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Spearfish Canyon—North of Rapid City near the town of Spearfish lays Spearfish Canyon Scenic Byway—a stunning 19-mile cruise through towering limestone walls and dense deciduous forest. The road follows Spearfish Creek past historic Homestake Gold Mine hydroelectric plants and multiple waterfalls. Photo compliments of the South Dakota Convention and Visitors Bureau.
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AIPG Publication Policy, October 4, 2010. AIPG encourages submission of articles and editorials for publication in TPG on topics related to the science and profession of geology. Submissions shall be of interest to the members of AIPG, other professional geologists, and others interested in the earth sciences. Articles and editorials may be noted as follows at the discretion of the Editor: “The opinions, positions and conclusions presented herein are those of the author and do not necessarily reflect the opinions, positions or conclusions of the American Institute of Professional Geologists.” All materials submitted for publication, including author opinions contained therein, shall include accurate and appropriate references. The Editor has the authority to solicit, edit, accept, or reject articles and editorials and other written material for publication. The Executive Committee has the authority if it so chooses to act on any particular case to support or overrule actions of the Editor regarding the solicitation, editing, acceptance, or rejection of any particular article, editorial, or other written material for publication.

American Institute of Professional Geologists (AIPG) is the only national organization that certifies the competence and ethical conduct of geological scientists in all branches of the science. It adheres to the principles of professional responsibility and public service, and is the ombudsman for the geological profession. It was founded in 1963 to promote the profession of geology and to provide certification for geologists to establish a standard of excellence for the profession. Since then, more than 10,000 individuals have demonstrated their commitment to the highest levels of competence and ethical conduct and been certified by AIPG.

The mission of the American Institute of Professional Geologists (AIPG) is to be an effective advocate for the profession of geology and to serve its members through activities and programs that support continuing professional development and promote high standards of ethical conduct.

The Professional Geologist (USPS 590-610 and ISSN 0279-0521) is published bi-monthly by the American Institute of Professional Geologists, 12000 Washington St., Suite 285, Thornton, CO 80241-3134. Periodicals Postage Paid at Denver, Colorado and additional mailing offices.

Printed in U.S.A. by Modern Litho-Print Company in Jefferson City, Missouri.
For AIPG news and activities go to www.aipg.org.
ARIZONa SECTIOn

Where was this photograph taken and what is happening there?

This is the famous Arch Bridge that crosses the Colorado River just south of Interstate 40 between Topock, Arizona and Needles, California. The Arch Bridge is a narrow span that originally carried vehicle traffic across the river into California from 1916 to 1947. It was part of Route 66 from 1926 to 1947, and is seen in the 1940 movie “The Grapes of Wrath”. During World War II vehicle size increased, essentially turning the bridge into a one lane road: the large trucks could only cross one at a time. After a new, wider bridge was constructed just upriver in 1947, the Arch Bridge was closed to traffic. It then was purchased by Pacific Gas & Electric Company, who now shares use with El Paso Natural Gas Company. The bridge supports two natural gas transmission pipelines: one 34-inch and one 30-inch diameter.

Why the white cover? The bridge has been under renovation since January 2012. The old lead-based paint is being blasted off, and the white plastic covering contains the spent abrasive blast media and lead contaminants under negative pressure. The blast media is collected via an industrial vacuum and cyclone system under the east side of the bridge, placed in supersacks, tested for lead content, then shipped for disposal at an approved landfill. The bridge is being repainted in stages, and the work should be completed in July at a cost of about $1.4 million.

Dave Palmer, CPG-09960
Section Secretary

California Section

For the twelfth year, AIPG California Section provided judges for an earth science speciality prize at the California State Science Fair at the California Science Center in Exposition Park in Los Angeles, California on May 1, 2012. The AIPG California Section sponsored the prizes. In addition to the awards presented by the California Section judges on behalf of the California Council of Geoscience Organizations, other awards were given by the sponsors of the fair.

Long-time judge, David Sadoff, an eleven year AIPG judge and Jim Jacobs, a four year judge, reviewed the seventeen junior division (6th through 8th grade) and seven senior division (9th to 12th grade) projects. All projects had been through local and regional science fairs in order to proceed to the California State Science Fair in Los Angeles. Each student was required to provide an abstract, including objectives/goals, methods/materials, results and conclusion/discussion. All entrants prepared a detailed poster and display with the science research. In addition, students were required to note the help they received from others. Some students had entered for the first time, while others had research that was on going. One tenth grader had been to the state science fair five times (6th grade to 10th grade) with updates and progress reports to the original research. The judging included student presentations in front of their project posters and interviews with the judges. The students interviewed at the State Science Fair were articulate regarding their research.

The winners from the Senior Division was Rose L. Leopold and the Junior Division was Matthew J. Chaffee. The two winners received a signed AIPG California Section Certificate as well as a $250 check. Below are the winning abstracts.

Senior Division Winner: Rose L. Leopold; Project Title: Morphological Disparity during the Ammonoid Recovery after the Permian Mass Extinction

Objectives/Goals

The Permian mass extinction caused the elimination of 80% of marine genera. Ammonoids, however, survived the extinction and returned to the levels of diversity that had been seen in the Late Permian within a million years while other groups recovered at a much slower rate.

This project examines how morphological disparity in ammonoid fossils decouples from taxonomic diversity following the Permian mass extinction. I hypothesized that the two diversities would follow the same trends before the extinction, but then break away from each other before once again leveling out.

Methods/Materials

I measured whorl expansion, umbilical diameter, aperture height, aperture shape and ventral acuity from illustrated specimens of 135 genera and used principal components analysis to quantify morphological diversity.

Results

Ammonoid disparity decreased after the extinction, but did not reach its lowest until the Dienerian sub-stage (2 sub-stages after the extinction), unlike taxonomic diversity which was lowest immediately after the extinction. By the Smithian sub-stage (4 sub-stages after the extinction) ammonoids had recovered in both morphological disparity and taxonomic diversity.

Conclusions/Discussion

Morphological disparity of ammonoids decreased after the extinction, but did not reach its lowest point until the next sub-stage. After reaching its lowest level of diversity on the Dienerian, ammonoids recovered at an astounding rate and regained the levels of diversity that were seen before the extinction and then even more. Taxonomically, ammonoids reached their lowest levels of diversity directly after the extinction, but then recovered around the same time as morphological disparity. This was most likely due to their ecology which allowed them to avoid the deepest waters where oxygen levels were low and due to their high metabolic rate which enabled them to better adapt to ocean acidification. The response of these ammonoids can help us to understand traits like motility that allowed ammonoids to come back
successfully from the brink of extinction unlike so many benthic groups. I studied how morphological disparity among ammonoid fossils decouples from taxonomic diversity in ammonoids after the Permian Mass Extinction. Professor Clapham at University of California Santa Cruz supervised project

OBJECTIVES/GOALS

Subsidence has cost billions of dollars in structural damage to buildings, roadways, homes and economic loss in land use. Most devastating consequence of subsidence is that it is responsible for having residents relocate due to coastal erosion and flooding. Based on existing research by Ingles & Aitchson that salt is important component of soil mechanics and the petroleum industry’s precedent to shore up the Long Beach harbor by injecting salt into oil bearing rocks. This project investigates whether salt’s ionic properties will add stability to ground material’s equilibrium and retard the effects of subsidence.

METHODS/MATERIALS

This project ran 40 trials of subjecting clay and soil to lateral compression to demonstrate the effects of pressure on ground material. Water was utilized as a transport method to introduce the salt to the two materials. The premise is that salt will act as a bonding agent in both clay and soil and exhibit lower compression rates. Increasing the volume of material in a “dry state” showed the lowest compression. The USGS indicated that minimal water intrusion is necessary in the “dry state” to make the material pliable to counter pressure changes but to limit the water so there will not be a loss cohesion and cause erosion.

Conclusions/Discussion

While my results were unexpected, I was able to make the observation of whether covalent bonding is stronger than the ionic bonding within the salt/clay mixture. Clay with its high porosity/low permeability allowed it to adapt to various shapes for energy distribution. In the future, I would measure salt’s ionization, utilize a vacuum apparatus to measure compression in psi and try different water levels that assist in the pressure stability without causing disequilibrium.

Jim Jacobs, CPG-07760
Section President

FLORIDA SECTION

Participation in Waterfest, Stuart, Florida—Recently the Florida section of AIPG (FAPG-AIPG) participated in the First Annual Waterfest Event held in Stuart, Florida. This event was organized by the City of Stuart; several City staff participated in the event.

Stuart is a quaint community of approximately 25,000 people located on a peninsula in Martin County, in the southeast part of Florida. Stuart is surrounded by the brackish St. Lucie River to the west, north and east. The City is known as the Sailfish Capital of the World, so the Sailfish is the City mascot and appears in their logo as well as in many other forms around the City. The City’s now famous “Sammi the Sailfish” is an eye-lashed, costumed sailfish mascot with a large "hair" bow who was adopted for the City’s Water Conservation Initiative. She is a local celebrity now and makes appearances at Citywide events; she has a significant following among younger citizens! Sammi made several appearances for the children that attended Waterfest and even made the front cover of the local newspaper!

There were 19 booths. The event location was a small, newly upgraded City Park near downtown Stuart. Others who participated were agencies involved with water, including the Soil and Water Conservation Service, South Florida Water Management District, University of Florida IFAS; professional organizations who have local chapters such as Florida Water Environments Association (FWEA) and Florida Section of the American Water Works Association (FSAWWA); and local clubs like the Master Gardeners. Each booth was given a colorful stamp and ink pad for marking children’s “bingo cards”. The children could pick up a unique ink stamp at each booth. A prize was given to each completed card – they ran out of prizes and cards at 276! This encouraged the children to visit each booth and learn something.

We were provided with three tables and plenty of chairs under a canopy, by the City. Vickie Hill at National AIPG sent me a very nice banner which stands upright and is very easy to set up, particularly if you are more than 6 feet tall (which I am not, so I enlisted the help of Kevin, a very helpful person at the Martin County Utilities booth next door)! I set up a binocular microscope, had some interesting fossils and rocks for viewing and some 4-inch rock cores of limestone and dolomite from Florida. I also had a “water level measuring display” consisting of three PVC “wells”, an electronic M-Scope and a measuring tape with directions.

Vickie had also sent literature – several packages provided by AGI from last year’s Earth Day which contained a lot of educational information which I tried to give to local teachers or interested older students, to pass on to their teachers. Other handouts included bookmarks with the geologic scale on it, AIPG logo stickers for car or file folder, and a one page piece about how geologist’s work affects our everyday life, and some pens. Our booth also offered a raffle – a digital subscription to Earth Magazine, which is published by American Geosciences Institute (AGI); AIPG is a member organization of AGI, so this was appropriate.

The event turned out to be a huge success with over 1,000 people! Almost all were families with children ranging from very young to teenagers. The booth saw one continuous stream of people from 9:00 am in the morning until 4:00 pm. The point of interest at our booth was the microscope and many children wanted to look down the microscope at the rock samples. I met many children (as young as eight) who were genuinely knowledgeable about geology and rocks and had that spark of interest. I hope...
that we managed to get our name out there and spark an interest in geology in at least a few of the folks who attended the event! There is a similar event being planned for Orlando later in the year and other municipalities are planning these types of events, so please get involved.

If anyone has any specific questions, or would like FAPG to participate in one of these events, please contact me.

Helen Madeksho-Hickman, CPG-07535
FAPG President

Georgia Section

During April I made the rounds to our universities giving our section's six $250.00 scholarship awards or presenting the National AIPG $1,000.00 scholarship award. I was extremely happy when I heard that our students won three of the eight National scholarships. The officers of the Georgia Section would like to congratulate all our scholarship recipients.

Other section scholarship winners not pictured include Brock Nelson, SA-3341 – Georgia Southern University, Joey Flynn, SA-3035 – Georgia State University, and Hamilton Goodner, SA-3342 – University of Georgia.

I’d like to thank the University of West Georgia for inviting me to attend their second annual career night. Also a special thank you to Dr. Mike Roden at University of Georgia for inviting me to attend their Department of Geology awards ceremony.

I’ve enjoyed working with all our student chapter officers. Most of the presidents are graduating so I’m looking forward to this fall and meeting the new officers. And last I’d like to thank our members that contributed to our student chapters. We were able to give our chapters $950.00. Some of this money was used to send students to GSA Southeastern conference and more will be used this fall for the National GSA conference in Charlotte, NC.

For all our graduates that plan to start working or looking for a job, please remember that AIPG has a new membership category called Young Professional that gives you a membership at a reduced cost for three years.

Ronald Wallace, CPG-08153
Section President

Michigan Section

LNAPL Workshop Summary: The American Institute of Professional Geologist (AIPG) – Michigan Section held a light non-aqueous phase liquids (LNAPL) Workshop on June 20 and 21, 2012 at the Ralph A. MacMullan Conference Center located at 104 Conservation Drive on the north shore of Higgins Lake in Roscommon, Michigan. This Workshop was endorsed by the Michigan Department of Environmental Quality, but was not MDEQ sanctioned training.

Jenna Schmidt, SA-3049, from University of West Georgia, received our section scholarship and the National scholarship.

Cheryl Wilkes, SA-3115, received our section scholarship and Don Osborne, SA-3137, received the National scholarship. Both students attend Columbus State University.

Na Hyung Choi, SA-3141, from University of Georgia, received the National scholarship.

Kaley Basile, SA-3050, from Georgia Southwestern State University, along with the department chairman Dr. Sam Peavy received our section scholarship.

Registration for the Workshop on July 20th. Photograph courtesy of Trevre Andrews.

Juli/Aug 2012 • TPG 5
The primary goal of the Workshop was to advance the knowledge of LNAPL behavior in the subsurface, including flow, transfer of components to water and gas phases, migration and distribution; site characterization and monitoring fundamental issues; key remediation concerns; and consultant’s case studies. The workshop also focused on the perspectives of owners and regulators on the application of a science-based LNAPL guidance developed by ITRC to efficiently move sites to closure and on creating a forum to promote the scientific information interchange between regulators, owners, and practitioners working in Michigan.

The first day was devoted to fundamental concepts, and the second day of the workshop was devoted to case studies of highly complex sites. The case studies illustrated how ASTM and ITRC guidance can be applied to a site. Mark Adamski with BP and Trevre Andrews with AECOM noted the workshop was the largest collection of presentations on LNAPL at a single workshop or conference in over five years.

196 attendees heard presentations on development of a site’s LNAPL Conceptual Site Model, LNAPL stability analysis and LNAPL recoverability evaluation. The cross section of speakers included representatives from academia, industry, regulatory, and consulting that presented the perspective of how information regarding LNAPL stability and recoverability is used to develop a realistic and effective conceptual site model used to establish remedial endpoints at a site. AIPG Michigan Section would like to thank all who attended the workshop and encourage you to share the knowledge gained at this informative presentation.

Several sponsors made the event possible and enjoyable for all. The sponsors include: Barr Engineering, Bureau Veritas, Conestoga Rovers & Assoc., Dakota Technologies, Dune Technologies, Fibertec, Inc., Fishbeck Thompson Carr & Huber, Gannett Fleming, Global Remediation Technologies, Hale & Aldrich, Mateco Drilling, and Stock Drilling. Our thanks to all the sponsors!

The Section Executive Committee would like to extend its appreciation to Sara Pearson, CPG-10650, and Kevin Lund, CPG-10052, the event organizers, for putting together another great workshop!

Geologists rock Michigan teachers with scholarships to DNR Academy-The Michigan Section of the American Institute of Professional Geologists has pledged scholarship money totaling $3,500 for Michigan teachers to participate in the Academy of Natural Resources this July 15-20 at the DNR’s conference center on Higgins Lake.

The Academy, now in its 5th year, is open to all educators who wish to learn more about natural resources in this week-long mixture of classroom and field experiences taught by a variety of professionals. The Academy offers four separate courses during the week, each with a different focus, but all connecting educators from the outdoors to the classroom. This year’s selections include: Forests, Fields and Fins; NatureQuest; Teachers into the WILD, and Natural Resources Curricula Certification.

Total cost for the Academy is $350.00 but the scholarships (at 100.00 per teacher) reduce the cost substantially. The remaining $250 cost covers five nights lodging, 15 meals and course materials. University Graduate credits are extra and up to 3.5 CEUs can be earned.

Attendees preparing for the kickoff of the conference as the first speaker is introduced by Kevin Lund and Sara Pearson. Photograph courtesy of Adam Heft.

Attendees enjoying a barbeque lunch on the shore of Higgins Lake. Photograph courtesy of Adam Heft.

President’s Message—Earlier this spring I met with a group of students at Concord University to discuss careers in environmental geology and hydrogeology as well as the benefits of joining AIPG. I encourage other section members to make connections with nearby college and university geology departments and involve the students in our meetings and field trips. They often do not hear about careers in geology in school and can really benefit from associating with practicing geologists.

One of the topics discussed at our business meeting was the nature of the Virginia professional geologist registration program and whether we want to work to change that program. Currently, the program is a voluntary “title” act. This means that you do not have to be registered to practice geology in Virginia. We discussed working with a state Senator or Delegate to introduce a bill to revise the act to a “practice” act making registration or licensure mandatory to practice geology in the Commonwealth. There have been reported incidents of individuals calling themselves geologists and presenting themselves as authorities when they did not have the appropriate training and experience to support that claim.

When we have pursued mandatory licensure in the past the bills have been rejected based on the philosophy of those in the General Assembly to minimize regulation of professions. That philosophy may have changed as the Soil Scientists were recently successful in passing mandatory licensure for their practice. Additionally, the Board for Geology is being merged with the Board for Professional Soil Scientists and Wetlands Professionals to form the Earth Science Board. So the time may be right if we decide to pursue mandatory licensure. I am interested in hearing from section members about whether or not they would be interested in pursuing such action. Please email or email me with your thoughts, mlawless@daa.com or (540) 552-0444.

Joe Norris, CPG-08002, is investigating the climate for pursuing a registration bill in West Virginia. If any of our West Virginia members are interested in helping him out please contact him at joe@norcosgo.com.

