Issue

02

2012



PCPG Newsletter

Communicating Key Information & Concerns to Geologists & Environmental Professionals

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Message from the President

Are You Being Served?

Greetings! In this issue of PCPG's newsletter you will find an article that discusses the results of the PCPG member survey conducted during the 1st quarter of this year. Thanks to the strong participation of our members and associates, we received over 350 very detailed responses. Overall the survey tells us that we are doing a good job. But in really delving into the data, we indeed find areas where we can do better. We currently have a strong Board of Directors, so I am confident that we will continue to improve an already great organization. I encourage you to read the survey article (see article on Page 10) and evaluate the data for yourself.



The survey results also point to misconceptions about PCPG and I wanted to address some of the larger misconceptions in this column. First...

PCPG is not the State Licensing Board — We are most often confused with the State Board of Professional Engineers, Land Surveyors and Geologists. We are simply not them; we are a separate organization that provides advocacy, education and networking opportunities for our members. But the confusion is not unfounded. PCPG's early years were devoted to obtaining professional licensure for Geologists in Pennsylvania. These efforts began prior to 1989 (our official founding year) and continued through the passage of Act 151 — The Geologist's Licensing Law of 1992 (you're welcome). Thereafter, PCPG's founder Richard E. Wright, P.G. served on the State Registration Board in the 1990's. Today, Pennsylvania has several member geologists (PGs) on the Board, which as required, is also comprised of Professional Land Surveyors and Engineers. To be on the Board requires nomination by the Governor and approval of the State Senate, but it does not require membership in PCPG, which is actually ironic and shows organizational separation. The point here is that PCPG does not make the laws or requirements that govern your licensure. We do strive to bring you information on renewals and changes in the licensing law. This brings us to....

Beyond Membership: Is PCPG Leadership Part of Your Career Growth Plan?

-- PCPG Membership Committee

PCPG is a 501(c)6 non-profit corporation organized to promote the professional practice of geology in Pennsylvania. As with nearly all non-profits, the general membership elects a core group of members who volunteer their time and talents to ensure proper operation of the organization. This group is called the Board of Directors. The role of a Board member is always important, but often unrecognized, and yet it involves a commitment of time, along with professional knowledge and experience, to ensure that PCPG continues to provide value to its members and profession.

Unlike for-profit businesses and corporations, organizations like PCPG are "owned" by their members. The Board of Directors represents the members at large and protects the interests of those members. Although PCPG retains the services of a part-time association manager to support the organization's vision in a tactical way like managing membership, course and seminar logistics and financial reporting, it's often hard to distinguish between what the Board does and what the organization accomplishes. Generally, the Board:

- Ensures that PCPG adheres to its guiding principals
- Takes responsibility for the organization's legal and ethical obligations
- Makes sure PCPG is accountable to its members
- Plans for the organization's future
- Protects the organization's reputation
- Identifies other volunteers to serve on various committees
- Leads these volunteers in the execution of PCPG's many initiatives
- Fulfills the organization's mission of education, advocacy and networking

In a nutshell, Board members are the heavy-hitters for a volunteer organization, serving as ambassadors...first for the professional, and second for the organization. Board members lend their name and reputation to the organization. Board members provide leadership, guidance, and the valuable resource of time.

How much time? PCPG's Board meets monthly via a conference call, and holds no fewer than three, face-to-face meetings each year. While these meetings offer the opportunity to provide updates on committee activities, review goals, approve budgets and generally ensure that the organization is on track and moving forward, the real work is done outside of these calls and meetings. At any given time, Board members, individually or with the support of their committee volunteers, work on PCPG projects that support our advocacy, education, and networking mission.

Over the past 12 months, PCPG Board members and committee volunteers have been directly involved with:

- Judging regional science fairs;
- Drafting science-based position papers;
- Providing public comment to draft legislation or before a legislative proceeding;
- Authoring newsletter articles;
- Newsletter design and publication;
- Editing and updating PCPG's web site;
- Visiting a local college and meeting with undergraduates;
- Speaking at municipal meetings;



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- Evaluating scholarship contest essays;
- Serving as project managers to develop PCPG seminar topics;
- Compiling biweekly PCPG news blasts;
- Leading committee conference calls;
- Performing outreach to regulators or legislators; and more.

