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Photos: Top-Glacier in Alaska; Center-Train Turnagain Arm; Bottom-Anchorage City Skyline. Photos top and middle compliments of Nicole Geils, Alaska Conventions & Visitors Bureau. Bottom photo compliments of Jody Overstreet.
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.

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.
On behalf of the AIPG Alaska Section and the Annual Meeting Planning Committee, I am excited to welcome everyone to Anchorage, Alaska in September 2015! The Alaska Section is looking forward to sharing so much that our amazing state has to offer; unique and complex geology, northern flora & fauna, and breathtaking scenery!!

Since the 1999 meeting held at the Alaska Resort in Girdwood, Anchorage has grown and developed considerably, while maintaining the essence of wild and adventure just minutes from town. The 2015 meeting will be held at the Hilton Hotel in the heart of downtown Anchorage, with access to the rich history of our town (Anchorage celebrates the 51st anniversary of the 1964 earthquake and its Centennial this year!), modern amenities (shopping and entertainment), plus quick access to some of the country’s most incredible state and national parks.

The Alaska Section is looking forward to sharing the riches of Alaska with all of the meeting attendees and their family/guests with some fantastic field trips that will take you across much of Southcentral Alaska and north to Fairbanks. The appeal of Alaska speaks for itself, but to entice you just a bit more, a sampling of the field trips and activities planned include:

**Turnagain Arm Tour** – See the Kenai Formation and McHugh Complex as you travel along Cook Inlet down the Seward Highway. Stops include viewpoints with the potential for wildlife spotting (Dall sheep and Beluga whales), the Portage Glacier Visitor Center, and the Anton Anderson Memorial Tunnel to Whittier.

**Anchorage Geology Tour** – Learn about the history of Anchorage’s devastating 1964 Good Friday Earthquake. This will be combined with a trip to the newly opened Alaska Geological Materials Center.

**Denali National Park and Healy Valley Coal Mine** – Travel by motor coach up the Parks Highway north of Anchorage to the Healy area (between Anchorage and Fairbanks). Here you will be treated to two days of complex geology, a tour of the Usibelli Coal Mine, and a trip into Denali National Park.

**Glacial Geology of the Upper Kenai Peninsula** – Renowned geologist, R. D. Reger, will lead a two-day field trip across the Kenai Peninsula with stops at key locations to describe the effects of widespread and multiple glacial outburst flood geology.

**Wishbone Hill and Matanuska-Susitna Valley** – This one day field trip, will feature a drive north of Anchorage to the scenic Mat-Su Valley. This trip includes a moderate hike to Wishbone Hill, a world class paleontological site for Early Tertiary fossils, and a stop at the historic coal mines near Sutton that have gained a renewed interest for the high quality bituminous coal in the area.

**Fairbanks Area** – A pre-conference trip to the Fairbanks area is being planned in order to offer participants a taste of central Alaska. Activities planned for Fairbanks include the Cold Regions Research and Engineering Laboratory (CRREL) permafrost tunnel and a tour of the Fort Knox Gold Mine.

Regardless of the field trip(s) you select to join, you will be granted an adventure to remember. September weather in Anchorage and the Kenai Peninsula is typically mild, with evening and morning temperatures in the 40s Fahrenheit and daytime highs in the 50s Fahrenheit. We recommend dressing in layers, and being prepared for rain and cool weather, especially along Cook Inlet and Turnagain Arm. Should you plan to travel on one of the local glacier cruises, be sure to wear your rain gear and base layers!

The conference dates (September 19-22) occur at the tail end of ‘tourist season’ where most of the tourist-drawing amenities are still available, but fewer crowds! Downtown Anchorage hosts a variety of activities within walking distance of the Hilton, with many fabulous restaurants and local bars, several art galleries and historic buildings, and the Tony Knowles Coastal Trail to stretch your legs and offer sightseeing vantages.

We look forward to seeing old friends, meeting new faces, and establishing (or growing!) our professional and personal networks. For more information in planning your stay, please be sure to visit the Anchorage Visitor’s Convention Bureau (http://www.anchor-age.net/).

See you in September!!