Mike Lawless-CPG-09224

Section President

Adam Heft, CPG-10265

Section Editor

John Barkach, CPG-09121

Section Vice President
# Registration Form

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## FEES AND PAYMENT INFORMATION

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<td>Spouse/Guest Full Registration (Admission to Welcome Reception, Breakfast, Lunch, Breaks and Exhibits)</td>
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<td>I Would Like to Support Student Registration</td>
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<td>Sitting Bull Crystal Caverns Tour and Mt. Rushmore</td>
<td>$95.00</td>
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<td>The Journey Museum, Food, and “Journey Into Space” Presentation</td>
<td>$18.00</td>
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<td>(Sat., 9/22, 5:00 pm – 9:00 pm)</td>
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<td>Eocene and Oligocene Geology and Paleontology of the White River Badlands</td>
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<td>Precambrian Geology and Mineralogy of Classic Pegmatite Localities in the Black Hills</td>
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<td>Paleofloods &amp; Hydrogeology of the Black Hills</td>
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<td>$125.00</td>
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<td>Devils Tower and the Bear Lodge Mountains: Laramide Plutons and Mineralization in the Northern Black Hills Uplift, Wyoming</td>
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<td>$125.00</td>
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<td>Homestake Mine Tour and Deadwood, SD</td>
<td>$95.00</td>
<td>$125.00</td>
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<td>(Sun., 9/23, 9:00 am – 5:00 pm)</td>
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<td>The 1880 Train, Keystone, SD and Mt. Rushmore</td>
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<td>(Mon., 9/24, 8:30 am - 4:30 pm)</td>
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<td>Tour of RESPEC’s Materials Testing Laboratory</td>
<td>$25.00</td>
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<td>(Mon., 9/24, 3:00 pm - 5:00 pm)</td>
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<td>South Dakota School of Mines &amp; Technology Paleontology Research Lab and Museum of Geology Tour</td>
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## FIELD TRIPS (Must be Registered for the Conference)

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<tr>
<td>Reclamation at Active and Closed Heap Leach Gold Mines in the Black Hills; Wharf, Richmond Hill, and Gilt Edge Mines (Weds., 9/26, 7:30 am - 6:00 pm)</td>
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<td>Gold Mineralization in the Black Hills (Weds., 9/26, 8:00 am - 5:30 pm)</td>
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<tr>
<td>Paleozoic and Mesozoic Reservoir Rocks of the Northern Black Hills Uplift (Weds., 9/26, 8:00 am - 6:00 pm)</td>
<td>$95.00</td>
<td>$125.00</td>
<td>$</td>
</tr>
<tr>
<td>Engineering Geology of the Black Hills and I-90/Hwy 79 Development Corridor (Weds., 9/26, 8:00 am - 6:00 pm)</td>
<td>$95.00</td>
<td>$125.00</td>
<td>$</td>
</tr>
</tbody>
</table>

## SHORT COURSE/ SOCIAL EVENTS (Must be Registered for Conference)

<table>
<thead>
<tr>
<th>Event</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Course - Natural Fractures in Hydrocarbon Reservoirs (Sun., 9/23, 8:00 am - 4:00 pm)</td>
<td>$225.00</td>
</tr>
<tr>
<td>Welcome Reception (Sun., 9/23, 6:30 pm - 8:30 pm) (please circle if attending)</td>
<td>Included with Registration</td>
</tr>
<tr>
<td>AIPG Past- Presidents Breakfast (Mon., 9/24, 7:00 am - 8:30 am) (please circle if attending)</td>
<td>Invitation Only</td>
</tr>
<tr>
<td>Awards, Dinner and Entertainment (Mon., 9/24, 6:00 pm - 8:30 pm)</td>
<td>$35.00</td>
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</tbody>
</table>

**TOTAL AMOUNT DUE $**

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**Organization Meetings (see Program for Dates and Times) – Please Indicate if Attending**

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Attending</th>
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</thead>
<tbody>
<tr>
<td>AIPG National Executive Committee Meeting (9/22)</td>
<td>yes / no</td>
</tr>
<tr>
<td>AIPG 2012 Advisory Board Meeting (9/22)</td>
<td>yes / no</td>
</tr>
<tr>
<td>AIPG 2012-2013 Joint Executive/Business Mtg. (9/22)</td>
<td>yes / no</td>
</tr>
</tbody>
</table>

Full AIPG, Oil & Gas, and Non-Member Registration Includes: Welcome Reception, Technical Sessions, Student Poster Sessions, Exhibits, Registration Materials, Continental Breakfast, Lunch, and Breaks on Saturday, Monday, and Tuesday.

I understand that by registering for the AIPG and SDSM&T New Horizons in Oil & Gas Conference 2012 Annual Conference & Exhibition, I release and agree to indemnify The American Institute of Professional Geologists (AIPG) and the SDSM&T New Horizons in Oil & Gas and their agents, officers, volunteers and employees from all liability for any loss, damage or injury sustained by me while involved in any way with the Conference and Exhibition except that AIPG and the SDSM&T New Horizons in Oil & Gas are not released from such liability to the extent the same is caused by its actual negligence or willful misconduct. I have read and understand this waiver and release.

I also understand that submission of this registration form gives AIPG and the New Horizons in Oil & Gas the authority to utilize any photograph taken of me at the conference for conference related publicity (e.g., photo gallery on CD, web site, TPG, etc.).

Hotel Information: Best Western Ramkota Hotel, 2111 N. LaCrosse Street, Rapid City, SD 57701, (605) 343-8550.

**METHOD OF PAYMENT**

**PLEASE CHECK METHOD OF PAYMENT**

- [ ] Check No. Enclosed (drawn in U.S. Dollars on a bank located in the US or Canada)
- [ ] International Postal Money Order (in U.S. Dollars)
- [ ] VISA  [ ] Master Card  [ ] American Express *(Credit cards are processed in US dollar amounts only)*

Card No. Exp. Date CVV

Print name of cardholder: ____________________________

REQUIRED: Credit Card Billing Address (street, city, state, and zip):

__________________________________________________

__________________________________________________

Authorized Signature ____________________________

**Mail to:**
American Institute of Professional Geologists
12000 N. Washington Street, Suite 285, Thornton, CO 80241
or fax to (303) 253-9220 or register on-line at www.aipg.org, phone (303) 412-6205

Refund Policy: A 90% refund of total fees paid (10% withheld to cover administrative costs) will be given upon receipt of a written request until 7/31/12. Cancellations made by written notification received between 8/1/12 and 9/7/12 will be assessed a charge of 20% (to cover administrative costs) of the total fee paid. NO refunds will be given for cancellations received after 9/7/12 or for no-shows after the meeting. Substitutions welcome. Based on the decision of AIPG and New Horizons in Oil & Gas field trips and short courses are subject to cancellation due to lack of participation. Notification and a full refund for field trips or short course will be given in case of required cancellations.
## PROGRAM

### Saturday, September 22, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 am – 5:00 pm</td>
<td>Registration – Hotel Lobby</td>
</tr>
<tr>
<td>7:00 am – 8:00 am</td>
<td>AIPG Executive Committee Breakfast (complimentary to all registrants)</td>
</tr>
<tr>
<td>8:00 am – 12:00 noon</td>
<td>AIPG Executive Committee Meeting (open to all registrants)</td>
</tr>
<tr>
<td>9:00 am – 3:00 pm</td>
<td>Guest Trip – Sitting Bull Crystal Caverns Tour and Mt. Rushmore</td>
</tr>
<tr>
<td>1:00 pm – 4:30 pm</td>
<td>AIPG Advisory Board Meeting (open to all registrants)</td>
</tr>
<tr>
<td>4:30 pm – 5:00 pm</td>
<td>AIPG 2012-2013 Joint Executive Committee Meeting &amp; Business Meeting (open to all registrants)</td>
</tr>
<tr>
<td>5:00 pm – 9:00 pm</td>
<td>Journey Museum, Food, and “Journey Into Space”</td>
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### Sunday, September 23, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:30 am – 5:00 pm</td>
<td>Registration – Hotel Lobby</td>
</tr>
<tr>
<td>8:00 am – 4:00 pm</td>
<td>Short Course – Natural Fractures in Hydrocarbon Reservoirs</td>
</tr>
<tr>
<td>8:00 am – 6:00 pm</td>
<td>Field Trip – Eocene &amp; Oligocene Geology and Paleontology of the White River Badlands</td>
</tr>
<tr>
<td>8:00 am – 6:00 pm</td>
<td>Field Trip – Precambrian Geology and Mineralogy of Classic Pegmatite Localities in the Black Hills</td>
</tr>
<tr>
<td>8:00 am – 6:00 pm</td>
<td>Field Trip – Paleofloods and Hydrogeology of the Black Hills: 40th Anniversary of the 1972 Rapid City Flood</td>
</tr>
<tr>
<td>8:00 am – 6:00 pm</td>
<td>Field Trip – Devils Tower &amp; the Bear Lodge Mountains: Laramide Plutons and Mineralization in the No. Black Hills Uplift, WY</td>
</tr>
<tr>
<td>9:00 am – 5:00 pm</td>
<td>Guest Trip – Homestake Mine Tour and Deadwood, SD</td>
</tr>
<tr>
<td>6:30 pm – 8:30 pm</td>
<td>Welcome Reception – Exhibit Area Open (complimentary for all registrants)</td>
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### Monday, September 24, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:00 am – 5:00 pm</td>
<td>Registration – Hotel Lobby</td>
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<tr>
<td>7:00 am – 8:30 am</td>
<td>AIPG Past President’s Breakfast (by invitation)</td>
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<tr>
<td>8:30 am – 5:00 pm</td>
<td>Technical Sessions</td>
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<tr>
<td>8:00 am – 5:00 pm</td>
<td>Guest Trip – The 1880 Train, Keystone, SD and Mt. Rushmore</td>
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<tr>
<td>9:00 am – 5:00 pm</td>
<td>Exhibits Open</td>
</tr>
<tr>
<td>12:00 noon – 1:30 pm</td>
<td>Luncheon with Keynote Speaker (complimentary to all registrants)</td>
</tr>
<tr>
<td>6:00 pm – 8:30 pm</td>
<td>AIPG Awards, Dinner and Entertainment (AIPG members and non-members welcome with additional fee)</td>
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### Tuesday, September 25, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:00 am – 9:00 am</td>
<td>AIPG Foundation Meeting</td>
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<tr>
<td>7:30 am – 4:00 pm</td>
<td>Registration – Hotel Lobby</td>
</tr>
<tr>
<td>8:00 am – 5:00 pm</td>
<td>Technical Sessions</td>
</tr>
<tr>
<td>8:30 am – 11:00 am</td>
<td>Guest Trip – SDS&amp;MET Paleontology Research Lab &amp; Museum of Geology Tour</td>
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<tr>
<td>9:00 am – 4:00 pm</td>
<td>Exhibits Open</td>
</tr>
<tr>
<td>12:00 noon – 1:30 pm</td>
<td>Luncheon with Keynote Speaker (complimentary to all registrants)</td>
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<tr>
<td>1:30 pm – 4:00 pm</td>
<td>Guest Trip – Prairie Berry Winery Tasting</td>
</tr>
<tr>
<td>3:00 pm – 5:00 pm</td>
<td>Field Trip – Tour RESPEC’s Materials Testing Lab</td>
</tr>
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### Wednesday, September 26, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:30 am – 6:00 pm</td>
<td>Field Trip – Reclamation at Active &amp; Closed Heap Leach Gold Mines in the Black Hills</td>
</tr>
<tr>
<td>8:00 am – 5:30 pm</td>
<td>Field Trip – Gold Mineralization in the Black Hills</td>
</tr>
<tr>
<td>8:00 am – 6:00 pm</td>
<td>Field Trip – Paleozoic and Mesozoic Reservoir Rocks of the Northern Black Hills Uplift</td>
</tr>
<tr>
<td>8:00 am – 6:00 pm</td>
<td>Field Trip – Engineering Geology of the Black Hills and I-90/Hwy 79 Development Corridor</td>
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</tbody>
</table>

Best Western Ramkota Hotel and Conference Center
2111 N. LaCrosse Street, Rapid City, SD 57701
(605) 343-8550 - Room Rate $94
The AIPG Executive Committee is pleased to announce the awardees for the 2012 Student Scholarships. AIPG has awarded six scholarships this year. The recipients are Alexandra Breeding, Texas A&M University, Kingsville, Texas; Na Hyung Choi, The University of Georgia, Athens, Georgia; Rania Eldam, Jackson School of Geosciences at The University of Texas at Austin, Austin Texas; Brooklyn Hildebrandt, University of North Carolina Wilmington, Wilmington, North Carolina; Jennifer Kasbohm, Yale University, New Haven, Connecticut; Don Osborne, Columbus State University, Columbus, Georgia; Kristina Pourtabib, Eastern Illinois University, Charleston, Illinois; and Jenna Schmidt, University of West Georgia, Carrollton, Georgia.

The scholarships are made possible by the support of the Foundation of the American Institute of Professional Geologist and the AIPG members voluntary contributions.

Alexandra Breeding, SA-1749

Geology was not a study I had thought of pursuing before I went to college. I considered chemistry and engineering and art and computer science and law, but not geology. Rocks were fascinating, but I do not recall being conscious of them as the focus of study. Therefore, I took chemistry classes and planned my mechanical engineering degree while I doodled in notebooks and taught myself computer programming. Then, by chance of an invitation from a professor, I took an earth science class. I have not looked back since then. Something about the subject knocked me silly. Maybe it was the way a natural laboratory could create structurally unparalleled compounds with the most beautiful shapes and colors; maybe it was that I could see how groundwater moves through complex sedimentary facies by modeling the geology with a computer; maybe it was because I wanted something to take all the pieces of what I was learning and ask for more. Playing with rocks, I finally got to use everything I knew to make sense of a problem. I have never enjoyed learning about something more than I have learning about the earth.

Fortunately for me, I have had the privilege to work on several research projects since I joined the geology department. Initially, my advising professor put me on his research grant, producing contaminant transport groundwater models for the Army Corps of Engineers. Over the span of two years, I worked with several other students to adapt generalized block models of fluvial and deltaic environments into mesh-generated solids with GMS (Groundwater Modeling System).

Concurrently, I worked with two other students on a field project, wherein we interpreted the reservoir potential of an outcrop of the Edwards Reef formation. We mapped the outcrop for facies boundaries and made preliminary predictions of which sections would provide the best reservoir rock. I made forty thin sections from the hand samples collected on location and examined them with a petrographic microscope to determine average porosity of the various facies. Upon concluding that the reef flank would make the optimum reservoir in the formation, we confirmed our thoughts by reading Dr. Henry Nelson’s interpretation of the formation.

More recently, I have taken significant interest in igneous processes. Last year, I mapped a pegmatite in central Texas with the purpose of determining the economic viability of the rare earth minerals it contains. In addition to a rough volumetric estimate of rare earth rich fluorite veins that transected the pegmatite, I took a number of samples to the Army Corps of Engineers in Vicksburg, Mississippi and prepared them for analysis with a scanning electron microscope and X-ray diffractometer. I produced elemental spectra and X-ray dot maps for six samples from the pegmatite with the intent to write a report with complete chemical analyses for my geochemistry class. This project has reaffirmed my growing preference for igneous geochemistry. I particularly want to continue studying rare earth element deposits in igneous rocks.

I want to be a professional geologist because I cannot imagine having more fun than I do when I am mapping a pegmatite or examining a thin section or interpreting a map. I love looking at an outcrop that nobody has ever bothered with before and trying to recreate its history. It feels like I am learning the fundamental devices of the earth when I learn how a formation came to be. It’s addictive and I am intent on making it my business.

Na Hyung Choi, SA-3141

Sauntering through a trail with heavy foliage is one of my favorite pastimes -- a surprise scenery sometimes awaits behind the leaves. Last summer, I emerged from such a trail onto the edge of a vast and sinuous gneiss outcrop. On the opposite edge, the Chattooga River gushed over the hill of naked metamorphic rock. Here at Woodall Shoals, South Carolina, I scurried from one spot to another with a notebook and a camera, searching for clues to deformation phases. This first field project of mine gave me the challenge and satisfac-
tion of addressing a question about the very mountains I live on. Similarly, addressing questions about the very planet we live on is not only intellectually stimulating but also critical to the status of our communities. As a geologist, I want to help foster public discussion about controversial issues, explore our physical world, and eventually teach and inspire young minds.

A process of elimination and the intriguing idea of a mandatory field program brought me to my major, but I found true joy in studying geology while learning more about the world’s people. A lecture about climate change by NOAA’s Susan Solomon taught me that some people denied global warming. News of physically and emotionally torn Haitians led me to learn that earthquakes are virtually impossible to predict. Like mine, the public’s understanding of our physical world is full of misconceptions that often lead to unnecessary arguments or disasters. For this reason, I would be honored to be a part of the search for knowledge and the paths for communication as a geologist. As a Geology Club officer on campus, I plan to organize current issue discussions open to everybody. These discussions would inform scientists and non-scientists, geologists and non-geologists, about each other’s point of view. As a geologist, environmentalist, and person of faith, I want to foster understanding among different people by advocating exchange of ideas and writing about science for the public.

Last semester I read a memoir on Greenland excursions by Willi Dansgaard, the pioneer of oxygen isotope paleoclimatology. His strange stories of analyzing rain in beer bottles and ramming a ship into icebergs for samples epitomize the kind of adventures I would like to have. As a geologist, not only can I travel to places of natural wonder, but I can also probe into the reasons for their shape and composition, revealing their significance in the history of Earth. The upcoming summer field school in Colorado excites me for this reason. The short trip to Woodall Shoals gave me a taste of that experience, but the field work immersion and adventures in an unfamiliar region will be a milestone in my training as a geologist.

My past two years as a geology student have stirred up in me an interest in paleoclimate and structural geology, and I would like to combine my love of learning and of teaching to become a geology professor. Conversations with a professor about paleoclimate records in stalagmites and about environmentalism sparked my interest to read the Dansgaard memoir. Also, this year I started working under professor Sandra Wyld, a Science Editor for Geology. Assisting her editorial duties by combing through submissions and working with a graduate assistant in helping structural geology students in labs are solidifying my interest in researching and teaching geology for life.

Out of the myriad of subjects to study at the University of Georgia, I am thankful to have found geology. The globally divisive issues it inquires about—climate change, evolution, and resource exploration, to name a few—make geology a source of important understanding and, possibly, of steps toward peace. I hope that my appreciation for geology will only get richer with age, and that I will inspire young minds and the public to do the same through my teaching and writing. Perhaps someday I will invite a student of mine to step out of a trail, onto a beautiful outcrop that will inspire her to inquire about the depths of Earth’s history.