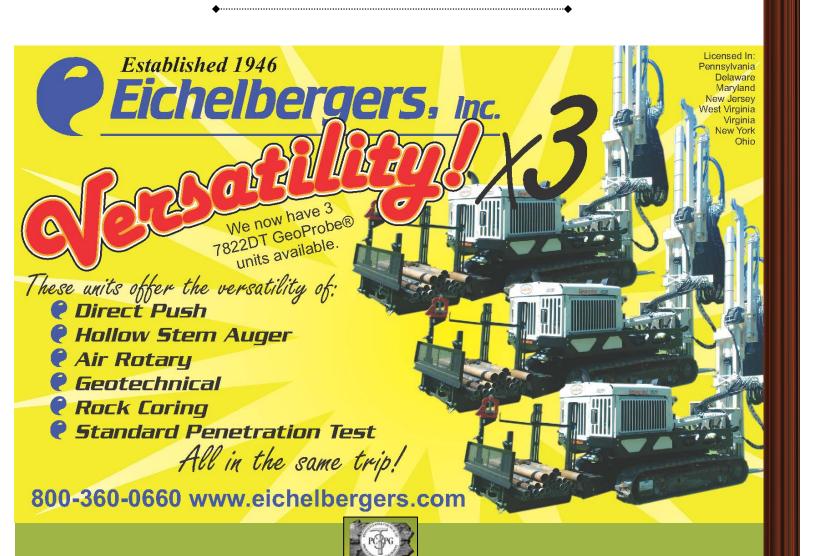
If you feel you have what we're looking for in a volunteer board member, and you have a passion for PCPG's sustained growth and effectiveness in advocating, educating, and networking on behalf of our member constituencies, please consider running for the Board of Directors.

We're looking for Board members who will serve the organization, the profession, and our constituency in a consistent manner each year of the three-year term for which he or she is elected.

What's Next?

Elections will be held through electronic balloting during December, with the Board then meeting at the Annual Meeting on January 15, 2013 in Harrisburg where the newly-elected Board members will be recognized.

If you're interested in running for election, or would like to nominate a candidate for election, please contact PCPG President-elect Jennifer O'Reilly by <u>e-mail</u>.





Excellence Delivered As Promised

As a company founded in 1915, Gannett Fleming is poised to celebrate its 100th Anniversary in just a few short years. Since its early years, the company has focused on supporting the significant development and expansion of public and industrial infrastructure in the United States. Like other companies that came of age when investment in infrastructure projects was a bit more aggressive than today, Gannett Fleming has benefitted from visionary ideas like rural electrification, public water and sanitation systems and the interstate highway system.

The company's founder, Farley Gannett, was born in 1880 and received a Bachelor of Science in Sanitary Engineering from the Massachusetts Institute of Technology in 1902. As a boy he was influenced by his father, Henry Gannett, who was the Chief Geographer of the United States Geological Survey and subsequently was influential in the founding of the National Geographic Society. In what must have been an "age of opportunity", Farley Gannett was well postured to succeed, and he was armed with a world view vicariously matured by the travelers and explorers who passed through his parents Washington D.C. home during his childhood. In the thirteen years following his college graduation, he rose to the position of State Engineer for the Commonwealth of Pennsylvania and soon after founded the firm that would become Gannett Fleming.

The early ventures of the firm were quite varied and perhaps not surprisingly included a number of projects to exploit our nation's abundant natural resources. One such enterprise was an underground salt mine in the Finger Lakes Region of New York. The project began in the early 1920's when a chemical company asked Gannett Fleming to evaluate sending salt brine to Niagara Falls by pipeline instead of by bulk rail shipment. The pipeline concept was infeasible but Farley Gannett and his associates leased the mine and continued in the salt business financing the operation by selling stock to ice cream companies who relied on a steady supply of rock salt for the manufacture of their sweet product. Today, Gannett Fleming's mining and geotechnical practices involve geologists and hydrogeologists in supporting responsible development of several unconventional shale gas plays; the quarrying of crushed and dimension stone products in the Mid-Atlantic region; development of heavy oil in the Athabasca region of Northern Alberta; and surging coal, illmenite, and base/precious metals mining markets.