Keri Nutter, CPG
Alaska Section Vice-President
2015 Meeting Planning Committee Co-Chair
### PROGRAM

#### Thursday, September 17, 2015
- **8:00 am—6:00 pm** (in Fairbanks)
  - Pre-Conference Field Trip — Fairbanks, Alaska — Fort Knox Gold Mine and Permafrost Tunnel Tours (begin and end in Fairbanks)

#### Friday, September 18, 2015
- **8:00 am—12:00 noon**
  - AIPG Executive Committee Meeting *(open to all registrants)*
- **1:00 pm—4:30 pm**
  - AIPG Advisory Board Meeting *(open to all registrants)*
- **4:30 pm—5:00 pm**
  - AIPG 2015-2016 Joint Executive Committee Meeting & Business Meeting *(open to all registrants)*
- **5:00 pm—6:00 pm**
  - AIPG Foundation Meeting

#### Saturday-Sunday, September 19-20, 2015
- **6:00 am Saturday — 6:30 pm Sunday**
  - 2-day Field Trip — Denali National Park and Usibelli Coal Mine Tour
- **8:00 am Saturday — 6:00 pm Sunday**
  - 2-Day Field Trip — Glacial Geology of the Upper Kenai Peninsula

#### Saturday, September 19, 2015
- **8:00 am—6:00 pm**
  - Field Trip — Wishbone Hill, Palmer, Alaska

#### Sunday, September 20, 2015
- **7:30 am—5:00 pm**
  - Registration — Hotel *(1st floor)*
- **8:00 am—5:00 pm**
  - Field Trip — Matanuska Glacier
- **10:00 am—4:00 pm**
  - Exhibitor and Poster Set-up
- **2:00 pm—5:00 pm**
  - Field Trip — Alaska Volcano Observatory
- **6:30 pm—8:00 pm**
  - Reception — Exhibit Area *(complimentary for all registrants)*

### Monday, September 21, 2015
- **7:30 am—5:00 pm**
  - Registration — Hotel
- **7:30 am—5:30 pm**
  - Field Trip — Transect of the Mesozoic Subduction Complex, Southcentral Alaska
- **8:00 am—5:00 pm**
  - Exhibits Open
- **8:30 am—10:00 am**
  - Plenary Session
- **10:30 am—5:00 pm**
  - Technical Sessions
- **10:30 am—5:00 pm**
  - Field Trip — Backstage Tour of the New Alaska Geological Materials Center and a Tour of the Alaska Volcano Observatory
- **12:00 noon—1:30 pm**
  - Luncheon with Keynote Speaker *(complimentary to all registrants)*
- **6:30 pm—8:30 pm**
  - AIPG Awards, Dinner, and Entertainment *(All attendees welcome with additional fee)*

### Tuesday, September 22, 2015
- **7:30 am—3:00 pm**
  - Registration — Hotel
- **8:00 am—5:00 pm**
  - Technical Sessions
- **8:00 am—3:30 pm**
  - Exhibits Open
- **8:00 am—5:00 pm**
  - Field Trip — Turnagain Arm Geology Tour
- **8:00 am—12:00 noon**
  - Field Trip — 1964 Great Alaska Earthquake: Geologic Causes and Effects
- **10:00 am—11:30 noon**
  - Field Trip — Backstage Tour of the New Alaska Geological Materials Center
- **12:00 noon—1:30 pm**
  - Luncheon with Keynote Speaker *(complimentary to all registrants)*

*All field trips begin and end at the Hilton Anchorage with the exception of the pre-conference Fairbanks, Alaska trip on Thursday, September 17th, which begins and ends in Fairbanks.*

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**Hilton Anchorage**

500 West Third Avenue  
Anchorage, AK 99501  
(907) 272-7411 or 1-800-HILTONS  
$137 plus tax per night in AIPG15 Room Block

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*Photo Courtesy of Visit Anchorage*
Pre-Conference Field Trip—Fairbanks, Alaska—Fort Knox Gold Mine and Permafrost Tunnel Tours

Date: Thursday, September 17, 2015
Time: 8:00 am to 6:00 pm (in Fairbanks)
Cost: $149 Early/$199 Regular (includes box lunch, snacks, water & transportation)
Leader: Becky Morgan, CPG-11563
Quentin Ghering and Kevin Bjella
Limited: Minimum of 10 participants by August 1