Rania Eldam, SA-3215

Three years ago, I knew nothing about the geosciences. I was a dramatic writing major who had just transferred to the University of Texas at Austin from New York University to pursue a film degree at a university a bit closer to home. I was forced to take a natural science credit by my department, thought that the “Age of Dinosaurs” class looked easy and fun, and so I enrolled in the class. Once I began to learn a bit about the obscure science, I was addicted. Four weeks into class and I was chatting with Dr. Timothy Rowe about possible ways to get involved with research. They never saw me as a joke, this girl that had been writing screenplays and plays for two years; they saw me as potential. I began working with dinosaur fossils and learning computer modeling programs to work with CT data of avian skulls. I applied for a transfer into the Jackson School of Geosciences, and was accepted in the Fall of 2010, on the Deans’ Honors List with an academic scholarship.

After a year of working in paleontology and taking a few more geology classes, I decided to broaden my expanse of knowledge in the school. I inquired about other undergraduate research positions, and acquired a job with Dr. Jaime Barnes, working in her brand-new stable isotope geochemistry laboratory. I mostly did rock crushing and picking grains for the first semester, but I couldn’t get enough. I applied for the Undergraduate Honors Research Program (UHRP) in the Spring of 2011, and was accepted that following summer.

My current research interests include fluid-rock interactions, metasomatism, high temperature petrology, metamorphic reactions, structural geology, and subduction zone processes. I am now presently working on three different research projects that cover a wide range of analytical methods within the field of geochemistry. This past summer I conducted two weeks of field work assisting a Masters student with her thesis project. We collected eclogites, blueschists, and serpentinites from the Franciscan Complex. These samples were analyzed for both their stable oxygen and hydrogen values using an isotope ratio mass spectrometer to determine fluid source interaction with these rocks within the subduction zone. In addition, I am also working on a transect of rock samples from the Tianshan mountains in western China to understand volatile loss and fluid migration during subduction. My honors thesis project concentrates on serpentinites from California. I plan to use stable isotopes (particularly chlorine, hydrogen, and oxygen) and major- and trace-element geochemistry to determine the tectonic setting of serpentinization and incorporate this information into a tectonic model for western California. I have also applied for admittance into the RISE-DAAD Program in Germany for this upcoming summer to work with a PhD student at the University of Muenster, utilizing experimental petrology and geochemistry to assist in the development of a model of pyroxene amphibole metasomatism from rock samples collected in SE Norway.

I want to become a geoscientist because to me, the geosciences are vital and timeless. I have stayed in my lab working until 3:00 am because I’m so wrapped up in my new data that
Brooklyn Hildebrandt, SA-3395

Geology: The Answer to My Question

In the second grade, I received my first ever parent-teacher conference. Although I wasn’t sure what it was for, I knew it wasn’t good. After the conference, I was switched into another class and when I asked my mom why, she told me I had asked Mrs. So and So too many questions.

“Too many questions?” I remember saying as I was flabbergasted by my mom’s statement. I didn’t understand how I was supposed to learn without them.

“Some teachers just don’t take well to students like you, Brooklyn. You’ll love your new teacher though, she’s very sweet,” my mom left the issue by the wayside like it was another week’s garbage.

I think it was then that I learned the importance of questions. Of questioning the answers given to me, questioning the world around me, and even questioning myself. Eventually, I learned the question-welcoming subject was science. Science was the first class that taught me how to question and what my questions could lead to with proper efforts. A scientist, to me growing up, was the Queen of Questions, and I knew I wanted to be her one day.

Fast forwarding to my freshman year at the University of North Carolina at Wilmington, I took every science class I could, only to find my semesters falling short of wonderment. The following summer, I was working at the UNCW Center for Marine Science and came across a book written by the chair of the Department of Geography and Geology. Without hesitation, I called the author and made a meeting. Three days later I was a declared geology major. Admittedly, I began to question my spontaneous act in the days leading up to my first conference. Although I wasn’t sure what it was for, I knew it wasn’t good. After the conference, I was switched into another class and when I asked my mom why, she told me I had asked Mrs. So and So too many questions.

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Geology, I learned, was more than just the study of rocks; it is the study of life, as we know it. The life we understand today would be nothing without the geological puzzle that gives us insight to past life on Earth and the biological life we observe today would be completely different without it. To be a geologist is to be so many things, in my opinion. The beauty of the geologist is his or her versatility and ability to be involved in every aspect of today’s society through their dedication to and passion for seeking answers to the questions they never hesitate to ask.

Whether it is mapping outcrops for the purpose of a historical interpretation of an area, core logging to determine the size and value of an economically valuable deposit, or understanding the effects of erosion and rising sea level on an area’s morphology and deciding upon a solution, the geologist is valuable everywhere, even outside the world of science. Geologists are problem solvers and innovative thinkers, and I would like to consider myself one.

Coastal geology and morphology is undoubtedly the area I am most inclined to; however, I refuse to limit myself in my undergraduate education. Without understanding every aspect of geology and how the Earth works, it is difficult to be a geologist- so I have strived hard to take diverse classes and give every concentration a chance. To be honest, I haven’t quite figured out exactly where I want to go with my degree because I can’t imagine graduating next year. My ideal situation would be to enroll in graduate school, as I want to continue my learning efforts and become more knowledgeable in the fields that interest me the most, such as coastal and marine geology. Eventually I want to call my work my home: I want it to be more than a desk or a lab. I want it to be a community. Nothing seems greater to me than working in a community where questions are always happily received and even encouraged, where individuals work together and off of each other. Living in a world with so many questions waiting to be asked, how could I let myself do anything but?

Jennifer Kasbohm, SA-3457

Growing up, I wanted to be a spy. Not the James Bond kind of spy, the idol of teenage boys everywhere. My fascination with espionage came in fifth grade, with the release of a new television show called “Alias.” In this series, Jennifer Garner played Sydney Bristow, a double agent for the CIA who fights to bring down an evil terrorist organization. Despite the dangers of her job and the adversity she faced, Sydney was everything I wanted to be. She was smart and poised, athletic and determined, cool under pressure, and above all, resourceful. Schooled in weapons and martial arts and the master of many languages and disguises, Sydney could handle any situation with confidence. Her missions took her to exotic locations all over the world, from Rome to Siberia to Indonesia to Egypt. With a chameleon’s skill, Sydney played any role, for one slip could mean certain death. Her ability to handle these dangers in spite of being female made her far more interesting to me than James Bond.

I was determined to walk in Sydney’s footsteps; with the naivete of a pre-teen girl, I set my sights on becoming the perfect candidate for the CIA. I took the hardest courses offered at every grade level, to be ready for the challenges of any mission. I earned a third degree black belt in Tae Kwon Do so that I would be ready to defend myself in any situation. I mastered Spanish as a stepping-stone to the study of other languages. I traveled widely with my family, to grow in cultural experiences and broaden my worldview. With each new achievement, I moved closer to my dream of becoming Sydney Bristow.
As the years passed, my plan was coming together perfectly. But one day I had a sudden epiphany: Sydney is nearly killed in every episode! I, however, do not want such risk to be part of my daily routine. Unlike Sydney, or Bond for that matter, I want my life to be stirred, not shaken by danger and betrayal. But what could possibly replace my goal of saving the world as a spy? Perhaps something safer, and more urgently needed—saving the world through the study of geology.

The skills I pursued for the CIA will be equally useful in this dynamic field. I have always loved academic challenges in all areas, and have honed the investigative passion and analytical skills essential for performing research. Instead of questioning terrorists in their cells, I question the rocks I see and collect in the field. My study of stratigraphy allows me to discover in what environment they were deposited, and my research in paleomagnetism enables me to track their movements, from their place of origin to how they have moved since formation. As a Geology & Geophysics major at Yale, I have been able to travel the world as Sydney did. In the last 3 years, I have spent a total of 10 weeks on international and domestic geology field trips and field work in Namibia, South Africa, Sicily, the Adirondacks, and the Hartford Basin. This summer, I am looking forward to using my Spanish skills as an interpreter for a seismology project in Peru, and to continuing my paleomagnetism research project in Namibia. Finally, my 15 years of studying Taekwondo have given me the confidence to leave the safety of the laboratory and to venture into places that I would have otherwise avoided.

My education, experiences, and defense skills will undoubtedly aid me in my goal of becoming a professional field geologist. I aim to become a geology professor specializing in Precambrian earth history. At first glance, it seems that studying continental movements and depositional environments of almost one billion years ago will do little to “save the world.” However, Earth’s burgeoning population will soon need more mineral resources to enable industrial, technological, and economic development. Future society requires geologists to continue exploring the resources in the crust. By traveling to new areas of the world to collect the rocks that will shed light on continental reconstructions, I will also be on the lookout for potential new resource deposits. And as I shake up the research community with my contributions to scholarship in the field, I will also stir my students to make discoveries of their own.

Geology has traditionally been a male-dominated field. However, when I succeed in my new mission, I will become the Sydney Bristow of geology, an alternative to all of the Geo James Bonds. As I work to save the world, I will inspire the next generation of young women to do the same.

Don Osborne, SA-3137

Ever since I was a child I was fascinated by the Earth. I wanted to learn more about the world around me, and grew up in Northern Florida along what I now know to be the coastal plain. Attending a small rural community school system gave me some insights into earth sciences, at least as much as a meager public school system budget would allow. I, out of all the toys I had received in my preteen years the one I remember the most was a small mineral sample box that my grandparents bought me on a trip to a flea market one weekend. The sample box contained hand samples of pyrite, galena, halite, and calcite. As a child I was fascinated by the samples and they were akin to treasures to a young boy in a farming community.

I reached adulthood and at that time pursuing college and even more specifically a science degree seemed the most unobtainable of all goals to an 18 year old. So I joined the military and served my country in a unit specifically trained for mountainous terrain. While in the service I often wondered about how the mountains of North Georgia were formed. It was with the same sense of wonder I had with that simple box of minerals as a child. I left the service, tried miserable to attend college for one quarter. I left that quarter with a disappointing 1.39 GPA, and started a family and left those questions in the past.

Three years ago I seen the opportunity to try one last time to realize the chance for a degree and enrolled at the local college. I attended my freshman year as an undeclared major, studied hard, managed my time for work, family, and brought my GPA to a 3.00. I continued to raise my GPA semester by semester to now a respectable 3.55 overall, a 3.90 at campus level, an active member of the University’s Honors Program, and have been awarded Dean’s list three times. I actually signed up for an Introduction to Geology course for the sole reason that it fit conveniently in my schedule, not that it evoked any real interest at the time.

That all changed from my first lecture, I suddenly realized that several life experiences had been leading me to geology, not just as a career, but also as a passion. I began to learn answers about how processes shaped the places I had lived, worked or visited. I learned that I am humbled by the amount of time that is encompassed by this field, and the scale of the processes that shape the world around us.

In closing I can only express why I want to be a geologist into one simple reason, I want to be able to answer the question as to what happened to an area in the past, to explain how what is observable now came to be. I want to satisfy the curiosity that this field has reigned in a child’s curiosity from so many years ago.

Kristina Pourtabib, SA-3410

Ever since I can remember, I have been fascinated with the Earth. Even today I have fond memories of my family’s annual vacations to various National and State Parks all across the continental United States. I can still picture my younger self standing in awe every time we came to a vantage point on our hikes and not yet being able to wrap my then elementary school educated mind around how these spectacular landscapes came into existence. As a young kid I was an avid rock collector from all of our trips, and over the years I have amassed, what I think to be, quite an impressive rock collection. To this day, that same rock collection which currently resides in my basement, neatly organized into various tackle boxes, has me impressed with my younger self at the unique samples I was fortunate enough to have obtained. From those early signs, one would think that my love for the outdoors and
for the Earth would have led me directly down the career path to becoming a geologist, but it actually took quite some time for me to figure that out for myself. Unfortunately, throughout my early years of schooling, geology was always portrayed as more of a hobby than a viable career option, and it was because of this early learned mentality towards geology that it took me so long to change my perspective and consider geology as a real educational option.

It was during my Introduction to Geology course, second semester of my freshman year of college, when I finally realized that I want to be a geologist. Up to that point in my life, no other course that I had taken had sparked my interest or intrigued me quite like that class. After my career epiphany, I transferred to a university with a program in geology and have never regretted my decision nor lost any bit of that initial passion I had for geology. If anything my enthusiasm for all things geology related has only grown. Geology is, in my opinion, one of the most interesting and multi-discipline encompassing areas of study. Geologists are akin to detectives in the sense that they are given a set of clues, visible in the rock record, and have to apply their knowledge of the Earth in order to recreate the geologic history of an area. They need to be well rounded in their education as well, in order to be able to think out situations logically and accurately. I want to be a geologist because I am a problem solver. I want to be able to try and comprehend the processes that have taken place and are taking place on the Earth and the surrounding planets. The work of a geologist is not only confined to the interpretation of the formation of the Earth, but can be found most everywhere, like from the buildings we live into the products we use, geology is such a prominent, underlying part of our society. Geologists are given the privilege of having seemingly limitless choices when it comes to finding a job in geology. The amount of variation in the job marketplace for geologists makes the career that much more exciting. I want to be a geologist because I want to have the opportunity to find a unique job and to be able to apply my education to so many different applications of geologically related work.

There are many different reasons of why I want to become a geologist, but my first and foremost reason for following down the education path to graduating with a degree in geology is the simple fact that there has been no other discipline that can amaze me, intrigue me, and raise hundreds of questions in me all in the same moment. I am currently learning and will be learning as much as I can about geology, and that is what I love about the discipline. Being a geologist is never boring, there is always some new piece of information to take away from either a lecture, from being out in the field, or even if it is just finding another cool rock to add to my ever expanding collection. I do not just want to be a geologist, I am a geologist. I am already following down my own path to finding a career in geology, and I cannot wait to get out into the world as a geologist, and start problem solving.

Jenna Schmidt, SA-3049

Why I Want to Be a Geologist

I do not have any elaborate reason to explain why I want to become a geologist. I guess you could say that it just seems to fit who I am. I have always found science in general to be a fascinating subject. I think it is amazing how mankind can have so much knowledge built up over so many years. It astonishes me how we can know so much about the planet we live on.

My journey into the world of geosciences began my senior year of high school when I decided to take an environmental science class. I originally took the class for the AP credit, but little did I know it was a decision that would affect my entire future. I ended up loving the class.

I learned about so many current issues going on in the world and affecting our planet. I felt as if I had been blind to so many important issues for so long. I asked myself, “Why don’t more people know about these things?” It was then that I felt the urge to pass this knowledge onto others. So naturally when I went off to college, I chose environmental science as my major. Well, one of the required classes for this major is physical geology. I think it was in the first week of the class that I fell in love with geology. I loved learning about all the rocks and minerals that I had had in my rock collection as a kid. I changed my major to geology before the semester even ended.

Now, as a junior, I am in the middle of my second semester of upper level geology classes, and I still love it just as much as I did in that first week of class. Every day I look forward to what I will learn in that day’s classes. Currently, I am working with one of my professors on an independent research project studying pegmatite samples collected from St. Peters Dome in El Paso County, Colorado. Mineralogy is one field that I find to be particularly fascinating. I know that I am only at the very beginning of my journey to be a professional geologist, but I cannot wait to get there. I know it will be a long road with a lot of hard work as I go onto graduate school, but I am ready to take on the challenge. I look forward to continuing my education and eventually leaving my own mark on the world of professional geology.
American Institute of Professional Geologists (AIPG)
Georgia Section Presents:

4th Conference on: Innovative Environmental Assessment and Remediation Technology

Schedule: Wednesday September 12, 2012 and Thursday, September 13, 2012
7:45 AM - 5:00 PM
7:45 AM - 4:00 PM

Location: Kennesaw State University
Continuing Education
3333 Busbee Drive
Room 400
Kennesaw, Georgia 30144

This conference will focus on innovative assessment and remediation technologies being used in the environmental field. Case studies will include petroleum hydrocarbons and chlorinated solvents sites. Presenters will include representatives from private consultants, regulatory personnel, industry, and legal backgrounds. Attendees will earn 14 personal development hours of continuing education.

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The use of geology and geologists by fiction writers has been ongoing since the late 1800s. The following table summarizes the more well known stories where geology and its practitioners have played a part, for good or ill, in various crimes and plots that include mining swindles, murder, scientific intrigue, high treason, and the end of the world.

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Character</th>
<th>Works</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conan Doyle, Sir Arthur – late 1880s to early 1900s</td>
<td>Sherlock Holmes</td>
<td>A long bibliography of novels and short stories. Conan Doyle non-Holmes work <em>The Lost World</em> (1912) describes the competing views of Victorian-age paleontology and evolution.</td>
<td>Holmes expertise in geology is introduced in <em>A Study in Scarlet</em> (1887) in Watson’s famous line “…Knowledge of Geology. Practical, but limited.” This characterization certainly describes my own capabilities and, to one extent or the other, probably most other geologists as well. Geology is highlighted further in several other stories (e.g., <em>The Sign of Four</em> (1890) and <em>The Five Orange Pips</em> (1904).</td>
</tr>
<tr>
<td>Freeman, R. Austin – 1916 though 1925</td>
<td>John Thorndyke</td>
<td><em>John Thorndyke’s Cases</em> (1916); <em>The Shadows of the Wolf</em> (1925); and <em>The Puzzle Lock</em> (1925)</td>
<td>The use of foraminifera, phonolite, and eolian sand to track down murderers and other assorted miscreants.</td>
</tr>
<tr>
<td>Upfield, Arthur William – 1928-1961</td>
<td>Inspector Napoleon Bonaparte (Bony)</td>
<td>Over 20 mystery novels set in the Australian outback. Although not a geologist, Bony regularly interacts with, arrests, and investigates geoscientists and their nefarious doings.</td>
<td>Gritty tales that bring to life post-World War I Australia. The main character struggles to overcome the racial and cultural stereotypes that exist even in one of the most remote parts of the world.</td>
</tr>
<tr>
<td>Andrews, Sarah – 1984 to present</td>
<td>Em Hanson</td>
<td>11 forensic geology fiction novels and numerous other non-fiction publications about the geologist as mystery writer</td>
<td>Em Hanson is not an easy character to like and her frequent emotional battles with family, friends, lovers, and employers makes me wonder why anyone would want to hang out with her.</td>
</tr>
<tr>
<td>DuBrul, Jack – 1998 to present</td>
<td>Philip Mercer</td>
<td>Seven action adventure novels with geology and geologists as integral plot components</td>
<td>Brings to mind Clive Cussler’s <em>Dirk Pitt</em>. Who knew there were so many ways for a geologist to save the world from total destruction?</td>
</tr>
<tr>
<td>Miller, Susan Cummins – 2002 to present</td>
<td>Frankie MacFarlane</td>
<td>Five geo-sleuth novels focused on research projects that somehow regularly intercalate with murder</td>
<td>Field work is the setting for these stories and the author has a great feel for what it is like to be a working geologist.</td>
</tr>
</tbody>
</table>

Sources for this table include Sarjeant, 1994 and 1995 and information from www.thenakedscientists.com web site forum “Geology in Fiction”.
There are numerous other stories where geologists play a role, but I limited the above list to those authors where geology makes regular appearances or is involved in a meaningful way in the story line.