Another area where today's geologists and engineering geologists have found linkage to the company's early work is in the firm's highly successful Earth Science and Hydraulics Practice. In this group, dams and geotechnology professionals work collaboratively on new and aging water retention and diversion structures. Historically, the firm has been involved in the development of dams and flood protection structures beginning with the design of flood control works to protect Erie, PA and continuing with such diverse projects as a pumped storage dam for the P.H. Glatfelter Paper Company Reservoir Project at Lake Marburg in York County, PA; the two dams of the Tioga-Hammond Lakes Project for the U.S. Army Corps of Engineers (USACE) and a high, roller compacted, concrete water supply dam for the City of Lebanon Authority.

Today, some of Gannett Fleming's most highly developed technologies are deployed at new and historic dam sites to solve very pressing infrastructure problems including foundation seepage that threatens dam safety. In 2005, the USACE began a screening portfolio risk assessment of each of its dams throughout the U.S. As of 2007, 202 of its 609 dams had been evaluated, five of which were identified as Dam Safety Action Classification (DSAC) I, which means "Urgent and Compelling." The USACE Nashville District's Center Hill Dam in Lancaster, TN, is one of those five dams. Failure of this structure, the District's second largest reservoir,

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Photo Above: Gannett Fleming Geologist Completing a Diaital Photogrammetry Study of Stone Masonry Dam

would inundate portions of Nashville, TN., and outlying areas causing extensive damage and loss of life. In fact, conditions indicated a high risk of failure under normal operating conditions without intervention. Because of its highly solutioned limestone foundation and rims, seepage problems have plagued the dam since the first test filling of the reservoir. Cavernous features are known to exist at the site, and active seepage conditions from springs and caves located on both abutments downstream of the dam have significant discharge.

The USACE retained the Kiewit-Advanced Construction Techniques, Ltd. (ACT) Joint Venture (JV) to perform the first phase of seepage remediation project for Center Hill Dam which included permeation grouting of the main dam embankment foundation and left rim.

As a consultant to the JV, Gannett Fleming provided a team of geologists and geotechnical engineers for quality control services and technical oversight during drilling and grouting operations that were monitored using patented IntelliGrout technology, which was jointly developed by Gannett Fleming and ACT.

IntelliGrout includes comprehensive integration of geologic and geotechnical data collection, real-time data display, database functions and analytical capabilities combined with computer aided design and drafting (CADD). The system was designed specifically to manage permeation drilling and grouting programs. Three of the five DSAC I dams included grouting and IntelliGrout as part of their major rehabilitation -- Center Hill Dam, Wolf Creek Dam in Kentucky, and Clearwater Dam in Missouri.

A number of other technologies instrumental to the successes achieved on these highly challenging dam projects including the following:

- Deployment and extensive use of optical and acoustic televiewer logging to create "virtual rock core" for further refinement of core boring logs prepared by professional geologists.
- Borehole deviation surveys to measure compliance with borehole trajectory objectives.
- Geophysical surveys were completed by the Quantum Geophysics division of Gannett Fleming (including electrical resistivity profiling, multichannel analysis of surface waves (MASW), surface and down-hole sonar surveys) to evaluate open subsurface karst openings
- Digital photogrammetry of rock abutment areas deployed for the purpose of developing robust geologic structural data sets to use in stability and seepage analyses.

Within Gannett Fleming, geology is alive and well; practiced by trusted professionals who are relied on to manage robust data collection programs and deploy sophisticated technologies used to extract information that is essential to the responsible development of our natural resources and management of critical infrastructure elements. This role demands vision and attention to detail, dedication to the principles of the science of geology and open-minded diligence in interpretation. Gannett Fleming Chief Geologist, Michael A. Knight, P.G., indicates that, "Our hope is that we can continue to practice our craft in a world where renewed emphasis is placed on sound science solutions for world-class infrastructure problems and where visionary thinking drives us sustainably forward."