Fort Knox is an open pit gold mine located in the historic Fairbanks mining district. Owned and operated by Kinross Gold, the mine is located 25 miles from the city of Fairbanks. At Fort Knox, gold is hosted by a late-Cretaceous granite pluton. Gold, bismuth and tellurium occur in quartz veins, fractures, and shear zones within the pluton. The sulfide content is very low (<0.1%). Gold is recovered using two mineral processing streams. A carbon-in-pulp mill processes higher grade ore and lower grade material is placed on a valley fill leach pad. With nearly 20 years of production, Fort Knox poured their 6 millionth ounce of gold on Dec. 18th, 2013. Fort Knox is the single largest producer of gold in the history of the state of Alaska. This tour will provide the opportunity to view the open pit, primary crusher, and mill facilities.

See permafrost up close; learn about ice wedges, ice lenses, and other permafrost features; see bones of the Pleistocene bison, mammoth, and horse. The United States Army maintains and operates a unique research facility near Fairbanks, Alaska, known as the CRREL Permafrost Tunnel Research Facility. CRREL is an acronym for the U.S. Army’s Cold Regions Research and Engineering Laboratory, part of the U.S. Army Corps of Engineers Engineer Research and Development Center. Researchers at the CRREL Alaska Research Office Fairbanks, Alaska, maintain and manage the Permafrost Tunnel Research Facility and offer support for scientific research projects.

The Permafrost Tunnel was excavated from 1963–1969 for the study of permafrost, geology, ice science, and the mining and construction techniques specific to permafrost environments. Fascinating features of the tunnel are described in the Soil and Rock and Paleontology sections, and are shown during the Virtual Tunnel Tour. The Permafrost Tunnel offers a unique research platform for scientists and engineers who wish to study a frozen environment over 40,000 years old.

Gold Mine—Guests must wear closed-toe shoes, long pants, and no loose clothing. Guests between 9 and 18 years of age must have a parent or legal guardian sign the release on the minor’s behalf. Children under 9 years of age are not permitted on tours.

Tunnel—Dress for cold temperatures and wear appropriate footwear. All participants will be required to wear a hard hat (provided).

Gold Mine-Guests must wear closed-toe shoes, long pants, and no loose clothing. Guests between 9 and 18 years of age must have a parent or legal guardian sign the release on the minor’s behalf. Children under 9 years of age are not permitted on tours.

Tunnel—Dress for cold temperatures and wear appropriate footwear. All participants will be required to wear a hard hat (provided).

Denali National Park and Usibelli Coal Mine Tour (2-day trip)

Date: Saturday, September 19, 2015 thru Sunday, September 20, 2015
Time: 6:00 am Saturday to 6:30 pm Sunday
Cost: $575 Single Room Early/$675 Single Room Regular
$525 Dbl Room Early/$625 Dbl Room Regular
(includes hotel breakfast and box lunch-day 1; snacks, water, transportation, hotel, guide book, park fees and park transportation fees; dinner day 1 and all meals day 2 on your own)
Leader: Dr. Nicholas VanWyck, CPG-10553
Limited: Minimum 10 participants by August 1

Take a ride along the scenic Parks Highway north along the edge of the Susitna Basin with (weather-permitting) spectacular views of Mt McKinley and the Alaska Range to the west. A geology-themed tour by the NPS geologist has been booked for that afternoon with specific details to follow. The weekend of the visit fortuitously coincides with the annual lottery for limited local access to the park, always popular for its opportunity for reduced numbers of visitors, good fall colors and wildlife viewing opportunities. Lodging and dinner will be outside the park in Healy where the following morning, a tour of Usibelli’s active coal mining operation is scheduled. The Usibelli coal mine is located within the Before returning to Anchorage a quick tour of Golden Valley Electric newly opened, mouth-of-mine, coal-powered electric generation plant is planned.