One of the author’s who has incorporated geology into many of his tales is Stephen King. Although not thought of as an action adventure writer, King’s use of geology is subtle, yet pervasive. For example, in King’s novella *Rita Hayworth and Shawshank Redemption*, geology plays an important part in the mechanics of the story as well as in describing the attitude of the main character to his long prison term. Quoting Red, the story’s narrator: “Geology is the study of pressure and time. That’s all it takes really... pressure... and time... That, and a big goddamn poster.”

**Geology in the Works of Stephen King**

Stephen King (1947 - ) is one of the most prolific, popular, and critically well-regarded writers in the United States and perhaps the world. He has written 50 novels (2011 count), five non-fiction books, and nine short story collections. King also has produced, appeared in, and adapted movie and television screenings for at least nine of his works. He is a semi-accomplished musician and lives a relatively private, quiet life in Bangor, Maine. I have been a fan and avid reader of his fiction and non-fiction work since the late 1970s when, in a snow bound Cleveland airport coming back from my first field assignment as a working geologist, I picked up a copy of *The Stand*. This 1,300-page thriller about the battle between good and evil in a post-apocalyptic America, where the Rocky Mountains play a key part in the final scene, kept me enthralled and occupied through the enforced 18 hour lay-over at a crowded and chaotic airport.

I re-discovered King this past summer, during a period of forced convalescence after a minor health scare, when I had the chance to re-read several of his books. In doing so, I was struck by how much geology and geologic processes contribute to King’s story lines and character development. Possibly his roots in rural Maine, a state where geology dominates the landscape and many parts of the economy, have sensitized King to the influence earth features can have in real-life’s routine, and fiction’s extraordinary, events.

King’s integration of geology into his stories and characters is worth examining for several reasons. Given the wide reach of his novels and short story collections (over 350 million copies sold), King’s work regularly makes best-sellers lists. His use of geology exposes the public to our profession in ways only slightly less dramatic than major earthquakes and tsunamis. It is therefore worthwhile to check on the accuracy or reliability of King’s terminology and geologic science. In addition, the integrity of King’s geology is an important literary factor in the credibility (i.e., readability) of his stories. Part of the value of Isaac Asimov’s and Kim Stanley Robinson’s books were that they were (generally) technically reliable.

Reading fiction involves suspending the everyday by the reader is less burdensome and more enjoyable if the author can provide a realistic framework in which the characters operate and the plot naturally develops. Authentic geology is an important, and in some of the stories, a crucial component of the worlds King fabricates and asks his “Constant Reader” to join him in for a little while.

I chose two of King’s writings that illustrate his relationship with geology: *Desperation* (1996 – Penguin) and the seven volume Dark Tower series (various publishers, 1982-2004). *Desperation* is set in Arizona at a recently reopened porphyry copper mine that has a tragic past, the China Pit. Unfortunately for the people of the small town of Desperation, the mining company taps into more than finely disseminated native copper in a quartz monzonite groundmass when they unseal a 100 year old adit. The Dark Tower series, King’s self described Jupiter – because it dwarfs all of his other work – is a travelogue of five unlikely companions’ search for and discovery of the Dark Tower, the actual and metaphorical nexus of all universes. The value of the Dark Tower series in illustrating King’s relationship with geology is that much of the story involves the characters walking west across a rough approximation of the United States, in intimate contact with the land and terrain. During this trip and, to a lesser extent in *Desperation*, King uses geology in three ways to advance the story line: (a) as a descriptor that sets the stage or tone for a current or upcoming scene; (b) as a plot device that enables or contributes to the actions of protagonists and antagonists; and (c) as a connector that joins the story’s reality to alternate universes or supernatural worlds.

N.B. For those of you not familiar with King’s characters and their special vocabulary, I have included a short explanation of terms, offset by brackets [ ].

**Geology as a Descriptor**

At the beginning of *Basin and Range*, John McPhee calls geology a descriptive science and “…a fountain of metaphor”. He provides several examples of how geologists name things “…in a manner that sent shivers through the bones”. King’s vivid accounts of the landscapes in *Desperation* and the Dark Tower books confirm McPhee’s non-fiction observations. Recalling the development of Rattlesnake Number One, part of the China Pit - the porphyry copper mine in Desperation, Arizona where the story of the same name takes place, the fictional narrator says:

“The ground where they sank Rattlesnake Number One had a good vein of gold, but mostly it was hornfels – cooked shale. You could snap a piece of it in your hands, and when the mine got down seventy feet and the men could hear the walls groaning and squeaking around them, they decided enough was enough.”

However, after the inevitable cave in, King’s geology becomes more specific:

“The roof fell in about sixty feet from the adit...The miners got up that far from below, and there they were stopped by twenty feet of fallen hornfels, skarn, and Devonian shale.”

King accurately describes the mine workings and some half-hearted rescue efforts and these realistic portrayals establish a convincing backdrop for the development of the story line and characters. By the end of the book, most readers have a trustworthy image of an open pit, porphyry copper mine.

One of the more extensive uses of descriptive geology by King is in Book IV of the Dark Tower series: *Wizard and Glass*. Here he creates an intricate setting that weaves together an oil field, a box canyon, a fault scarp, and a red
rock. In one of the final, climactic scenes, the protagonists have successfully lured the bad guys into a box canyon and now watch their destruction from a geologically advantageous position:

“Cuthbert was closest to the top of the canyon’s wall, then Alain, then Roland, standing on a six inch shelf of rock and holding an outcrop just above him. From their vantage point they could see what the men struggling in their smoky hell below them could not: that the thinny [monster] was growing, reaching out, crawling eagerly toward them like an incoming tide.”

Geology run riot is on display in Book III of King’s Dark Tower Series: The Waste Lands. Trapped on a high speed, futuristic train operated by a maniacal and suicidal robot named Blaine (after a former Maine governor and presidential candidate? See http://digital history. uh.ed for some background information on Blaine and try Nancy McPhee’s Book of Insults – Ancient and Modern for Blaine and other politicians) the book’s ka-tet [a group of people brought together by fate] are treated to a view of a fantastic landscape as they flee for their lives from a city being poisoned by toxic gas:

“The lands below had been fused and blasted by some terrible event – the disastrous cataclysm which had driven this part of the world deep into itself...The surface of the earth had become distorted black glass, humped upward into spalls and twists...and twisted downward into deep cracks and folds which could not properly be called valleys...Misshapen things which looked like pterodactyls cruised between these pipes on leafy wings...Whole flocks of these gruesome aviators roosted on the circular tops of other stacks, apparently warming themselves in the updrafts of the eternal fires beneath...Deep inside lay a thin thread of the deepest scarlet, pulsing like a heartbeat. Other, smaller fissures branched out from this...A fiery fountain erupted directly below them, spewing flaming rocks and stringy clots of lava upward. For a moment it seemed they would be engulfed in flames.”

These somewhat over-the-top descriptions come alive because of King’s crisp, clean prose and believable geology and are re-enforced by macabre illustrations that are common in many of his books. King’s account of lava flows and volcanic vents conjures up images of Hawaii’s Volcanoes National Park or Llaima in Chile. In this and other passages throughout the book, he enhances the plot and character development by emphasizing the role of geology and using it to augment the story’s setting.

**Geology as a Plot Device**

*Desperation* is about how people react to a series of other-worldly events and King ties those reactions inextricably to geology. While some of the drama plays out on the roads and in the town of Desperation, without the open pit, adits and shafts of Rattlesnake Number One, there is no setting for the story. Indeed, all of the characters actions lead up to and are focused on the final confrontation that takes place at the mine.

“At the site of the landslide, and not too far from the broad gravel road leading down from the rim of the pit, there was a black gaping hole. The site of it made David profoundly uneasy. It was as if a monster buried in the desert ground had opened one eye.”

Replace China Pit and Rattlesnake Number One with a shopping mall or high rise office building and it loses the mystique and dangers inherent with the natural (and supernatural) processes that the book describes as operating deep within the earth.

Geology serves as a key plot device for the story line in the Dark Tower series. As a young boy and the old-before-his-time title character travel towards their ka [fate] in *The Gunslinger*, geology intervenes:

“They had entered a long tunnel of some weird phosphorescent rock, and the wet walls glittered and twinkled with thousands of minute starbursts. The boy called them fot-suls...To the gunslinger the clumps of fot-suls looked like the captive tubes of swamp gas...to the boy they look like endless streamers of neon tubing. But in its glow they could both see the rock that had enclosed them so long ended up ahead in ragged twin peninsulas that pointed toward a gulf of darkness – the chasm over the river.

King is a little loose with phosphorescence in this passage, as calcium carbonate requires either long-wave ultraviolet light or ionizing radiation to fluoresce; neither of which the story mentions. However, the intent of the passage is clear, the geologic setting – a long tunnel through fissillarous, glowing limestone – leads to a deep chasm carved out by a rapidly flowing river. The events that take place when the two main characters attempt to cross the chasm influence the relationships within the ka-tet in the next six books.

In the final book of the *Dark Tower* series, The Dark Tower, the action centers around a mountain cave overlooking a town that the protagonists must invade. This cave, whether natural or man-made King never specifies, serves as a storage depot for weapons and data. In one scene outside the cave, King has his characters make a fine geologic distinction:

“Roland, limping slightly, led Jake to where the path curled around the flank of the lumpy mountain...He pointed to the ground with his right hand. “What do you see?” ...The ground was littered with pebbles and fallen chunks of rock. Some of the talus had been disturbed, leaving marks in the scree.”

Few writers know the difference between talus and scree and even fewer are able to use that difference to help drive a story-line.

**Geology as a Connector to Alternate Realities**

Many of King’s works involve the actions his characters take when confronted with or placed in a reality that is outside their normal experience. Whether trapped in a car by a crazed dog (*Cujo*) or snow-bound in a luxurious mountain resort (*The Shining*), King’s strength as a writer lies in his ability to make those situations, and his characters’ reactions to them, believable and to teach us something about being human. Nevertheless, King faces a dilemma – how do you transition a story from one world to a different one and, sometimes, back again? In the *The Cell*, he uses an errant satellite signal, in *The Dome* it’s an impenetrable, see-through force field. And in *Desperation* and the Dark Tower series, it is geology that serves to unite the characters with alternate realities.

In *Desperation*, King explicitly makes the connection between geology and other worlds in this description at the edge of China Pit:

> David ignored him; it was still Marinville he seemed to be mostly talking to. “The force of evil from the ini [dimensional portal] filled the can tahn [stone carvings of “little gods” – demonic animal spirits] the same way the minerals fill the ground itself – blown into every part of it, like smoke....”

As the main character struggles to close up China Pit and prevent the
escape of Tak — the incorporeal evil force that is causing all the trouble — he must move very close to the entryway through a geology that marks its boundary:

“...but the descending, narrowing circle was lined with crystal outcrops of quartz and cracked hornfels. Johnny slid down this like a kid down a slide that has grown crooked glass thorns...Needles of stone tore through them. He saw his shirt-sleeves turn red...He turned over on his side instead, clutching at the crystal outcrops that were tearing him open.

At the bottom of the funnel shaped China Pit, Johnny has the final confrontation with Tak:

“It was no wonder ...that Tak was caught on the other side of the funnel. The hole to which it narrowed was stringent, no more than an inch across. Red light pulsed in it like a wink.

Deep within the earth, at the bottom of China Pit, is a thin boundary of rock that prevents an evil force desperately trying to leave his world and enter ours. The final actions of the story’s surprise main character provide a fitting geologic ending to the book.

Within the Dark Tower Series, King uses geology to separate and connect the worlds or, more accurately, the reality in which his characters live. In The Gunslinger, as Roland and Jake come closer and closer to their elusive quarry, the Man in Black, geology begins to factor into the story:

Ahead of them the mountain threw up its final defense — a huge slab of insurmountable granite facing that climbed into cloud infinity. At any moment the gunslinger expected a twist in the stream to bring them upon a high waterfall and the insurmountable smoothness of rock — dead end. But the air here had that odd magnifying quality that is common to high places, and it was another day before they reached that great granite face.

But King’s most powerful use of geology is when it connects his characters with alternate worlds or even alternate destinies. As Roland plans for the final battle in Wolves of the Calla, he accompanies a village elder to a free-standing door in a cave:

The stench breathing from the cave’s open mouth grew stronger yet...Something inside the cave, there in the shadows... “Be careful, gunslinger,” Henchick said, but stood aside to let Roland enter the cave... “These hills are magnetic, and riddled with many ways into many worlds. We’d gone into a cave near the old garnet mines and there we found a message.”

At the end of Wolves of the Calla this cave, and the door in it, sets the stage for the next book. Similarly, although more associated with topography then geology, King creates doorways for his characters to travel to the Maine we know in our world and to interact with him and, I suspect, his neighbors.

Closing Thoughts

On balance, the characters of Stephen King and the stories he creates for them are entertaining, often times insightful, and always, always, always, unfailingly honest. The same is true of his geology. The descriptions of volcanoes, erosion, and their associated landscapes are credible and serve to support the story line in realistic ways. His description of earth processes and the landforms they fashioned are accurate and work well within the tale he is telling. King’s portrayal of our profession can be a useful tool that brings the science to life, albeit not in ways that many of us learned in Historical Geology class. I enjoy his books and look forward to his next release, hopefully one with a good geologic setting.

Acknowledgement:

Many thanks to Bob Stewart for his constructive review of this article.

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Bob Blauvelt is a geologist with more than 25 years experience in the investigation and remediation of soil and ground water contamination at commercial and industrial sites. He also has assisted clients in complex, multi-site due diligence assessments, compliance audits, and provided expert witness services in cost-recovery and liability allocation litigation.
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- A panel discussion on the application of the 2012 US EPA Science Papers to the Vapor Intrusion Pathway
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### Exhibit Hours

- Set-up Sunday, September 23, 2012, 10:00 am - 4:00 pm
- Sunday, September 23, 2012, 6:30 pm – 8:30 pm (reception)
- Monday, September 24, 2012, 9:00 am – 5:00 pm
- Tuesday, September 25, 2012, 9:00 am – 4:00 pm
- Tear down Tuesday, September 25, 2012, 4:00 pm - 6:00 pm

### Space Requirements

Space will be reserved on a first-come, first-served basis and we will try to honor special requirements. Indicate your space requirements below:

- Electrical (please bring your own power strips/electrical cords)
- Other

*Please note that AIPG nor the SDSM&T New Horizons in Oil & Gas are responsible for any lost or stolen items. The exhibit room will be locked at night but we cannot guarantee security.*

### AUTHORIZATION

I, on behalf of my company, hereby acknowledge that we have received, read, and understand the 2012 Exhibitor Prospectus and Terms & Conditions. Furthermore, we understand that these Terms & Conditions are a part of this contract and that by signing this application, we agree to be bound by all the terms contained therein.

| Signature |  |
| Date |  |
1. Which of the following geologic periods is known as the “age of fishes”?
   a. Cambrian.
   b. Devonian.
   c. Mississippian or Lower Carboniferous.

2. Which of the following metamorphic facies would one expect at temperatures of around 500 degrees Centigrade and very high pressures on the order of 9 to 10 kilobars?
   a. Eclogite.
   b. Zeolite.
   c. Pumpellyite.

3. Which of the following carbonates is commonly used in jewelry and may be found associated with “Azurite”?
   a. CaMg(CO₃)₂
   b. CaCO₃
   c. Cu₂CO₃(OH)₂

4. A rectangular storage tank is located at the ground’s surface and very near the face of an exposed clay slope. The tank is 15 feet deep and 30 feet wide and is to be filled with a fluid of approximate specific weight of 1,027 kilograms per cubic centimeter. What is the expected force in pounds on one face of the rectangle?
   a. 50,250 lb.
   b. 216,371 lb.
   c. 405,000 lb.
   d. Dream on!

Have you given a presentation at a seminar, or annual meeting?
If yes, then we are interested in you submitting your paper for publication.

Please contact AIPG Headquarters at aipg@aipg.org, if you are interested in having your paper being published in TPG.

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Over the past few months, in addition to various AIPG activities, I have had the privilege to attend and represent AIPG at several other professional society meetings. What was very evident were the issues that we share and the role our organizations have as the voices for the profession of geology.

As you know or as a reminder from AIPG’s defining and purposes statements:

The American Institute of Professional Geologists (AIPG), founded in 1963, is the largest association dedicated to promoting geology as a profession. It presently has more than 6,000 members in the U.S. and abroad, organized into 36 regional Sections. The Institute adheres to the principles of professional responsibility and public service and is the only international organization that certifies the competence and ethical conduct of geological scientists in all branches of the science with members employed in industry, government, and academia. AIPG emphasizes competence, integrity and ethics. AIPG is an advocate for the profession and communicates regularly to federal and state legislators and agencies on matters pertaining to the geosciences.

The purposes of the Institute shall include:

1. advance the geological sciences and the profession of geology;
2. establish qualifications for professional geologists;
3. certify the qualifications of specific individual Member geologists to the public;
4. promote high standards of ethical conduct among its Members and Adjuncts, and within the profession of geology; and
5. represent, and advocate for, the geological profession before government and the general public.

I started out the year with the 4th International Professional Geology Conference (4IPGC) meeting in Vancouver in late January. I served on the planning committee throughout last year. AIPG Past President, Robert Font, CPG-03933, and I were co-moderators for a two-part session on professional standards. The meeting was led by Geoscientists Canada (GC) with AIPG, the European Federation of Geologists (EFG), and the Australian Institute of Geoscientists (AIG) as co-conveners. 4IPGC was held in conjunction with AME BC’s Mineral Exploration Roundup. 4IPGC had registrants from 17 countries, 39 professional papers, over 2½ days. Many sessions and discussions focused on the role of professional organizations, the need for common global academic and professional standards in part to increase the public awareness of the important role of professional geologists, and to improve public perception and trust in geologists.