(PRESIDENT'S MESSAGE -- continued from Page 1)

PCPG did not institute Continuing Education (CE) Requirements — While PCPG certainly supports continuing education, PCPG did not develop the CE requirements that are law today. These requirements were developed by the State Board and actually came about in many states at the same time. Check out the ASBOG website (http://www.asbog.org/) and the CE requirements for surrounding member states. You will find many similarities to PA's CE requirements. Prior to enactment of the CE requirements, PCPG routinely developed and provided educational courses to our members and such courses were well attended and received. We now have a law-based purpose to provide CE to our members. We wish to continue this effort and we will strive to keep our courses affordable and relevant and include interaction with colleagues, regulators and experts well versed in Pennsylvania's geological and environmental issues.

<u>PCPG Board and Executive Committee Members are **Volunteers**</u> – Yes, that is correct and hard to believe. Members' dues go towards running the organization, paying for business expenses, doing advocacy and outreach. Our news blasts, position papers, and the entire newsletter - to name but a few activities - are currently completed by volunteer professionals. Similarly, new course development requires focused committees to assemble and present relevant courses to our members. Once a course topic and proposed content is developed, an instructor is sought and vetted to teach the course. Although modest instructor compensation is sometimes provided for certain seminars requiring a higher level of instruction, many of our course moderators and instructors also volunteer their time.

In concluding this column, I simply wish to thank you for your support and ask that you consider getting involved to help our <u>mission</u> and continue to improve our organization. Perhaps you are an expert and want to develop and teach a course. Let us know. Perhaps a proposed regulation or draft policy requires some well deserved technical comments. Get involved, lend a hand. Lastly, check out the member survey results, I believe you will certainly find the data interesting and enlightening, as have I.

Regards,

Louis F. Vittorio, Jr. P.G.

PCPG President

ARE YOU ATTENDING???

2012 FIELD CONFERENCE OF PENNSYLVANIA GEOLOGISTS

A Journey Along the Taconic Unconformity Northeastern Pennsylvania, New Jersey and Southeastern New York

October 18 – 20, 2012

PCPG is seeking attendees at this year's Field Conference of Pennsylvania Geologists (FCOPG) to provide photographs and information for our 4^{th} Quarter Newsletter. If you wish to help provide information for our next Newsletter, please contact Newsletter Editor Kelly Kinkaid via <u>e-mail</u>.

Visit the FCOPG website for more information about this event:

http://fcopg.org



UPCOMING EVENTS

October 29 - 31, 2012 **Pennsylvania Brownfields** Conference

Marketplace Meets Brownfields Monroeville, PA Link **HERE** for more info

November 14, 2012 **Environmental Field Methods Refresher** (Followed by Networking Mixer) Reading, PA

December 5, 2012 **Environmental Field Methods Refresher** (Followed by Networking Mixer) Monroeville, PA

January 15, 2013 **PCPG Annual Meeting** (Followed by Networking Mixer) Harrisburg, PA

February 27, 2013 Resistivity/IP/SP for **Environmental and Engineering Applications** Harrisburg, 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.

PCPG's Essay Scholarship Results

-- Jeffrey Leberfinger, P.G. (PCPG-Immediate Past President)

In order to foster and support an academic interest in geology, PCPG has developed an Annual Essay-based Scholarship Program for students pursuing geology or related earth resource degrees. Earlier this year PCPG made two awards, with the first place recipient receiving a \$1,000 scholarship and the second place recipient receiving a \$400 scholarship. The top 10 ranked essays also received a copy of the book "The Geology of Pennsylvania". The recipients of the scholarship awards were determined based on an essay written by the student applicant. The essays were a maximum of 500 words addressing the topic of "Why I want to be a geologist or earth resource professional." The college applicants also had to maintain an active student membership in PCPG.