Participants must be able to walk for 45 minutes and have warm clothing and hiking boots.
Field Trips

Glacial Geology of the Upper Kenai Peninsula (2-day trip)

Date: Saturday, September 19, 2015 thru Sunday, September 20, 2015
Time: 8:00 am Saturday to 6:00 pm Sunday
Cost: $475 Single Room Early/$575 Single Room Regular
$425 Dbl Room Early/$525 Dbl Room Regular
(includes hotel breakfast and box lunch-day 1: snacks, water, transportation, hotel, guide book, park fees; dinner day 1 and all meals day 2 on your own)
Leader: R.D. Reger
Limited: Minimum 10 participants by August 1

Traveling via the Seward Highway the first day examines the late glaciation features with stops along Turnagain Arm, Kenai Lake, Sterling and Soldotna. The following day will start with a drive to Kenai along the Kalifornsky Beach Road across the Sterling Terrace to discuss features and stratigraphy of the estuarine reach of the lower Kenai River and the stratigraphy exposed in the bluff at Kenai to the north. The trip will continue northward up the extensive outwash braidplain graded to ice terminal positions in the Nikiski area, passing the oil and natural-gas processing facilities near Nikiski. We will discuss the stratigraphy exposed in the coastal bluffs as we drive northeast to Captain Cook State Park through well-preserved end moraines and pitted proximal outwash of the last major glaciation. At Captain Cook State Park we will observe the extensive field of large, mainly granitic erratics brought to the Kenai Peninsula by glaciers from the west side of Cook Inlet. The moderately high tide occurs about noon on September 20th, so most of the erratics will be submerged during our visit, but enough beach will be exposed with numerous erratic blocks and we can walk a short distance along the beach to observe the stratigraphy in the coastal bluff before remounting the bus and heading back toward Anchorage.

Wishbone Hill-Palmer, Alaska

Date: Saturday, September 19, 2015
Time: 8:00 am to 6:00 pm
Cost: $139 Early/$189 Regular
(includes box lunch, snacks, water & transportation)
Leader: Mike Belowich, CPG-11077 and Anne Pasch

The Wishbone Hill Field Trip is a day long excursion by four-wheel drive vans from Anchorage into south-central Alaska’s lower Matanuska Valley and its bituminous coal field, to see the old Evan Jones coal mine and still open strip pits. The area is very important in Alaska’s early coal mining industry; the U.S. Navy’s interest in high quality bituminous steaming coal for use in its early 20th Century Pacific Fleet was the driving force behind the initial construction of the Alaska Railroad to reach the Chickaloon coal field, located about 20 miles east of Wishbone Hill. Also around this time period (1914 ¬-1920), spur railroad lines were built to the Wishbone Hill area by the Alaska Engineering Commission to access the coal resources there. Interestingly, Anchorage was initially founded in 1915 as a tent camp for workers building the railroad to these coal fields. There is currently renewed interest by companies looking to re-establish the coal mines for export purposes as a result of the increasing global demand for high quality bituminous coal which the area possesses. Wishbone Hill is also a world class paleontological site for Early Tertiary fossils. Participants should come prepared for the elements with proper hiking footwear, warm clothing, and raingear.

Matanuska Glacier

Date: Sunday, September 20, 2015
Time: 8:00 am to 5:00 pm
Cost: $189 Early/$219 Regular
(includes box lunch, snacks, water & transportation)
Leader: Chris Bruns, MEM-2343

Travel from Anchorage to Matanuska Glacier. More details coming soon.

Alaska Volcano Observatory

Date: Sunday, September 20, 2015
Time: 2:00 pm to 5:00 pm
Cost: $59 Early/$79 Regular
(includes snacks, water, & transportation)
Leader: Chris Waythomas
Limited: Maximum 20 participants

You will be transported to the Alaska Volcano Observatory for an overview of what we do at the observatory, show people the operations room where real-time seismic and satellite data
Field Trips

come in, talk about eruption response, hazard assessment and
things like that.

Please consider wearing comfortable shoes for the tour.