In April, I attended the American Geoscientists Institute (AGI) member societies meeting in Long Beach, California held in conjunction with American Association of Petroleum Geologists (AAPGs) annual meeting. The presidents of the member societies gave an overview of activities. AGI presented information about various programs, publications, and initiatives including the development of a web-based database of existing educational programs for geoscientists. AGI was also promoting a movie on energy entitled Switch featuring Scott Tinker, CPG-10564, State Geologist of Texas. Along with the movie there are short education videos for educational use. AGI and AIPG are also developing a webinar series. President-elect Ron Wallace, CPG-08153, is AIPG’s representative on AGI’s academic classification committee which will review geoscience academic programs with the intent to recommend an academic program to assure students and potential employers of a standard of academic preparation to be professional geologists.

In May, I attended the executive board meeting of the European Federation of Geologists (EFG) in Tenerife, Spain. The meeting included geologists from 14 European nations. The focus was on council business and the development of mutually agreeable professional standards to allow for the global practice of geology. The meeting also included a day-long geohazards workshop and a field trip to the volcano that forms the island of Tenerife. As discussed at the geohazards workshop, some of the issues related to geosciences practice and geohazards were the publics’ lack of understanding of potential hazards, the difficulty to perceive natural hazards where people have lived for generations without incidence, the need to develop trust between scientist/public/politicians, and the importance of public involvement skills. Discussions also included the need for global standards for geoscientists.

I attended the Board of Directors and Annual Members Meeting of Geoscientists Canada (GC) in Niagara-on-the-Lake in Ontario, Canada, in June. It was an interesting meeting with an update on professional issues in each of the provinces. GC also presented their Geoscience Knowledge and Experience Requirements for Professional Registration in Canada publication designed to provide common requirements for licensure of geoscientists and with recommended courses for univer-
sity geoscience programs. Much of the focus of the meeting was on the results of a Task Force report on Incidental Practice (IP) issues (licensure to work across province boundaries for a limited time) and discussions on issues such as the ability to discipline, who benefits from such a program, time frame, liability insurance, the cost of implementing and administering, and similar.

As follow up from the 4IPGC, GC along with EFG and AIPG initiated a proposal to the International Union of Geological Sciences (IUGS) for the development of The Professional Affairs Task Group to assist in the setting of standards for competent and honest communication of geoscience information relevant to public safety and sustainable development, standards for geoscience practice, and public reporting and other matters. This proposal will be submitted to IUGS at the 34th IGC (International Geological Congress) in Brisbane, Australia in August.

It is important to note that efforts of the professional organizations on these “advocacy for the profession” functions is the work of many volunteers and we all depend on our members to help in their own way to communicate with fellow geologists (and also importantly, with students and young professionals), the public, and government representatives on the role of professional geologists, to promote the science of geology and the ability of professional geologists to apply the principles of the geosciences in their work, and the necessity of high standards and qualifications for this global profession. There are other professional organizations as well as the ones I mentioned in this message that are advocates for the profession, and together there is strength in harmony as the voices of professional geology.

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**Gulf Coast Association of Geological Societies and the Gulf Coast Section of SEPM**

**62nd Annual Convention**
**October 21–24, 2012**
**Austin, Texas**
**Hosted by the Austin Geological Society**

“Solving for E3”—addressing the complexities at the intersection of energy, environment, and the economy.

A 3-day technical program will focus on areas such as stratigraphically deep opportunities in the Gulf of Mexico, salt tectonics, unconventional plays, balancing water and energy needs, and the environmental future and economic challenges of the Gulf of Mexico region. The third day will feature speakers from the 2011 GCAGS Veracruz technical program.

The conference will host panel discussions that focus on energy, water, and the economy. Join the conference and listen and learn from these industry thought leaders:

- Dr. Scott W. Tinker—Panel Chair, Moderator—Director, BEG
- Amy Jaffe, Associate Director, James A. Baker III Institute for Public Policy, Rice University
- Dr. Tadeusz Patzek, Professor & Chair, Department of Petroleum and Geosystems Engineering, UT
- Scott Anderson, Senior Policy Advisor, Air and Climate Program, Environmental Defense Fund
- Dr. Ken Medlock, Adjunct Professor of Economics, James A. Baker III Institute for Public Policy, Rice University
- William (Bill) Maloney, Executive Vice President, Development and Production North America, Statoil
- James H. Painter, Executive Vice President, Exploration and Technology, Cobalt International Energy

**Early registration begins June 1. Reserve your space today!**

Visit this link for registration information:
http://www.gcags2012.com/
It’s fortunate for me that I am not required to earn my living by writing spell-binding columns, because there are times when the imagination simply will not cooperate. This is one of those times, so perhaps, while you’re preparing for the last part of your summer vacation and post-Labor Day work schedule, you will find some of these facts to be of interest.

- AIPG will celebrate its 50th anniversary in 2013.
- AIPG is one of 50 member societies which comprise the American Geological Institute (www.agiweb.org).
- AIPG was founded by petroleum geologists who, at the time of AIPG’s incorporation, represented the predominant geologic discipline within the institute.
- Presently the sub-discipline of hydrogeology is practiced by close to 60% of AIPG members and less than 10% of AIPG members are petroleum geologists.
- AIPG was organized to offer a post-academic credential to the experienced practitioner, and to advocate on behalf of the entire profession.
- Advocacy is particularly effective on the state level, conducted by section members, to support legislation and regulations which affect the practice.
- Advocacy on the national level includes liaison with federal agencies, congressional offices, and exhibiting at the annual meeting of the National Conference of State Legislatures (NCSL). (This is an opportunity to meet and discuss issues with legislators from all 50 states. The geology exhibit is sponsored and staffed by AIPG, AASG, AEG, AGI, GSA, SME)

Foundation of the American Institute of Professional Geologists

Since its establishment in 1963 AIPG, through the national executive committee, has worked diligently to represent the best interests of AIPG members, provide services in support of professional standing, and develop non-dues revenue sources in order to place less direct dependence upon dues.

To date, the AIPG continuing education program has been growing and is beginning to show promise. The continuing education program requires more funding to allow for its expansion. A mechanism for supplying the required investment is the Foundation of the AIPG. The Chairman of the Foundation, Dr. Ray Talkington, CPG-07935, is leading the development of a fund raising campaign. More information is found on the AIPG website. Please consider making a tax-deductible contribution to the Foundation now.

Come Join Us in Rapid City, South Dakota for the 2012 AIPG Annual Meeting.

Sponsorship Opportunities

YES!! We want to be part of the AIPG and New Horizons in Oil & Gas Conference, September 22nd-26th, in Rapid City, SD.

The 2012 Conference can count on us as a Sponsor.

Monument ($7,500)
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Sponsorship Form can be found on the AIPG website. For more information, contact Cathy Duran at cld@aipg.org or call (303) 412-6205.

www.aipg.org

START AN AIPG STUDENT CHAPTER TODAY!

The AIPG Student Chapter Manual is available on the AIPG National Website at www.aipg.org or contact National Headquarters at (303) 412-6205.
Answers:

1. The answer is choice “b” or “Devonian Period” termed as the “age of fishes”. During this time span (417 to 354 million years ago) ray-finned and lobe-finned fish appeared, along with sharks and other creatures.

   The Cambrian Period, approximately 543 to 490 million years ago, is better known as the “age of the trilobites”, marine arthropods which became dominant sea dwellers mainly during the Lower Paleozoic Era.

   The Mississippian Period (Lower Carboniferous Period), approximately 359 to 318 million years ago, is better known as the “age of the crinoids”. Although first appearing at around 530 million years ago, the echinoderms known as crinoids (sea lilies) achieved their highest generic richness and overall abundance during Mississippian time.

2. The answer is choice “a” or “eclogite”.

   The “zeolite” facies would be expected to occur at temperatures closer to 200 degrees Centigrade and pressures ranging from 1 to 4 kilobars.

   The “prehnite-pumpellyite” facies would be expected to occur at approximately similar temperatures as that of the “zeolite” stage, but at higher pressures, more in the range of 3 to 6 kilobars.

3. The answer is choice “c” or “[Cu\textsubscript{2}CO\textsubscript{3}(OH)\textsubscript{2}]” or “malachite”, another copper ore commonly found with “azurite” or [Cu\textsubscript{3}(CO\textsubscript{3})\textsubscript{2}(OH)\textsubscript{2}].

   Choice “a” or [CaMg(CO\textsubscript{3})\textsubscript{2}] is “dolomite”, while choice “b” or [CaCO\textsubscript{3}] depicts calcite.

4. The answer is choice “b” or “216,371 lb.” The proof follows:

   Specific Weight (SW) = Weight per Unit Volume
   SW = (1,027 kg/cu. cm) = (64.11 lb/cu. ft.), or ~ density of salt H\textsubscript{2}O  \hspace{1cm} (1)

   Submerged Area (A) = Depth x Width = (15 ft) x (30 ft) = 450 sq. ft.  \hspace{1cm} (2)

   Depth of Centroid (DC) = (15 ft)/2 = 7.5 ft. \hspace{1cm} (3)

   Force on face (Ff) = Specific Weight x Area x Depth of Centroid.
   Ff = (SW) x (A) x (DC) \hspace{1cm} (4)

   From (1), (2) and (3) above, equation (4) becomes:
   Ff = (64.11 lb/cu. ft.) (450 sq. ft.) (7.5 ft.) = 216,371.25 lb \hspace{1cm} (5)

   Equation (5) depicts the expected force on one face of the rectangle and reflects choice “b” for our question.
Dear Barbara,

I was pleasantly stunned by your March 6th letter stating that I would be a recipient of the Honorary Membership Award. I write to thank you, and the rest of the AIPG Executive Committee for what I consider to be a very high bestowed upon me.

Looking at the list of previous recipients, I am not at all convinced of my worthiness to be in their company; but excitedly, I do look forward to humbly accepting this accolade this September.

Please pass my thanks and kind regards to the Executive Committee and AIPG’s fine staff.

Most Sincerely,
John L. Bognar, CPG-08341

Geology Ranked #7 Among Top Professions

Forbes magazine ranks Geology at the 7th most valuable college major “in terms of salary and career prospects.”

They used PayScale’s “massive compensation database and job growth projections through 2020 from the U.S. Bureau of Labor Statistics.”

Forbes listed college majors by “median starting pay, median mid-career pay (at least 10 years’ experience), percentage growth in pay and projected growth of job opportunities.”

The numbers they published for Geology:

- Starting Median Pay: $45,300
- Mid-Career Median Pay: $83,300
- Growth In Pay: 84%
- Projected Job Growth: 19.3%

Is Your Profile Correct?

It is important to keep your address, phone numbers, and e-mail information up to date in our records. Please take the time to go to the AIPG National Website, www.aipg.org, login to the member portion of the site and make sure your information is correct. You can edit your record online. If you do not know your login and password you can e-mail National Headquarters at aipg@aipg.org or call (303) 412-6205.
Academic Freedom

Dr. William Menke, Professor of Earth and Environmental Sciences at the Lamont-Doherty Earth Observatory and the Earth Institute at Columbia University, posted the following 14 ethical scenarios on his blog on May 6, 2012. I found them to be an interesting look at ethical issues involving academic freedom and received Dr. Menke’s permission to include them in this column. Academic ethical issues are important but are infrequently addressed in this column.

“Jonathan Cole, the former Provost of Columbia University, sent around a survey that contains fourteen scenarios that depict ethical dilemmas faced by professors or the university administration that supervises them. Many of the scenarios are thought provoking; I summarize my take on them, below.

“As you will see, most are archetypically academic in that they test the limits of academic freedom, the principle that professors can hold, express and publish on any subject, even a controversial one, without fear of retaliation from colleagues or the university administration. In this sense, it is similar, though perhaps somewhat more expansive, than the right of free speech that is granted by the US Constitution.

“Voltaire, the eighteenth century philosopher, epitomized free speech when he declared, ‘I detest what you say, but I will defend to the death your right to say it.’ My experience is that we academics have such an easy time with free speech because we detest so little. Unusually well-versed with the spectrum of world opinion, we are seldom threatened by new ideas, since few are new to us. On the other hand, when we do detest an idea, we are no more likely than the average human being to fight to protect the speaker’s right to express it.

“When teaching in a classroom, professors face a special challenge in balancing free expression of ideas against good pedagogic technique. On the one hand, college is about expanding the mind; that is, encountering unconventional points of view that lead to intellectual growth. Toward this end, a professor can rightfully challenge students with opinions that are controversial or even offensive. On the other hand, the presentation needs to engage the class to be effective. A professor, who merely offends the sensibilities of students, without connecting with them and earning their respect, is likely to accomplish little. Several of the scenarios explore this balance.

“Scenario 1 postulates that a member of Congress questions the validity of the research conducted by a professor receiving Federal funding and demands that the university require that the professor stop the work immediately. Analysis: This is not an academic freedom issue. Official actions of Congress are made by its members acting in a group according that that body’s rules. No member, acting unilaterally, has any more authority to demand an action than does an ordinary citizen. In particular, no member can overrule a properly executed grant or contract between a Federal agency and a university. Contract law, and not the principle of academic freedom, is at stake here. Action: The university should ignore the demand.

“Scenario 2 asks whether a professor commits racially motivated harassment, by publicly telling an African American student in a dismissive and disdainful voice that the student is a product of Affirmative Action and, consequently, doesn’t belong in college. Analysis: The professor’s obligation to fairly assess a student according to academic performance takes precedence over free expression. There is no constructive criticism in this scenario, only ridicule based on racial stereotyping. Furthermore, aspects of the student’s confidential academic record (e.g., university admission), or at least the professor’s guesswork about them, are discussed publicly—another violation of university policy. Action: The professor should be disciplined.

“Scenario 3 asks whether the university administration should discipline a professor who privately views sexually explicit material on his office computer. Analysis: Except for child pornography, most sexually-explicit videos can be legally viewed in the US. In 2008, the Maryland State Assembly attempted to require its State University to develop a policy restricting porn on campus. However, their action was in response to students, not faculty, viewing a sexually explicit movie. Media reports of the time claimed that this would be the first such policy at a public university. The State’s requirement was rebuffed by its Board of Regents, who argued that ‘best interest of the University System

1. Dr. Menke is married to one of my cousins, who is also on the staff at Lamont-Doherty Earth Observatory.
of Maryland or the state because of the First Amendment issues such a policy would raise and because of the administrative burden and costs of implementing [it]. Indeed, my opinion is that this is an archetypical freedom of speech issue, precisely because it comes across as merely recreational and needlessly so. Detesting pornography would seem to have so little downside. But as the Lenny Bruce trials of the 1960s showed, the public’s notion of the obscene is pretty fluid and could easily grow to encompass, if we let it, a much larger segment of our culture than Pirates XXX (the movie that so offended the Maryland State Legislature). As an alternative, a university could seek to ban all non-educational use of its computer networks. However, such a ban would be confounded by the blurred boundaries between a typical professor’s private and university life. Some professors provide their own personal computers for their offices. Some use their own smart-phones connected to commercial, not university, networks. Some live in university housing connected to university-sponsored networks. Some are allowed or even encouraged to use their offices for non-university work, be it pro bono work for third parties, such as reviewing journal articles, or paid consulting. Others have no office at all, and work in the library or at home. Another issue is that such a policy might be enforced through blocking (that is, censoring) internet sites or by monitoring a professor’s network traffic. Either would be perceived as unacceptable restrictions of academic freedom by most professors. Action: None; the professor is violating no university policy.

“Scenario 4 asks whether a professor can be disciplined for being a member of a group that denies the Holocaust. Analysis: The United States has a long tradition that a person should not be penalized on account of association with a group or organization. Exceptions, such as the McCarthy Era Communist Party witch hunts are seen by most people as an embarrassing aberration. Many universities, including Columbia, specifically protect associations under their academic freedom policies (Statutes of the University 8.70) Action: None.

“Scenario 5 asks whether a university’s Institutional Review Board (IRB, a biomedical ethics board), can require mandatory, full and detailed disclosure of birth control options to subjects participating in an anthropologic study in Venezuela, in a case where the researchers themselves advocate a more nuanced approach tuned to the group’s religious sensitivities. Analysis: The IRB is a mandatory requirement of the US Federal medical funding system created to prevent exploitation of human research subjects. A common criticism of the IRB system is that it was designed to handle medical research in US hospitals and that its rules are unsuited for other types of research, especially social science research abroad. Action: This is a good argument for social science professional societies working towards changing the rules. However, until that time, the university has no legal option but to follow the advice of its IRB. Any student of academic bureaucracies knows that a review board will issue ridiculous rulings in at least a small percentage of cases. Get used to it!

“Scenario 6 asks whether it’s a shame that a brilliant but unconventional researcher fails to get an appointment or a research grant because his or her work is outside the current paradigm. Furthermore, it asks whether it’s ethical for a peer to give such a researcher a poor review. Analysis: It is almost axiomatic that brilliant researchers are usually shunned or even persecuted, not only by society but by their closest colleagues. It’s a failure of our scientific review system, which asks the average scientists, through the writing of peer reviews, to direct the course of the field. The average scientist does well enough in distinguishing innovative from mundane research, but is poor at recognizing true genius. Action: Yes, the hindering of genius is a shame, but it is the defect of the system, not of an individual peer reviewer. Some types of training can help peer reviewers identify when their own biases are affecting their judgment. But curing honest but poor judgment is much harder.

“Scenario 7 asks whether the university administration can require that a biology professor remove a blog from her web site that discusses the ‘evolutionary benefits of homophobia’ and which is perceived as anti-gay by some readers. Analysis: The general notion that behaviors can have a genetic or evolutionary basis is accepted in biology, so it should be no surprise that homosexuality and homophobia have been discussed in this context in the scholarly literature (but with very little settled, I might add). It is generally accepted that the principle of academic freedom forbids the administration from censoring a professor’s writings in non-university forums. The issues then is whether it can restrict the posting of controversial, offensive or unpopular ideas to the professor’s page on the university web site, especially in a case where it has some scholarly basis. An argument for restricting such material is that the university might be perceived as endorsing such an idea, merely through hosting a blog that expresses it. This argument is weak, because blogs are generally understood to be editorial in nature; they express only the author’s thoughts at the moment. Many blogs (including my own) contain an explicit disclaimer to this effect. Universities receive considerable benefits from professor-contributed web; eliminating it altogether would be counterproductive. Furthermore, professors would undoubtedly just move their blogs to alternative sites should they be prohibited from university-sponsored sites. Setting up a system to respond to any complaint about a blog’s content would seem to be cumbersome. Action: None, except to suggest to the complainants that they express their opinions in a blog of their own.

“I note as an amusing aside that, while the professor’s musings on homophobia might well be offensive to some people, her implicit endorsement of evolution would offend at least as large a fraction of the overall US population. However, ardent creationists tend to be concentrated in sectors of society that have little contact with, or respect for, academia.