After thorough consideration, PCPG awarded the PCPG first place scholarship to Penn State University.

Elizabeth Graybill from Ohio University. The second place award went to Irena Gorski of



Pictured Above: First Place Winner Elizabeth Graybill (left) and Second Place Winner Irena Gorski (right)

Elizabeth grew up in Carlisle PA, attended

Boiling Springs High School then Lafayette College for her Bachelor's degree. At Lafayette she became interested in geology and double majored in geology and art. She then went on to Ohio University for her Master's degree in Geology, which she officially received on June 1, 2012. Elizabeth also worked at the PA Geologic Survey as an intern. After graduation, she moved to Scranton PA, where she works for Kaufman Engineering as a geologic consultant for various mining operations. Elizabeth attended the PCPG luncheon meeting on April 26, 2012 in Reading, PA where she was presented with the scholarship awards. She also read her first place essay to the PCPG audience.

Irena began her senior year at Penn State University in the fall of 2012 majoring in Geoscience with a minor in Hydrogeology. She is from central New Jersey (North Brunswick), and interned during the summer 2012 with Excel Environmental Resources, Inc. Irena's future aspirations are to work for an environmental consulting company, and eventually pursue a Master's degree in hydrogeology or an earth/water-related engineering field.

The top 20 essays were written by students representing the following schools -- Ohio University, Penn State University, Temple University,

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PCPG Host Mentoring Luncheon at Kutztown University

-- Louis F. Vittorio, P.G. (PCPG President)

On April 12, 2012, PCPG hosted a mentoring luncheon at Kutztown University with students interested in learning about careers in the geosciences. The event was arranged through Kutztown's Geology Club and the Department of Physical Sciences, with publicity assistance and facilities provided by the Club and Geology Professor Dr. Sarah Tindall. The event generated significant student attendance, we believe due to the proposed topics covered, but certainly a free lunch did not hurt. PCPG Board members on-hand to speak to the students included Kelly Lee Kinkaid, PG; Sean Chelius, PG; and President Louis F. Vittorio, Jr., PG. We found that Kutztown has a strong and growing geology and environmental science department and we were encouraged by the growth and the core emphasis on the physical sciences. The workshop involved a discussion on the wide range of geoscience careers and skills that were currently being sought by employers of new graduates. The students were encouraged to network, apply for their Geologist-in-Training certification while in school and use on-line resources, such as LinkedIn, to search for employment opportunities.

PCPG offers these sessions for several reasons, but mainly to inform our 'minor league teams' about the state of the profession, the job market, and to offer tips on courses and employer desired skill sets. We are also there to network and discuss departmental offerings and the educational requirements for attaining a PG license.

PCPG has plans to visit West Virginia University, Slippery Rock University and Lock Haven University this fall. Would you like to offer a mentoring workshop to your Alma Mater? Are you in academia and would like PCPG to speak with your geoscience department? If so, let us know. We would like to reach additional students and departments and would be happy to setup a similar mentoring workshop, food included.





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West Virginia University, Slippery Rock University, Bucknell University, Franklin and Marshall College, Kent State University, Bryn Mawr College, Pittsburg University, and Indiana University of PA. PCPG wishes to thank all the students who provided essays and looks forward to supporting the student membership in the future.

Information on applying for PCPG's essay scholarships has been posted on the PCPG website and was sent to Pennsylvania colleges and universities as well as those in neighboring states. You can find the 2012 scholarship information at the following link:

http://www.pcpg.org/EssayScholarships

The deadline to apply is December 5, 2012 and the scholarships will be presented at our Annual Meeting on January 15, 2013 in Harrisburg, PA.





