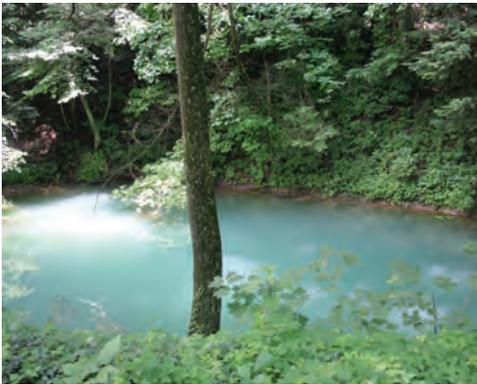
Gary Kribbs, P.G. (AEON Geoscience, Inc.)

The 78th Annual Field Conference of Pennsylvania Geologists was held September 26 through September 28, 2013 and headquartered at The Holiday Inn, in Williamsport, PA. The field conference topic this year was “A Tale of Two Provinces: the Nippenose Valley and the Route 15 Corridor.” This year’s conference was limited to 170 attendees, of which 21 were students representing Kutztown University, Shippensburg University, Temple University, Edinboro University, West Chester University, Millersville University, Keystone College and the University of Rochester. Special thanks are due to all the contributors to the scholarship fund. Preconference field trips were some of the best attended in recent memory, and the incredible weather added to the overall enjoyment.

The conference covered a broad spectrum of disciplines, including unique source rock stratigraphy and structure, uncommon karst manifestations, structural transition zone interpretations, coal geology and mining, Devonian terrestrial-marine transition stratigraphy, great fossil hunting, and last (but not least) huge glacial deposit cross sections.

Day 1 was spent examining the Nippenose Valley of Lycoming and Clinton Counties. Stop 1 was led by Don Hoskins (Pennsylvania Geological Survey, Retired), where well-exposed Marcellus shale jointing, volcanic ash and calcareous concretions were observed (see photo below). As discussed by Don Hoskins, the outcrop is located nearly along the axis of a broad Appalachian syncline defined by two nearby, prominent and ridge-forming, eastward-plunging Tuscarora anticlines. Over nearly the entire extent of the exposure, the layers dip to the east at a relatively low angle of 7 degrees. At the extreme western end the layers exhibit a shallow dip to the west, defining a small anticline. The outcrop approximately emulates the horizontal position of layers presently encountered at depth by drillers in northern and western areas of Pennsylvania (Hoskins 2013).

During Day 1 Stop 2, led by Bill Kochanov (Pennsylvania Geological Survey), the group viewed the development of the karst landscape in the great amphitheater of Pennsylvania, the Nippenose Valley. Hidden along the pathways of hemlock and hardwoods are sinkholes, caves, and the Nippeno Spring, Pennsylvania’s largest spring (also known as Big Spring or the Enchanted Spring). See photos below.



Nippeno Spring



Linear karst collapse with a bridge across



Marcellus Shale outcrop, with jointing and calcareous concretions visible

Day 2 explored along the US Route 15 corridor, examining exposures of the stratigraphic succession from the Devonian Braillier/Harrell/Lock Haven into the Pennsylvanian Bloss complex. At Day 2 Stop 10, led by Duane Braun (Bloomsberg University, Retired) the group ventured into a large sand and gravel mining operation.



Attendees observing an extensive glacial esker cross-section

The 2014 FCOPG (79th annual) will take place in late September/early October and will feature Pennsylvania’s Great Valley, and its bordering South Mountain and Appalachian Mountains near Carlisle PA. For more information, visit: <http://fcopg.org/>

DON'T FORGET TO VOTE

PCPG members, our Board of Director Elections are upon us...

An e-mail from PCPG with a link to your ballot will arrive in early December and elections close on December 31st.

The election will be held entirely online. PCPG members in good standing are eligible to vote, so be sure to cast your vote and have your say in the leadership of PCPG.

If you do not receive an election email, please contact Jim LaRegina at jlaregina@hrg-inc.com.

Bios for each candidate are provided when you link to the voting website.

Remember to...Vote



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DEADLINE FOR OUR NEXT NEWSLETTER IS JANUARY 20, 2014

For more information, contact our PCPG Newsletter Editor and Communications Committee Chairperson - Valerie Holliday, P.G., by **Email** or telephone at 610-517-7898.

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Pennsylvania Ground Water Association's
2014 Winter Conference
Harrisburg/Hershey Holiday Inn in Grantville, PA
at Exit 80 on I-81 (16 miles from Harrisburg)

THURSDAY JANUARY 23, 2014

8:00 am – 1:30 pm **REGISTRATION OPEN**

11:30 pm – 12:30 pm **LUNCH ON YOUR OWN**

12:30 – 1:30 pm	Keynote Address: Keynote Presentation to be Announced on www.pgwa.org
1:30 – 2:30 pm	A Study of Roadside Springs in Pennsylvania – Bryan Swistock, <i>PSU Extension</i>
2:30 – 3:30 pm	How to Easily Convert an Air-Rotary Drill Rig to do Mud-Rotary Drilling – by Todd Giddings, Ph.D., P.G., <i>Todd Giddings and Associates, Inc.</i>
3:30 – 4:30 pm	Presentation to be Announced on www.pgwa.org
4:30 pm – 7:00 pm	RECEPTION & SCHOLARSHIP AUCTION in the Exhibit Hall

FRIDAY JANUARY 24, 2014

7:30 am – 9:00 am	BREAKFAST (provided) and General Membership Meeting
9:00 – 10:00 am	Groundwater Spreadsheets: An Efficient and Practical Resource for Solving Simple and Complex Flow, Pollution, and Environmental Problems – Carlos E. Molano, P.E., <i>McIlheney Lecturer</i>
10:00 – 11:00 am	How to Optimize the Performance of Open-Loop Geothermal Heat Pump Systems – Todd Giddings, Ph.D., P.G., <i>Todd Giddings and Associates, Inc.</i>
11:00 – 12:00 pm	Geothermal Earth Coupling: It's All About the Site Specifics – Carl Orio, <i>Chairman of Water Energy Distributors Inc., CGD, AI</i>
12:00 pm – 1:00 pm	LUNCH (provided)
1:00 – 2:00 pm	The Design and Construction of a Standing-Column Well – Carl Orio, <i>Chairman of Water Energy Distributors Inc., CGD, AI</i>
2:00 – 3:00 pm	Shale Energy Development: What You Need to Know – Dave Yoxtheimer, <i>PSU Extension</i>
3:00 – 4:00 pm	New Generation, One-Part Cementitious-Pozzolanic Grouts for Ground Source Heat Loops – Steve Skufca & Dr. Ray Hemmings, <i>GeoEnergy Alternatives</i>
4:00 pm	CONFERENCE ADJOURNS

Go to **www.pgwa.org** for more information, and to print a registration form to mail **before January 10, 2014.**

The Holiday Inn Harrisburg/Hershey (in Grantville) has a block of discounted sleeping rooms until **January 8, 2014.** Call (717) 469-0661 to make your hotel reservation today!

www.pgwa.org