“Scenario 8 posits a professor who advocates Israeli concessions to Palestinians and who condones suicide bombings, but only in non-university forums. It asks whether the university has the right to sanction him in response to student complaints. Analysis: The reference to political concessions is a red herring; the real issue concerns the suicide bombings. ‘Condone’ is a much weaker word than ‘advocate’ or ‘incite’, but still indicates some level of approval of a violent, and in my opinion immoral, act. Legally, ever since the 1969 Brandenburg vs. Ohio Supreme Court ruling, even inflammatory speech (let alone mere condoning) is legal unless it is directed to inciting and likely to incite imminent lawless action. Thus, the issue is whether the private lives of professors should be held to a higher standard than mere legality. This issue seems to have received some attention. Columbia University, for instance, specifically grants its professors academic
freedom, but notes that they ‘should bear in mind the special obligations arising from their position in the academic community’ (Statutes of the University 8.70). However, these obligations are not enumerated; the intent may be only to urge professors to exercise their best judgment. The scenario is reminiscent of the case of Ward Churchill, a University of Colorado professor who claimed that he was fired in retaliation for his condoning the 9/11 attacks. However, that case, still in appeal, is complicated by his having been dismissed (at least ostensibly) for research misconduct, not speech. In my opinion, professors’ private lives should not be held to standards higher than required by the law. Action: None.

“Scenario 9 also involves violence, but in the case, the professor himself commits it, by throwing a stone at a political protest, the act of which is recorded by a photographer. The issue is whether the professor should be sanctioned when the photo is brought to the attention of the administration by a group of students. Analysis: Throwing a stone could well constitute battery (if it strikes the victim) or assault (if it misses). Both are serious crimes. However, only the local civil authorities and not the university have the authority to indict and convict. And while a photograph, properly attached to by the photographer in a legal setting, may well be damming evidence of the crime, the same photograph—however disturbing—seen in the newspaper or browsed on the web, is certainly not. It may be giving a false impression of actual events. Action: The administration should consider having University Counsel confidentially advise the professor that rock-throwing can lead to an assault indictment, but in the absence of civil charges, the university should take no action against the professor.

“Scenario 10 imagines that a female student creates a controversial performance art project that includes videos of, and blood from, a self-induced herbal abortion. We are asked if the dean has the authority to exclude the art from display and whether the advisor, who approved the project, should be sanctioned. Analysis: The issue here is primarily the regulation of acts that lead up to the creation of art—the abortion—and not the art itself. If the artwork consisted of a video of a simulated procedure and if it contained only simulated blood, it would be only marginally more controversial than, say, a graphic and gory painting of the same subject. Such a painting, though still offensive to some, almost certainly would be displayed without debate. The distinction between art and act is important, because a spectator may feel that, by viewing the art, he or she participates in the circumstances of its creation. Such a feeling need not be related to the legality of the act, but only to moral conflict that it engenders. Thus, for instance, artwork created in New Jersey by videotaping the torture of mice and consisting partly of their tanned pelts violates no laws, as mice are explicitly excluded from that state’s animal cruelty laws. Even so, people viewing the art may well feel that they, themselves, are complicit in the act of animal cruelty. Those feeling would be absent if they merely viewed a painting that depicted tortured animals or even if they viewed a documentary film containing scenes of torture that were not instigated by the artist. The university, in displaying art, need not find acceptable all possible acts that might be conducted as part of its creation, and can legitimately prohibit advisors from approving art projects that involve them. Action: Any sanctioning of the advisor would need to be in the context of policies regulating art projects, which (if they exist at all) are not mentioned in the scenario. However, as an ancillary matter, the advisor approved a project that included the student performing a medically unsupervised abortion using non-FDA-approved substances, which was clearly in reckless disregard for the student’s welfare and may well deserve sanction.

“Scenario 11 posits that a white professor, during the first lecture of a course on race relations, presents a list of putative demographic differences between African Americans and whites and states that he will address the reasons for these differences in a later class. The list includes differences such as the higher imprisonment rates and lower average SAT scores of African Americans. Some African American students complain that the professor is racist and ask that the dean bar the professor from teaching the course. We are asked what the dean should do. Analysis: The students’ complaint, though understandable, is premature. Action: The dean should say to the students, ‘Stick with the course for a while and try to give the professor an open mind. If, after a few weeks, you still think the professor is racist, come back and we’ll talk about it more. And remember that you can always drop the course without penalty.’ And the dean should say separately to the professor, ‘Some of your students (who will remain anonymous) were taken aback at being left hanging about the reasons for the demographic differences. They are worried that you’re going to give racist reasons (which no doubt they’ve all heard before). Be sure to return to the subject as soon as possible and make special effort to be really clear about what you’re saying.’

“Scenario 12 asks whether a professor can be terminated if he is a ‘person of interest’ in a murder case involving one of the university’s students. Analysis: The ‘person of interest’ category is an informal term usually applied to persons who have not been formally charged with any crime, but who are involved in a criminal investigation. As the term is unofficial, it is unclear who has the authority to make such a designation or what precise implications it has. In contrast, terms like ‘arrested’ or ‘indicted’ are much more precise, as they refer to well-documented legal actions. For this reason, basing a termination decision on a person of interest designation is unwise. Should the university be concerned that the lives of its students are endangered, it has the option of placing the professor on administrative leave until the matter is resolved. Action: Place the professor on administrative leave.

“Scenario 13 imagines a male professor pointing out in a course that women don’t score as well as men on quantitative tests like the math SAT and stating his opinion that genetic differences might contribute to the difference. Students complain to the dean that the professor is sexist. Analysis: This case differs from Scenario 2 in that the controversial material is presented as part of normal academic discussion and is not specifically levied as a criticism. It is reminiscent of the controversy involving Lawrence Summers, the Harvard University president who expressed the same opinion in a speech. One of the main criticisms of Summers was ‘careless scholarship’; that is, neglect of the huge literature that uses the scientific method, and not guesswork, to address the reasons for the gender gap. Indeed, although the scholarly literature explores explanations based on both ‘nature’ and ‘nurture’, the professor apparently mentions neither when offering his opinion. The Summers case included a discussion of academic freedom, with most people arguing that
Summers’ opinions, while misinformed, were protected under it. An additional nuance in the current case is that social science research indicates that a student who will underperform if told, prior to a test, that he or she belongs to a group that can be expected to do poorly on it. Certainly a professor, when challenging students with a controversial point of view, should choose a forum that will minimize such effects. **Action:** A call from a colleague asking whether the professor really wants to be compared to Larry should do it!

“**Scenario 14**” asks whether it is ethical for the US Government to prevent citizens of certain foreign countries perceived as sponsoring terrorism from working in US university labs that handle pathogens such as plague. It further asks whether it is ethical for editorial boards of professional journals to have boards that self-censor; that is, rule on whether papers should be amended to omit information that could potentially be used in creating bio-weapons. **Analysis:** This is a case where the right to personal security trades off with other rights, such as free association and non-discrimination and where the US Government asserts that it is the arbiter or the balance. Concerning restrictions on employment, universities have no choice but to obey US law. Concerning review boards, the US Government may intervene directly if it thinks that journals are recklessly publishing information that facilitates the construction of bio-weapons; self-policing is a reasonable preemptive response. **Action:** Those people who would prefer a different balance between rights are free to work towards the easing the relevant laws and policies. But this doesn’t sound like a battle that those seeking drastically eased restrictions can win in the current political environment, and especially in light of the 9/11 anthrax attack. Science has often led to innovation in weaponry, as in the Manhattan Project. Scientists have to live within this reality.

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**Topical Index-Table of Contents to the Professional Ethics and Practices Columns**

A topically based Index-Table of Contents, “pe&p index.xls” covering columns, articles, and letters to the editor that have been referred to in the PE&P columns in Excel format is on the AIPG web site in the Ethics section. **This Index-Table of Contents is updated as each issue of the TPG is published.** You can use it to find those items addressing a particular area of concern. Suggestions for improvements should be sent to David Abbott, dmageol@msn.com.

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**Geologic Ethics & Professional Practices is now available on CD**

This CD is a collection of articles, columns, letters to the editor, and other material addressing professional ethics and general issues of professional geologic practice that were printed in *The Professional Geologist*. It includes an electronic version of the now out-of-print *Geologic Ethics and Professional Practices 1987-1997*, AIPG Reprint Series #1. The intent of this CD is collection of this material in a single place so that the issues and questions raised by the material may be more conveniently studied. The intended ‘students’ of this CD include everyone interested in the topic, from the new student of geology to professors emeritus, working geologists, retired geologists, and those interested in the geologic profession.

AIPG members will be able to update their copy of this CD by regularly downloading the pe&p index.xls file from the www.aipg.org under “Ethics” and by downloading the electronic version of *The Professional Geologist* from the members only area of the AIPG website. The cost of the CD is $25 for members, $35 for non-members, $15 for student members and $18 for non-member students, plus shipping and handling. To order go to www.aipg.org.

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**Accelerating Sea Level Rise Along U.S. Atlantic Coast “Hotspot”**

The rate of sea level rise (SLR) is occurring three to four times quicker than the global average along the Atlantic coast stretching from Cape Hatteras, North Carolina to Boston, Massachusetts according to research done by scientists at the United States Geological Survey (USGS) published on June 24 in Nature Climate Change. Global SLR is currently increasing at a rate of 0.6 to 1.0 millimeters per year, whereas the Atlantic “hotspot” rate of increase is 2 to 3.7 millimeters per year. This accelerated rate is estimated to yield an 8 to 11.4 inch sea level increase by 2100 along the U.S. Atlantic coast.

Estimates in the report were made using the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios, tide gage records, global positioning system measurements of vertical land motion, and satellite measurements of ice melt. Changes in sea level along the hotspot are affected by a number of variables including global temperature rise, decrease in ocean water density from ice melt, strength of the gyre system, aerosols in the atmosphere, and the slowdown of the Atlantic Meridional Overturning Current. In addition to global climate patterns, local oceanographic and atmospheric conditions can affect the magnitude of sea level rise projections and the associated level of uncertainty.

Sea level rise impacts communities by increasing coastal vulnerability to storm surges, intensifying flooding events, and making beaches and wetlands susceptible to deterioration. Research and models show that rates of SLR will continue to increase if global temperatures continue to rise. The USGS researchers suggest the sea level projections outlined in the report should be considered when planning for future coastal development along the Atlantic coast.

This information was taken from the AGI Summer 2012 Geospectrum.
That’s Quite a Water Table!

William J. Stone, MEM-2164

Water-table maps are important tools in ground-water studies, especially contamination cases. They can be used to get the depth to the saturated zone as well as the general direction of ground-water flow. However, overly complex and erroneous maps can result from mixing unrelated data. For example, water levels from various well depths may differ from water-table values due to vertical gradient. Also perched and regional water-table data may be unintentionally combined. More commonly, the water table for shallow unconfined water and potentiometric levels for deeper confined systems are not distinguished. All of these will lead to unrealistic water-table maps.

This was the case at a mine-tailings site I was reviewing when with a state environmental agency. The consultant had simply plotted all available water levels on a map and then contoured them. The result looked like a topographic map for the Appalachians! It was overly complex with closed contours here and zig-zagging contours there.

A careful analysis of the data showed that the site is underlain by both a shallow unconfined system as well as a deeper confined system. The problem was, values for the two systems had not been distinguished in water-table mapping. Because confined and unconfined systems were known to occur in the study area, vertical gradient or the presence of perched water could be downplayed as a cause of the complexity. Mapping the water levels for the two aquifers separately was straightforward.

Where initial contouring gives an overly complex map and the existence of multiple systems is suspected but uncertain, it can be verified by preparing a graph of available water levels. More specifically this involves, 1) drawing a straight line through a number of wells, preferably along a suspected flow line, that is, perpendicular to water-level contours on the complex water-level map and 2) plotting water levels, with a separate symbol for each aquifer, on a graph having water-level elevation on the “Y” axis and distance along the line of profile as the “X” axis. If the aquifers are hydraulically separated, the resulting water-level profiles will also be separated. TIP: For realistic water-level maps, be sure to separate data for different saturated systems.

Dr. Stone has more than 30 years of experience in hydroscience and is the author of numerous professional papers as well as the book, Hydrogeology in Practice – a Guide to Characterizing Ground-Water Systems (Prentice Hall). Feel free to argue or agree with him via email at wstone04@gmail.com.

Should I become a CPG?

Have you been thinking about upgrading your membership to CPG? If the answer is yes, what are you waiting for? To find out if you have the qualifications, go to Article 2.3.1 of the AIPG Bylaws. The AIPG Bylaws can be found on the AIPG website or the directory.

The CPG application can be found on the website under ‘Membership’. Just follow the instructions. The basic paperwork includes the application, application fee, transcripts, geological experience verification and sponsors.

If you have any questions, you may contact Vickie Hill, Manager of Membership Services at aipg@aipg.org or call headquarters at 303-412-6205. www.aipg.org

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When I was little, before my grandpa got me up to the farm again. This time, I was determined to take a closer look at my old friend. About waist-high now, it’s a gneissic boulder with plenty of pink k-spar and some slick edges (it was raining, I was in dress shoes...). I had forgotten my rock hammer, and judged the old wooden-handled hatchet my cousin found to not be a good idea for taking a piece (ok...so I may have very cautiously tried, but I knew it was a bad idea). A good look and a jump for old time’s sake were good enough. In the process of looking through the house and talking about family history, I learned that my geologic leanings were a family trait: my grandpa’s younger sister had been an avid rockhound and had traveled across the country to see geologic features. Apparently, she also had cutting and polishing equipment in her basement. This likely explains the pile of rocks around the tree next to the house, from which I picked out a nice coral, and is definitely the story behind some sweet bracelets I found inside.

I often wonder if it is odd to think about inanimate things such as rocks and their story as such integral and normal parts of everyday life. Looking at The Rock reminded me of a very similar boulder (no pink, and much more gneissic) on Wooster’s campus. It served as a memorial to a class and was appropriately near the geology building. Walking by it with a good friend (not a geologist) one day, he questioningly mentioned how he had been told that it was a local rock. In all seriousness and genuinely believing he was very mistaken, I responded, “No, it came from Canada.” With his look of confusion I explained, still not realizing he wasn’t on the same page as me, “The glaciers brought it.” Apparently, that was really funny.

The recent passing of my grandpa

Stephanie Jarvis, SA-1495, sjarvis@siu.edu
Earth Science Literacy and the Replacement of the Geoscience Workforce

As we enjoy a more relaxed summer atmosphere, and the lure of the outdoors once again captures our attention, let’s take a moment to reflect on a few issues of interest with implications for our instructional practice next year. As geoscience educators, we are charged with accomplishing two primary tasks, in a very simplistic sense, through our instruction: 1) prepare students for potential employment in the areas we teach by providing opportunities to learn related content knowledge and skills; and 2) promote an earth science literate citizenry in our nation. We recognize and strive to teach science content and technological skills as they relate to the potential future employment of our students. We understand the importance of promoting science literacy in general, and earth science literacy specifically. We also share with our students what we know about the growing need for a future STEM (science, technology, engineering, mathematics) workforce. Or, do we? For a refresher on some of the statistics and projections related to STEM and geoscience job growth in our nation, read on. The article concludes with the identification of the “big ideas” in earth science, and the featured resource: Earth Science Literacy Principles.

STEM Statistics, Geoscience, and Job Growth

STEM employment in the United States grew by 8% between the turn of the century and 2010, and employment growth is expected to continue1. STEM jobs are projected to grow by 17% by 2018, contrasted with only 10% growth for non-STEM jobs1. Despite economic downturn, the Bureau of Labor Statistics projects a nearly 20% growth in ‘science and engineering’ occupations for the period 2008-2018, more than the growth expected for any other category of occupations2. This is particularly relevant since ‘science and engineering’ includes the ‘physical and life science’ occupations (e.g., petroleum technicians, geoscientists, and environmental scientists) and corresponding college majors (e.g., geology, geoscience, and earth science). Although the ‘physical and life science’ occupations, accounting for about 13% of all STEM occupations, are not projected to grow as much as other categories of ‘science and engineering’ – like health fields, for example – they are expected to experience some growth1. The American Geological Institute’s forecast predicts as much as a 35% increase in the needed geoscience workforce by 2018 when both attrition and retirement are taken into consideration3.

A few additional facts worth noting:
• Two-thirds of all STEM workers currently employed hold a college degree1.
• Workers in STEM fields command higher wages, earning over 25% more than non-STEM counterparts. [For example, those with a bachelor’s degree in STEM earned an hourly average of $36, whereas those with a non-STEM degree averaged $28 (in 2011)].1
  • STEM workers, in general, have experienced lower unemployment rates than non-STEM workers1.
  • About 1500 college graduates are added to the geoscience workforce each year4.

These and many others are great reasons for students to pursue STEM-related careers.

Activey Seeking Tomorrow’s Geoscientists

You might now be saying to yourself: “that’s fine, but how does this pertain to me as a geoscience instructor?” The answer relates to our role in recruiting future geoscientists and STEM workers in general. Geoscience educators should consider promoting the previously mentioned STEM and geoscience facts and statistics as a way to market our profession. We could do this through our instruction in applicable courses and encouraging interest in STEM, and perhaps more specifically, geoscience. It is not easy for undergraduate geoscience degree recipients to find jobs; in many (or perhaps most) cases it takes a master’s degree to find a professional job in our field. This really means that we must be encouraging our students to consider graduate programs in the geosciences right out of their undergraduate programs. When we consider the future need for geoscientists, and the typically low student-faculty ratios in most geoscience departments across the country, the prospect of graduate study for interested students should be quite appealing. Geoscience instructors should be encouraged to identify, recruit, and inspire students demonstrating either aptitude or interest in geology and related fields. Many non-science (or non-geoscience) majors elect to take our introductory geoscience courses because they “sound interesting” or are perceived to be “less mathematically rigorous” than other potential science electives, manifesting in prime opportunities for promoting interest in the geosciences. Instructors wield powerful influence, and we can use our sway to help students who are “on the fence” to consider geoscience professions by providing the right encouragement at
the right time. A well placed suggestion, recommendation, or idea could be the spark or incentive a student needs to opt for a geoscience major, switch to a geoscience major, or consider graduate study in the geosciences. We should use today to actively seek out tomorrow’s geologists.