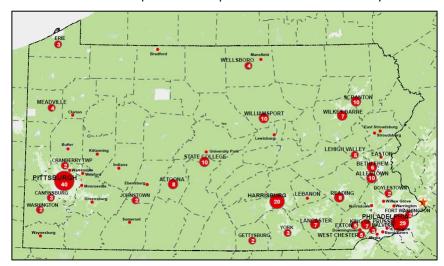


PCPG Member Survey Results Overview

-- Roger D. Moose, P.G. (PCPG Board Member, SAIC)

The goal of the PCPG 2012 Membership Survey was to solicit feedback on PCPG's education, advocacy and networking efforts, and to use this as guidance for PCPG's future endeavors. We sent out 2,279 email invitations for a 24-question survey. We received 365 responses, a rate of approximately 16 percent, which is a good response rate according to non-profit associations statewide.

As you would expect from a voluntary survey, our overall responses were positive to questions regarding satisfaction levels. Open-ended questions elicited a variety of useful responses. For instance, the responses



to Question #10 "Are there any specific cities, towns or venues where you would like to see PCPG hold a networking event?" provided significant insight into locations where more networking events are needed in the future, at diverse locations across the commonwealth, including the Lehigh Valley, State College/Altoona, Williamsport and Scranton/Wilkes Barre. The numbers of responses per location illustrated on the map to the left.

Significant support for posting jobs and positions wanted will help the Board decide on how to manage such postings in the future. We want to provide this service in a manner that will be helpful to our members (both corporate and individual) and yet professionally discreet.

Survey questions were designed to help us understand what types of educational opportunities are sought by our membership. Not surprisingly, of the most interest were topics where professional geologists find the most demand in their private practice. The top interest was in shale gas topics, including general information, environmental issues, and a desire for information on the practice of fracing. Tied with shale gas was interest in courses on hydrogeology, including general treatment of the topic, field methods and sampling techniques, and groundwater fate and transport modeling. Mining and engineering geology were third in the frequency of interest, and karst issues were in fourth place. Fifth place was split between remediation strategies and technologies, core geology topics, geophysics and geochemistry. There was also keen interest in regulations, particularly those for shale gas development and vapor intrusion.

Current issues that were of interest for PCPG to take a role in advocating positions for its membership included legislation, PA USTIF reimbursement rates, funding the PA Geological Survey, and reintroduction of traditional geology curricula at colleges and universities. It is clear from the responses that the misconception that PCPG is somehow tied to the State Board of Licensing persists. PCPG will continue its program of education, including educating industry of our distinct role, providing continuing education, advocating for the profession, and offering networking opportunities for our membership.

Members can view a slideshow summary presentation of the survey results on the "members only" section of the PCPG website, at www.pcpg.org. Thanks to all who responded – your opinions and ideas are valuable and are considered in plans for PCPG's future.

SAVE THE DATE!

PCPG Annual Meeting January 15, 2013 Harrisburg, PA

Come celebrate 20 years of PG Registration in Pennsylvania with PCPG!

Current speakers include:

William J. Kosmer, PG (PA DEP – Stray Gas)
Dr. Martin Helmke (West Chester University - Geothermal Energy)
Richard E. Wright, PG (Founding Father - 20 years of Registration in PA)
George Love (DCNR – State Geologist)

Plus, there will be exhibitor booths, raffles, networking and more!

NOTE: The Board of Director Election will be held electronically in advance of the meeting with results announced at the meeting. Watch for additional details forthcoming soon.



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News of the Pennsylvania Bureau of Topographic and Geologic Survey

-- George Love, P.G. (Pennsylvania State Geologist)

The Bureau of Topographic and Geologic Survey (aka BTGS or PA Geologic Survey) continues its activities to serve the citizens of Pennsylvania by collecting, preserving, and disseminating impartial information on the Commonwealth's geology, geologic resources, and topography in order to contribute to the understanding, wise use, and conservation of its land and included resources. Our recent activities include:

- Development of an electronic system to archive geologic data now being collected by staff. This system, referred to as the Stratigraphic Database, will be available to the public. Currently, BTGS is awaiting feedback on bids submitted to develop the application.
- Preparation of a grant proposal to the USGS for funds to preserve some of our older data that has not been digitized. BTGS has numerous data that have not been available to the public for some time. Those data include hand-drawn maps and field notes.
- The rock core library in the BTGS building is getting attention. The goal is to make a complete inventory of the core, describing the location, depth, rock descriptions, etc. As time allows, photos will be included.
- Work on the Sullivan County Water Resources Project.
- Work on the Troy and Gleason Quads in Bradford County. This USGS funded project includes bedrock mapping, a drill hole, and groundwater testing and isotopic analysis testing on carbonaceous zones in core.
- We continue to develop relationships with a number of gas drilling entities in the hopes of obtaining geophysical logs.
- Work on geologic field mapping in the Ordovician rocks of the Elizabethtown Quad.
- Work to compile drift thickness and bedrock topo maps for 2 Quads in Erie County.
- BTGS personnel continue development of interpretive signs to discuss the geology along select trails.
- BTGS staff is currently working with Ohiopyle State Park to develop maps and a guide book interpreting geologic exposures. Similar work is ongoing in the Laurel Highlands Conservation Landscape Initiative.
- Work with WVU to develop a Utica Shale Project.
- Work on the DoE-funded Geothermal project. BTGS expects to soon solicit bids from firms to aid in gathering temperature gradients in deep water wells in central and southeastern PA
- Digitizing figures for an unpublished report on the Reading Prong. The goal is to make the data available on-line in the near future.
- Work with USEPA on a case study of a Range Resources site in Washington County.
- Work with the Marcellus Shale Coalition (MSC) to identify opportunities to collaborate on research.



PCPG SEEKS BOARD OF DIRECTOR **CANDIDATES**

Any PCPG member that wishes to be considered for the slate of PCPG Board of Director candidates in the upcoming election (three-year term from 2013 – 2015) are reminded to contact President-Elect Jen O'Reilly. You can nominate a fellow PCPG member or yourself.

Jen can be reached by email or by phone at (610) 458-1077.

The deadline for nominations is Friday, November 09, 2012.

DEADLINE FOR 4th QUARTER 2012 NEWSLETTER IS DECEMBER 1, 2012

For more information, contact our PCPG **Newsletter Editor and Communications Committee** Chairperson,

Kelly Lee Kinkaid, P.G., by <u>E-mail</u> or by telephone at 610-375-9301.

2012 PCPG MEMBER AD RATES (Rates are listed as amount per issue)				
Size 1/2 Page 1/4 Page	Commitment:	1x \$225 \$140	4x \$150 \$95	

\$75

\$50

2012 PCPG NON-MEMBER AD RATES (Rates are listed as amount per issue)				
Size 1/2 Page 1/4 Page Business Card (H or V)	Commitment:	1x \$300 \$185 \$100	4x \$240 \$150 \$80	

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Business Card (H or V)





Pennsylvania Council of Professional Geologists

116 Forest Drive Camp Hill, PA 17011 www.pcpg.org

Introduction to Shale Energy Science: From the Depths to the Surface

9 a.m. - 4 p.m., November 8, 2012 Penn State Great Valley, Malvern, Pa.

presented by

Penn State Marcellus Center for Outreach and Research

Topics to be covered:

- · Overview of shale energy and geologic structure
- · Basics of horizontal drilling and hydraulic fracturing
- Induced seismicity and injection wells
- Managing water resources
- Wastewater management issues and solutions
- · Regulations to protect water resources

Instructors

Michael A. Arthur, Ph.D.

Professor, Department of Geosciences, Penn State

David Yoxtheimer, P.G.

Extension Associate, Marcellus Center for Outreach and Research

Registration

Fee: \$379; Early bird: \$329 (registration before 10/19/2012)

This course will be eligible for Professional Development Hours (PDHs) and Continuing Education Units (CEUs).

www.marcellus.psu.edu/events

GUESS THE FEATURE

The image (from the PaGS photo gallery) is of a karst fenster (subsurface stream emerges and sinks within a closed sinkhole). The stream cascades 20 feet over limestone of the Ordovician Salona Formation in the Nippenose Valley, Lycoming County. The photo was snapped by Gary Fleeger of the PaGS).

More images of interesting PA geologic features can be viewed on the PaGS <u>Photo Gallery website</u>.