**Toward an Earth Science Literate Society**

In last issue’s *Educator’s Page*, the petroleum and energy illiteracy of our nation was explored and discussed. It probably comes as no surprise that other aspects of what one might consider “earth science literacy” are equally weak and lacking in our nation’s populace. What constitutes *earth science literacy*? A few years ago, the National Science Foundation funded an Earth Science Literacy Initiative ultimately resulting in several Earth Science Literacy Principles (2009). [Similar endeavors both before and after have resulted in comparable guides for ocean literacy, climate literacy, and atmospheric literacy.] This guide outlines the nine “big ideas” in earth science as presented in the Earth Science Literacy Principles guide. See Table 1.

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<th>Earth Science Literacy Principles: Nine Big Ideas</th>
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<td>1. Earth scientists use repeatable observations and testable ideas to understand and explain our planet.</td>
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<td>2. Earth is 4.6 billion years.</td>
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<td>3. Earth is a complex system of interacting rock, water, air, and life.</td>
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<td>4. Earth is continuously changing.</td>
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<td>5. Earth is the water planet.</td>
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<td>6. Life evolves on a dynamic Earth and continuously modifies Earth.</td>
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<td>7. Humans depend on Earth for resources.</td>
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<td>8. Natural hazards pose risks to humans.</td>
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<td>9. Humans significantly alter the Earth.</td>
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Each of the nine “big ideas” includes several supporting principles. Some or all of these principles can be used in our introductory geology, earth science, and related geoscience courses as benchmarks for student learning and overall earth science literacy. A few of the “big ideas” are simple and straightforward (yet not necessarily accepted by our students), such as the *Earth is 4.6 billion years old* (Big Idea 2); others, however, are more intricate and complex, such as *Life evolves on a dynamic Earth and continuously modifies Earth* (Big Idea 6), and *Humans significantly alter the Earth* (Big Idea 9). See the “Featured Resource” section below for the link and additional information.

**Featured Resource**

The Earth Science Literacy Initiative’s *Earth Science Literacy Principles* accessible at [http://www.earthscienceliteracy.org](http://www.earthscienceliteracy.org)

The primary resource at this site is the Earth Science Literacy Principles Guide, which on page 2 states that this “guide presents the big ideas of Earth science that all citizens should know, determined by the Earth science research and education communities.” This resource provides a succinct way to share literacy-enhancing ideas with our geoscience students. It could be very useful to point out the relevant “big ideas” or associated principles throughout our class lectures or activities. The principles have also been aligned to the National Science Education Standards for K-12 educators.

Complementary projects related to ocean, climate, and atmospheric science are also provided at the site. If you’re unfamiliar with the “big ideas” in earth, ocean, climate, and atmospheric science literacy, as defined by these initiatives, these resources are worthy of further investigation. Of particular importance in an integrative science context is climate literacy, which is a continued source of media, political, and environmental attention today.

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AK Mary Azelton
ID Richard Moses
MI Kelly Cratsenburg
MN Michael Schuler
MT Blaine Mortenson
NY Scott Tucker
NY Aaron Yecies
RI Cynthia Gianfrancesco
WA Stanton Dodd
Canada Ruth Beys
Hong Kong/In Yuen Tsang
India Sudhir Pandey

Applicants Upgrading to CPG

AZ William Langer
CO Kenneth Witherly
FL Ralph Meder
MI Carolyn Powrozek
MN John Wilson
NY Peter Smith
NY Luigi Russo
TN Christopher Morie
WA Timothy Kingsley

New Certified Professional Geologists

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CA John Ochs CPG-11507
CA David Taff CPG-11514
CO Brett Marsh CPG-11510
CO Katharine McConaghy CPG-11511
GA Candace Trimble CPG-11520
ID Brian Brewer CPG-11508
MI Jim Sova CPG-11515
MN Michael Nemitz CPG-11512
MN Michele Mabry CPG-11521
NV Joseph Kitzes CPG-11513
NV Frederick Zoerner CPG-11517
OH Stephen Eshelman CPG-11519
OH Colleen Lear CPG-11522
OH Karl Urbach-Mallin CPG-11523

New Professional Members

AK Trel Evelyn Lough MEM-2195
AK Joanne Price CPG-11522
AK Michael Hagen CPG-11520
AK Ray Brown CPG-11544
AZ Alvin Burch CPG-11521
AZ Edwin Vandergrift CPG-11520
AZ William Langer CPG-11525
AZ Warren Thompson CPG-11529
AZ W. Dan Hauser CPG-11524
AZ Paul Plato CPG-11527
AZ Mark Cocker CPG-11528
CA David Ginter CPG-11522
CA James Richmond CPG-11528
CA Jon Trujillo CPG-11522
CA Henry Oliver CPG-11526
CA Tony Sawyer CPG-11529
CO James Parker CPG-11524
CO Chester Wallace CPG-11529
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CO Vladimir Zivkovic CPG-11523
CO Tyler Johnson CPG-11526
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FL James Herin CPG-11522
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Young Professional 6 21
Student Adjunct 876 1,395
Corporate Member 3 2
TOTALS 5,567 6,142

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NY Stephen Barnes AS-0090
NY Kentaro Moore AS-0087
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GA Josue Gallegos YP-0026

Student Upgrading to New Young Professional Members

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AL Mitchell Moore SA-3555
AL Joel Abrahams SA-3563
CA Abijah Bauer SA-3517
CA Nicholas Bel SA-3573
CA Victoria Blanchard SA-3622
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CA Ivan Carabajal SA-3625
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CO Jesse Pisel SA-3577
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New Members continued on page 40.
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The History of the Fort Worth Basin

Billy R. Caldwell, PhD., CPG-07464

Two major theories concerning the age and history of the earth have been proposed. The dominate theory is Uniformitarianism which states the “Present is the Key to the Past.” This theory establishes the earth as taking long ages to develop with an age of 4.6 billion years. The other theory, Catastrophism, is a belief that the past history of the earth has been interrupted or greatly influenced by natural catastrophes occurring on a worldwide or very extensive scale. Catastrophism was unpopular until some major events like the 1980 eruption of Mt. St. Helens occurred. The quick changes of the terrain after the events brought more interest in Catastrophism. Large recent tsunami or tidal wave destruction also showed how quickly areas can be altered. Baron Georges Cuvier (1769-1832), a versatile French genius and student of geology, supported the Catastrophism theory and also that the God of Genesis was the Creator of all. He also believed Noah’s Flood was universal and that this deluge, described in the Book of Genesis, could account for earthly events to form over shorter periods of time.

Neither theory can be proven without a shadow of doubt. If Catastrophism and the Genesis account are true, then the following article (Catastrophism and the Barnett Shale) outlines a potential of what might have happened in the Fort Worth Basin before, during and after the Barnett Shale was deposited.

Catastrophism and The Barnett Shale


The origin of the earth is still a great unsolved mystery. It shows, however, much evidence of intelligent design. The Catastrophism theory uses all the available evidence, including the written records in the Holy Bible, to come up with another potential for its origin and related geological events. Below is a theory of the earth’s history using Geology and Catastrophism.

In the beginning God created the heaven(s) and the earth. The earth was without form (most likely hot and molten in nature) and void (no life of any type). Darkness was on the face of the deep (light not yet created) and the Spirit of God moved on the face of the waters. Geologically, this means to me that the earth was extremely hot and liquid and great steam clouds poured from the earth’s surface. These clouds condensed into torrential rainfall that cooled the outer crust of the earth in a violent matter. The cool rain hitting the very hot earth originally spewed into steam and formed basalts and obsidian on the surface and deep seeded granite (due to slower cooling) at deeper depths. Great chunks and fragments of basalt and granite (granite wash) were formed at the surface due to the violent action of instant cooling. This intensive action released and dissolved great amounts of minerals into the water that eventually covered the whole earth. The salinity of the water changed from fresh water on the surface to salt water at depths. The dissolved minerals were so abundant and dense that great masses of rock such as limestone and dolomite were precipitated out of this super saturated solution and hardened into rock. The explosive action and eroded granite wash or basaltic gravels were deposited first and then the lime, dolomite and sandstones were also deposited. Since God works faster than the speed of light the granite and basalt could have also instantly changed (physically and chemically) to clays and this material also settled out as mud (clays and shales). All this would be the rock that would be raised as dry land on the earth on the third day. No fossils would be present in the original clastic rock formations, since life had not yet been created. This special “early” creation period occurred during a non-time mode in which God operates.

Eventually the outer crust of the earth was cooled and the earth coalesced into a spherical form under the new force of gravity (Isaiah 40:22). Darkness and deep water covered the entire earth. The spirit of God then moved or hovered over this early event (Genesis 1:2).

Light (energizing the earth) was created, the waters separated and then uplifted by plate tectonic activity to form dry land. This land was formed from the solidified rocks that were originally in suspension or solution or eroded prior to their controlled deposition. They are now seen in stratified deposits of various thicknesses throughout the world. The deeper basins would have collected thicker deposits. When this dry land appeared some of the rocks were quickly transformed and aged into soil. This prepared soil was then covered by functionally mature plants (not seeds) of all types (grass, brush, trees, flowers, etc.). They produced seeds that grew plants all over the total earth. This produced abundant oxygen for animals to be created later. Plants would be the specified food for the original future animal life, including humans. The sun was not needed this first day of plant life since it would be formed a creation day later and light was already present. The earth was probably level with little or no large original mountains.

This benefited organisms so they could migrate quickly. The continents were most likely closer or one mass such as ancient Pangaea. The earth contained a super variety and abundance of plant and animal life after the sixth creation day or period. God spoke first to water animals to “be fruitful and multiply” (Genesis 1:22). In obedience, the seas were full of life, which later became the abundant marine fossils found in sedimentary strata throughout the earth.

The Barnett Shale might have been formed during the Flood of Noah. Mountains are not mentioned early in the Bible. For a universal flood to occur and cover the high hills under the whole heaven (Genesis 7:19), it not only had to rain very hard for 40 days and nights, but the fountains of the deep (pressurized reservoirs) were broken up (Genesis 7:11). This allowed the deeper molten matter or lava (Job 28:5) plus water to spew out with immense out-bursting
ground water and lava surges. The continents cracked, were pushed apart by magma and began to move. The original movement might have been much faster in the past. The mountains rose and basins sank down (Psalm 104:6-9). Noah’s ark was safe on a protective perch formed during the flood. Pillow lavas (formed under water) on Mt. Ararat attest to this. Then great tidal or tsunami waves, thousands of feet high, pounded the newly formed uplifted and faulted mountains and destroyed many of them, plus depositing the mountain debris (sands, conglomerate, shale and clay) into basins. The Fort Worth Basin might have been formed during this violent tectonic period. The Bible mentions the erosion of mountains, mountains overturning, shaking or earthquake action or mountains disappearing in Job 9:5-6 and Job 14:18-19. This blends well with current geological knowledge except God does it quickly, when needed.

The Barnett Shale was deposited as mountains deformed and eroded sediments, with abundant destroyed plant life and some marine fossil animal fragments, were deposited in the basin. The destroyed organic materials were covered quickly to prevent the decay of the original matter. The Basin could have quickly filled up during the destructive year of the flood. Other formations, some with abundant dead or destroyed plants and animals (fossils), were also deposited in layers. This uplift and abnormal tidal wave action continued until the water subsided. Plant seeds were scattered all over the world by the water and quickly germinated. Water animals were not a part of the curse, so many survived to replenish the earth’s oceans. Abundant quickly deposited and destroyed marine organisms are found as fossils all over the world, even on top of the tallest mountains. The Ouachita overthrust remnant mountains under Dallas, Hill County, etc. (see Figure 1) are a part of the uplifted land that was mostly destroyed. The crush of South America pushing against Texas originally uplifted the Ouachita mountain front and folded down the shale, limestone and dolomite original strata (see Figure 2, Generalized Subsurface Stratigraphic Column) into a syncline called the Fort Worth Basin. This collected the organic matter, silt and shales that settled out and became, in part, the Barnett Shale that produces oil and gas in the Fort Worth Basin today. A famous Barnett Shale Geologist, Dan B. Steward, stated in a recent presentation about the Barnett Shale that, “It was a gift of God.” I also believe that to be true.

Dr. Billy R. Caldwell, CPG-07464, Fort Worth, Texas, has a BA and Master’s Degree from TCU. He completed his Ph.D. in 2004. Dr. Caldwell, a Professional Geologist for 58 years, is an Adjunct Professor at Tarrant County College. He created a college course, “Vacation Geology,” in 1989. He is a member of the following organizations: AAPG, AIPG, GSA, and Fort Worth Geological Society. He is a Certified Professional and Petroleum Geologist and holds a Certified Texas Geoscientist License. He is listed in Who’s Who in the South and Southwest, America and The World. Dr. Caldwell has been lecturing on numerous cruise ships for 23 years.

Figure 1: Elements of Late Paleozoic Tectonic Evolution.
Figure 2: Generalized Subsurface Stratigraphic Column.
Colorado Geological Survey Study Tying Geology To Poor Water Quality Wins National Award

Is high, pristine mountain water always clean and pure? Can streams unaffected by human activities and livestock influences be unfit for human consumption, or fish? A study by the Colorado Geological Survey (CGS) has some surprising answers. The study examines areas in Colorado that have naturally poor, surface-water quality due to the area’s geology. The pioneering report, titled “Natural Acid Rock Drainage Associated with Hydrothermally Altered Terrane in Colorado,” was recently recognized by the Geological Society of America (John C. Frye Memorial Award) as the best environmental publication of 2011. The report identifies a number of streams in Colorado where surface water is acidic and has high concentrations of metals upstream of historic mining.

Hot water circulating in the earth’s crust can “hydrothermally alter” rock composition by dissolving some minerals and depositing others. In affected areas, the hydrothermal-alteration process deposited metal-sulfide minerals, commonly pyrite (fool’s gold), in the rocks. When these rocks interact with oxygen, the iron sulfide “rusts” to form iron oxide minerals, creating striking yellow, orange, and red colors – similar to the oxidation of metal in an old rusty car. “Acid rock drainage” occurs when the sulfur combines with water to form weak sulfuric acid. The acid then dissolves minerals in rock, often adding significant amounts of dissolved metals to streams. Natural acid rock drainage has been active in Colorado for thousands, possibly millions of years. Many of the areas exhibiting intense hydrothermal alteration also contain historic mine sites. Frequently, acid rock drainage from natural sources and mine sites combine to cause severe downstream water quality problems. In these situations it is important to distinguish the natural, or background, water quality so that realistic clean-up goals for water quality can be set.

“Due to Colorado’s many naturally mineralized areas, it is challenging to separate mining impacts on water quality from natural sources. This well-written study has been invaluable in determining man-made mining impacts on water quality and the selection of reclamation projects at historic mines,” said Bruce Stover, the director of the Colorado Office of Active and Inactive Mines.

“This useful publication provides an understanding of how natural acid rock drainage affects water quality in and downstream of Colorado’s mineralized regions and is an invaluable resource to the Division,” said Andrew Ross, Senior Hydrogeologist with the Colorado Water Quality Control Division.

Funding for this study came from the Colorado Geological Survey portion of the Department of Natural Resources Severance Tax Operational Account. Colorado severance taxes are derived from the production of gas, oil, coal, and metallic minerals. To order the “Natural Acid Rock Drainage: Associated with Hydrothermally Altered Terrane in Colorado”, visit our online book store at http://geosurveystore.state.co.us and search for NARD.
Glossary of Geology now available as an e-book for Kindle and Nook

Alexandria, VA - The revised 5th edition of the Glossary of Geology, published by the American Geosciences Institute, is now available as an e-book for the Kindle and the Nook. The e-book version provides users with the full layout and text of the Glossary for half the price and none of the pounds of the print edition. The Glossary is an indispensable reference tool. It contains nearly 40,000 entries, including 3,600 new terms and approximately 13,000 entries with revised definitions from the previous edition. The revisions encompass advances in scientific thought and changes in usage, and underscores the importance of this volume for any Earth science professional or student. In addition to definitions, many entries include background information and aids to syllabication. The Glossary draws its authority from the expertise of the more than 100 geoscientists in many specialties who reviewed definitions and added new terms.

Earth Science Week 2012 Contests Announced

Alexandria, VA - In celebration of Earth Science Week 2012, the American Geosciences Institute (AGI) is sponsoring three national contests honoring this year’s theme “Discovering Careers in the Earth Sciences.” This year’s competitions will feature a photography contest, a visual arts contest, and an essay contest.

Students, geologists, and the general public are invited to participate in this year’s photography contest, “Earth Science is a Big Job.” Entries must be composed of original, unpublished material, and capture how Earth scientists work in your community.

This year’s visual arts contest, “Imagine Me, an Earth Scientist!” is open to students grades K-5. Use artwork to imagine yourself as an Earth scientist! What would you study? How would you gather information? And what tools would you use?

Finally, students grades 6 through 9 may participate in the essay contest. This year’s essays must address the idea of “Geoscientists Working Together.” Submissions will be judged by a panel of geoscientists on creativity, relevance, and incorporation of the topic at hand.

Selected winners will be awarded for their submissions. For details, please visit http://www.earthsciweek.org/contests/index.html.

AGI Launches GeoWord of the Day

Alexandria, VA – In celebration of the release of the revised 5th edition Glossary of Geology for the Kindle and Nook platforms, the American Geosciences Institute (AGI) has started a free GeoWord of the Day service.

The GeoWord of the Day is a fun and convenient way to learn a new geoscience term every day. Each morning (US ET) the service will highlight a new word or term featured in the Glossary of Geology, ensuring daily authoritative terms and definitions for years to come. Users may choose to receive the GeoWord of Day directly through email by subscribing online at http://www.agiweb.org/word/.

YES Holds Elections

The Young Earth Scientists Network (YES Network) held elections for its Executive Committee in May. The YES network is an international association of early-career geoscientists primarily under the age of 35. The organization aims to create a global network of Earth scientists committed to solving global challenges. In 2009, AGI, along with the IYPE, the Geological Society of London, the Geological Society of America and UNESCO worked to create the group as a result of the International Year of Planet Earth in 2007. To date, the YES Network has approximately 2500 members worldwide, including 200 US members. To learn more about the YES Network and to become a member, please visit http://www.networkyes.org/index.php/about/.

YES Holds Elections

Methane Hydrate Test in Alaska Successful

Field experiments conducted in Alaska have shown successful exchange of carbon dioxide for methane in methane hydrate deposits. Thus, methane for energy is gained while carbon dioxide is sequestered. Knowledge gained from the experiments and field tests is promising for future energy resource demands and carbon sequestration for climate change mitigation.

Report Projects Large Increases in Deaths Due to Rising Temperatures

According to the recently released National Resource Defense Council (NRDC) report, “Killer Heat: Projected Death Toll from Rising Temperatures in America Due to Climate Change”, predicted increases in summer temperatures could result in 33,000 additional U.S. deaths by 2050 and 150,000 deaths by the end of the century. Of the 40 most populated cities, the most affected are predicted to be Louisville, Kentucky with an estimated 19,000 heat-related fatalities by the end of the century, Detroit, Michigan with 17,900, and Cleveland, Ohio with 16,600.

Draft of Next Generation Science Standards Released

Twenty six states in collaboration with Achieve, the National Research Council (NRC), the National Science Teachers Association (NSTA), and the American Association for the Advancement of Science (AAAS), have developed a draft set of science education standards for K-12 students. Next Generation Science Standards (NGSS) will modernize the out of date science curricula and reinforce the United States’ competitive edge in scientific learning.

For more information on any of the above topics, please go to www.agiweb.org.
Earlier this month the newspapers carried articles on the comments from the “Captains of the Oil and Gas Industry” while they were attending the CERAWeek Conference in Houston. James Hackett, COB/CEO of Anadarko Petroleum Corp. and John S. Watson COB/CEO of Chevron were some of the ones quoted. Many of the quotes emphasized the importance of doing a better job of showing the public that Hydraulic Fracturing is safe and that Hydraulic Fracturing is not damaging our sources of ground water. It was independents like George Mitchell, that started the resource plays and it is the independents that are leading the way in making the public aware of the safety of Hydraulic Fracturing and the new energy future this means for our country.

AIPG - American Institute of Professional Geologists and AGWT - American Ground Water Trust proposed a symposium to explore the issues with shale-gas development and water issues associated with hydraulic fracturing in a public symposium open to anyone that wanted to attend. SIPES saw this as a great opportunity to bridge the anti-oil rhetoric and generate real dialog based on scientific findings. SIPES National sponsored the symposium and one hundred percent of the additional sponsorships came from SIPES members, Westerly Exploration and Dan Smith. Members of SIPES Houston Chapter lent support by recommending pertinent speakers. SIPES made a significant contribution to the symposium that had cooperation from the Bureau of Economic Geology, the Railroad Commission of Texas, the American Geosciences Institute, The Texas Groundwater Association, The Energy Institute - University of Texas at Austin, the Association of Environmental and Engineering Geologists Texas Section and the International Association of Hydrogeologists Commission on Groundwater for Decision Makers.

With 130 in attendance the meeting room had standing room only. Those attending included members of the Texas Water Development Board, The Department of Energy, The Railroad Commission, Managers of Water Districts, County Commissioners, the Sierra Club, and a nun from San Antonio. SIPES was represented by Jory Pacht and Scott Daniel, CPG-05044. Sadly the Environmental Protection Agency chose not to send a representative, and not one newspaper, television or radio station chose to cover the symposium. Members of both the EPA and the press were specifically invited.

The symposium was broken into five sessions each covering a specific topic. The session topics dealt with; the economic importance of the shale plays and the impact of the shale plays on energy production and water resources; the latest technology of hydraulic fracturing; protection of the ground water resources; public perception of hydraulic fracturing and water resources; regulation, compliance and litigation. Keynote speakers were Scott Tinker, CPG-10566, Director of the Bureau of Economic Geology speaking on The Role of Unconventionals in the Global Energy Future and Chip Groat, CPG-02774, Associate Director of the Energy Institute at the University of Texas Austin speaking on Fact-based Regulation for Environmental Protection in Shale Gas Resource Development (Report released February 16th). The first evening of the symposium Scott Tinker presented his new documentary film “Switch”. The film looks at all of the potential sources of energy and addresses the issues involved with switching from carbon based sources to both carbon-based and alternative sources in the future.

The symposium was the demonstration that a symposium like this can be put together and attended by a cross-section of professions, society members, regulators and policy makers and a uniform theme can prevail. With the facilitation of real dialog, problems can be solved, and public perception can be changed. To this end SIPES could not have had a better ambassador than Jory Pacht. His knowledge of the issues, his willingness to engage in real give and take dialog brought many people together, scientists, Sierra Club members and even a nun from San Antonio.
Bennett Bearden Appointment—Governor Robert Bentley has appointed AIPG member Bennett L. Bearden, CPG No. 7700, Chairman of the Alabama Water Agencies Working Group, a coalition of five state agencies, the Alabama Department of Environmental Management, Alabama Department of Conservation and Natural Resources, Geological Survey of Alabama, Alabama Department of Agriculture and Industries and Office of Water Resources, convened to develop water policy and a statewide comprehensive water resources management plan. Bearden, who serves as Special Counsel on Water Law and Policy in the Office of the State Geologist of Alabama and as General Counsel for the Geological Survey of Alabama, has more than 30 years experience in the field of natural resources and water policy and 19 years experience in environmental law and policy. He has a doctorate (JSD) in water law and policy from McGeorge School of Law, University of the Pacific, a master of laws (LLM) from the University of London and a Juris Doctor degree from Birmingham School of Law. He received his BS and MS degrees in geology from the University of Alabama and a post graduate certificate in watershed management from the University of British Columbia. He was the recipient of the 2008 Slater International Water Law Award. Bearden is a member of the Alabama State Bar and the Washington DC Bar, and is admitted to the Roll of Solicitors of the Supreme Court of England and Wales. He is a Licensed Professional Geologist in Alabama and is a member of the Executive Committee of the Environmental Law Section of the Alabama State Bar, the Water Resources Committee of the American Bar Association’s Section of Environment, Energy and Resources, the Alabama Chapter of the American Water Resources Association, the International Water Association and the Organizing Committee of the Alabama Water Resources Conference. He is a frequent panelist at water conferences and a former adjunct professor at the University of Alabama and the Birmingham School of Law where he taught courses in water policy and law and environmental law. His research has been published in Water Policy, the official journal of the World Water Council.

La Follette Institute Recognizes Lilek’s Innovative Approach to Handling Waste—Christine Lilek, CPG-10195, a Southeast Region DNR hydrogeologist stationed in Ply-mouth and our Wisconsin Section AIPG President, is one of three people being recognized by the 2012 La Follette Institute’s Lloyd D. Gladfelter Awards for government innovation! The University of Wisconsin-Madison Robert M. La Follette School of Public Affairs administers the competition, annually recognizing problem-solving and resourceful ideas generated by government employees. Chris found a way to re-use street sweepings and storm drain sediments that would normally go to landfills. Working with state, county and local municipal contacts, she was able to organize a low-hazard exemption project that sorts and screens solids for road or building construction fill, utility trench backfill, pipe bedding and aggregate in asphalt paving mixes.

Senator Fred Risser (left) and La Follette Institute Director Tom DeLeire joined Chris as she accepted her Gladfelter Award for government innovation.

Chris reminded the award presentation attendees that “the street sweeping recycling project is not just about recycling dirt; it is about people learning how to trust and share with each other.”

Chris has been a hydrogeologist, environmental specialist and naturalist with DNR for 26 years; currently, in the remediation and redevelopment program managing investigations and clean-up activities for Superfund and Brown Fields redevelopment projects.

Since 1995, she’s worked in DNR’s Solid Waste and Recycling, Hazardous Waste, Wastewater and Parks program, encouraging other community innovations such as:

- Establishing the Sheboygan County Construction and Demolition Recycling Group,
- Leading the development of the “TurboEMS” environmental management system software program for small businesses and hazardous waste transport/disposal/storage facilities,
- Obtaining funds for historical programs and natural resource signage at Wisconsin parks and trails, and
- Facilitating the development of Wisconsin’s first Community Wellhead Protection Plan in Cottage Grove.

In addition to serving as the current president of the Wisconsin Chapter of the American Institute of Professional Geologists, Chris is the natural resource chair for Sheboygan County’s Environmental Career Connections, and is an active member of the Wisconsin Women in Government organization.

AIPG Section Websites

AIPG Section Website links are on the AIPG National Website at www.aipg.org. Click on the top right drop down menu and click on Section Websites. If your section does not have a website contact AIPG Headquarters to get one setup (wj@aipg.org). AIPG Headquarters will maintain a website for your section. Several sections (AZ, CA, CO, FL, GA, HI, IL Chapter, MI, MO, NM, OK, PA, and TN) are examples of websites hosted by AIPG National.
The AIPG National Executive Committee convened June 16, 2012 in Thornton, Colorado, at National Headquarters, for their meeting. On Friday, June 15, the Executive Committee and members of the Colorado Section attended a field trip to Pawnee Buttes in Northeastern Colorado.

Many tourists who drive to Colorado from the east consider the Great Plains a vast expanse of nothing, and go across as quickly as possible in order to reach the mountains. These folks simply don’t know what they are missing! These wide open spaces have a definite beauty all their own; and their sedimentary rock strata and contained fossils contain evidence for two of the main events in the geologic history of North America - the Cretaceous Cordilleran Seaway, and the uplift of the Rocky Mountains during Tertiary time. On this field trip we investigated this evidence as well as other significant geological and historical sites.

The tour was lead by Dr. Lee Shropshire, Professor Emeritus of University of Northern Colorado, (UNC) Greeley, Colorado. The group sang Happy Birthday and ate cake in recognition of Lee’s 79th birthday.
Dick Matthews, CPA, has been AIPG’s outside accountant for close to three decades. He has been a friend and advocate of AIPG. In recognition, the Institute presented him a labradorite specimen. A brass plaque stated “In appreciation for his decades of selfless support of AIPG.”

**Fossil Site In Golden, Colorado, Dedicated.**

**Triceratops Trail joins nearby dinosaur haunts with federal recognition.**

GOLDEN — The 68 million-year-old dinosaur tracks at the golf course in Golden are set for a hit of notoriety today. A dedication ceremony took place at 1:30 p.m. at Triceratops Trail on the west side of Fossil Trace Golf Course, 3050 Illinois St., to acknowledge the fossil site as a National Natural Landmark.

Triceratops Trail at the golf course was added to the existing Morrison Fossil Area National Natural Landmark at Dinosaur Ridge in 2011. The new name for the extended site will be the Morrison-Golden Fossil Areas.

Friends of Dinosaur Ridge president Joe Tempel said, “We held off on the dedication to get some interpretive signs up about the designation and do some maintenance on the trail.” The mission of the Friends group has been to educate the public and preserve the dinosaur tracks in Morrison and Golden.

Retired geologist and Golden resident William Caneer has long been an advocate of the tracks’ preservation. He was active last year in urging Jefferson County to approve a protective cover over the prints at Dinosaur Ridge, 16831 Alameda Parkway. He told county commissioners, “We want to counteract the erosion and stabilize the vertical sandstone beds. The shelters will further preserve the prints.” He vowed to restart the conversation about a shelter over the prints in Morrison at the popular Dinosaur Ridge, where a new visitor center is being planned.

Tempel called Caneer a founder and “the godfather of Triceratops Trail.”

He said, “The Friends of Dinosaur Ridge are working with Jefferson County to determine where a new visitor center would be located and its design.”

Several dignitaries spoke, including Tempel and Martin Lockley, director of the CU Tracks Museum. A representative of the Department of the Interior and local officials will be on hand as well, as will Dr. Bob Weimer, CPG-00098, of the Colorado School of Mines.
Female Enrollments and Degrees in U.S. Geoscience Programs
Remain Steady in 2011

In the 2010-2011 academic year, the level of female participation in U.S. geoscience degree programs remained generally steady. Female enrollments and degrees at the undergraduate level continue to trail those of the graduate level, except for the percentage of doctorates awarded to women. After a sharp decrease of 8 percentage points in 2010 of women earning a geoscience doctorate, the trend reversed, growing over 1 percentage point in 2011. An interesting note is that the gender ratio of doctorate degrees drops sharply immediately following recessions, but then recovers rapidly. Though no immediate apparent causal relationship is evident, this pattern seems to be emerging again.

- Christopher M. Keane
Super-Volcanoes!
How Much Warning Do We Get Before a Gigantic Eruption?

David J. Tenenbaum

Can We Even Get a Warning?

A super-eruption that rocked the Yellowstone area in Wyoming 640,000 years ago spread ash across half the United States, and created a cloud of ash, dust and sulfuric acid that must have cooled the climate for years. Ditto for Long Valley, California, 760,000 years ago.

Long Valley, California, has had the kind of super-eruption that can change whole states and even the climate. This three-dimensional view of Long Valley was created from data taken by synthetic aperture radar on a space shuttle. Super-eruptions are barely-conceivable outbursts that are fueled by a huge pool of molten rock near the surface. The most recent occurred about 26,000 years ago. A super-eruption may contain more than 1,000 cubic kilometers of dust and ash, 1,000 times as much as Mt. St. Helens, and 10 times more than Tambora, the volcano in Indonesia that caused Europe’s “year without a summer” in 1815.

Our ancestors survived the super-volcanoes, but the human footprint on the landscape has grown so intense that a rerun could terminate civilization, largely by climatic cooling.

The first hints of the super-volcanoes came from rings of mountains 30 to 60 kilometers across, which resembled stupendously large versions of the ring-shaped calderas on “regular” volcanoes.

Until now, geoscientists have thought that the magma, once it formed or migrated close to the surface, would take roughly 100,000 years to erupt, which might give us some way to anticipate the inevitable tragedy.

But a study published yesterday says the eruption may happen in hundreds or thousands of years. Study director Guilherme Gualda, the assistant professor of earth and environmental sciences at Vanderbilt University, says “Our study suggests that when these exceptionally large magma pools form, they are ephemeral and cannot exist very long without erupting.”

No swimming: Such pools of molten rock may be tens of kilometers in diameter, and up to three kilometers deep!

A Focus On Disaster

Looking at a volcanic rock called tuff around Long Valley Caldera, Gualda and associates used several techniques to analyze the timing of melting and refreezing in the molten rock, and concluded that the eruption likely occurred hundreds or thousands of years after the magma began accumulating.

Volcanoes occur when a giant dollop of molten rock forms at shallow depths, then eventually bursts through to the surface. In a super-eruption, the same process is thousands of times more massive than eruptions during the past century.

The new schedule assumes that the magma that powers the eruption was rocks of the crust that were melted by heat from Earth’s mantle underneath. As crystals form in the molten rock, atoms can diffuse inside them, but after the eruption, the magma cools, freezing those atoms in place.

Normally, the level of impurities varies from place to place inside a crystal, but during prolonged heat, the impurities can migrate, allowing their concentrations to balance out. Therefore, measuring the concentrations and location of impurities provides a geologic “clock” that shows how long the magma remained molten. “We are dating the amount of time that passed, from the inception of the magma body, to its destruction by the eruption,” says Gualda.

In this case, Gualda and colleagues measured titanium, an impurity in the common crystalline rock quartz. “Titanium is a great marker,” says Gualda. “When it goes from 750° C heat to 0° C, after the eruption, that halts the diffusion.” By studying the titanium profile and comparing it to laboratory measurements of titanium migration, it’s possible to calculate how long the crystal remained hot enough for the titanium to move.

Not So Fast!

Since no such giant chambers are known to exist, it’s rather academic whether such a magma chamber would empty in hundreds of years, instead of, say 100,000 years, but the new time estimate is “much shorter than is commonly assumed,” says Ilya Bindeman, an associate professor of stable isotope geochemistry and volcanology at the University of Oregon. “I think this is too short by many lines of evidence.”

The new calculations, Bindeman says, “hinge upon the diffusion coefficient of titanium in quartz in experimental estimations.” Diffusion can vary exponentially, and a 10-fold decrease in the diffusion coefficient will change the results by a factor of 10, he says.

But Gualda says the new study applied straightforward lab measurements to the new analyses of Long Valley quartz. “The rate of titanium migration was experimentally determined by another group,” he says. “You put [the quartz] in an oven and wait long enough” to measure the titanium. “The principle is rather simple.”

This article was printed from The Why Files, a non-profit science news website produced by the University of Wisconsin-Madison.
The Oldest and Largest Meteorite Crater Ever Found On Earth.

Researchers think the crater was formed 3 billion years ago, making it the oldest ever found, said Danish researcher Adam Garde. The impact crater currently measures about 62 miles (100 kilometers) from one side to another. But before it eroded, it was likely more than 310 miles (500 km) wide, which would make it the biggest on Earth, Garde told OurAmazingPlanet.

The team has calculated it was caused by a meteorite 19 miles (30 km) wide, which, if it hit Earth today, would wipe out all higher life.

In the 3 billion years since impact, the land has been eroded down to about 16 miles (25 km) below the original surface. But the effects of the intense shock wave and heat penetrated deep into the Earth, and remain visible today, said Garde, a researcher at the Geological Survey of Denmark and Greenland.

Mining For Minerals

John Spray, a meteorite expert at the University of New Brunswick, who wasn’t involved in the research, said he thinks it’s probably a meteor crater, but points out that it hasn’t been proved, and may not be for some time. “It’s very interesting and it’s good science,” he said. “But we don’t really know how to recognize very old impact craters, because they are typically so highly modified.”

That’s because Earth is alive and constantly changing due processes such as erosion, precipitation and plate tectonics. At one time Earth likely had as many craters as the moon, which is essentially geologically dead. But these have mostly been wiped away, destroyed by erosion and the like.

Only around 180 impact craters have ever been discovered on Earth, and nearly one-third of them contain significant minerals deposits such as precious metals. The Canadian mining company, North American Nickel, is exploring the region where the potentially newfound crater is for nickel and other mineral deposits, company geologist John Roozenaal said. They are conducting airborne surveys and will soon do more mapping, small-scale sampling and drilling to see if they can find an area that could be economical to mine.

These impacts are of interest to mining companies not because of the large meteorites themselves — they typically vaporize — but because of the effect upon the Earth’s surface. The impact heats rocks so much that metals can melt and then collect toward the bottom of the crater. Craters can also be important sources of oil and gas; the crushed, permeable rocks can act like a sponge, absorbing hydrocarbons.

Before this discovery, the oldest crater was thought to be the Vredefort crater in South Africa, estimated to be 2 billion years old. At 186 miles (300 km) wide, it’s also the largest crater that remains visible. Scientists expect that there were many more craters formed around 3-4 billion years ago when Earth lacked a protective atmosphere.

Garde said the most interesting thing about the experience was finding an alternate explanation for something outside of his training. “I had a problem I couldn’t solve in a region I knew very well,” he said. “A meteor impact was the idea that made everything fall into place — It’s not something I was looking for.”

Reprinted from the July 2, 2012 Sigma XI, SmartBrief.
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