Transect of the Mesozoic Subduction Complex,
Southcentral Alaska

Date: Monday, September 21, 2015
Time: 7:30 am to 5:30 pm
Cost: $139 Early/$189 Regular
(includes box lunch, snacks, water & transportation)
Leader: Dr. Susan Karl
Limited: Maximum 26 participants

This field trip traverses exposures of a multi-generation Mesozoic magmatic arc and subduction-accretion complex that had a complicated history of magmatic activity and experienced variations in composition and deformational style in response to changes in the tectonic environment. This Mesozoic arc formed at an unknown latitude to the south, was accreted to North America, and was subsequently transported along faults to its present location. Some of these faults are still active. Similar tectonic, igneous, and sedimentary processes to those that formed the Mesozoic arc complex persist today in southern Alaska, building on, and deforming the Mesozoic arc. The rocks we will see on this field trip provide insights on the three-dimensional composition of the modern arc, and the processes involved in the evolution of an arc and its companion accretionary complex.

The field trip starts in the Late Cretaceous accretionary prism along Turnagain Arm and finishes in the roots of the Late Cretaceous arc at Hatcher Pass. The transect is divided into 5 parts, which we will visit in the following order: 1) the accretionary prism, consisting of Jurassic to Late Cretaceous sedimentary and volcanic rocks of the Chugach terrane, 2) the terrane boundary, marked by the Border Ranges and Knik Arm Faults, 3) the overlying oceanic arc terrane, consisting of Paleozoic to Jurassic metasedimentary, metavolcanic, and intrusive igneous rocks of the Peninsular-Wrangellia composite terrane, 4) the forearc basin, consisting of Cretaceous and younger deposits that unconformably overlie the Peninsular terrane, and 5) the plutonic underpinnings of the Late Cretaceous arc that was built on the Peninsular terrane after it was accreted to the continental margin.

Stops 1 and 4 will involve a scramble down a bluff. Athletic shoes will suffice for all stops. Be prepared for wind and rain: rubber boots, warm jacket, raincoat, hat, and gloves are highly recommended.

Backstage Tour of the New Alaska Geological Materials Center and a Tour of the Alaska Volcano Observatory

Date: Monday, September 21, 2015
Time: 10:30 am to 5:00 pm
Cost: $99 Early/$149 Regular
(includes box lunch, snacks, water & transportation)
Leader: Kenneth Papp, and Chris Waythomas
Limited: Maximum 20 participants

The trip begins with a tour of the new Alaska Geological Materials Center which will last approximately 45 minutes with 15 minutes for conversation in the main core viewing room. The tour will highlight: a history of the Alaska GMC, its role in natural resource research and discovery in the state, how samples are acquired, organized, and processed, the challenges of relocating the entire archive from Eagle River to Anchorage, unique renovations made to the old Sam’s Club warehouse, how industry and geoscientists utilize the facility, and the center’s role in educating the general public.

After a lunch break, you will be transported to the Alaska Volcano Observatory for an overview of what we do at the observatory, show people the operations room where real-time seismic and satellite data come in, talk about eruption response, hazard assessment and things like that.

Please consider wearing comfortable shoes for the tour.

Turnagain Arm Geology Tour

Date: Tuesday, September 22, 2015
Time: 8:00 pm to 5:00 pm
Cost: $139 Early/$189 Regular
(includes box lunch, snacks, water, park fee & transportation)
Leader: Holly Weiss-Racine, CPG-11738

The bus will drive the Seward Highway along Turnagain Arm, a designated All-American Road and Scenic Byway known for its beauty and history. A local guide will be present on the bus to discuss geology, the history of the corridor, current avalanche
Field Trips

and rock fall issues, and the impacts of the 1964 earthquake. The ride will take approximately 1.5 hours.

The first of two stops will be at the U.S. Forest Service Begich Boggs Visitor Center in Portage Valley. Attendees will have the opportunity to enjoy the center for 2 hours. The BBVC highlights information about local glaciers, flora, fauna and the cultural history of Southcentral Alaska through the award-winning film “Retreat and Renewal: Stories from Alaska’s Chugach National Forest” and interactive exhibits. Paved and non-paved hiking trails are available for exploration; please dress appropriately as Portage is known for driving rain and strong winds. At 11:30 am, the group will meet in the BBVC conference room for lunch, discussion and questions with a U.S. Forest Service Ranger, and to prepare for the tunnel tour.

The group will re-board the bus at 12:30 pm and drive to the entrance of the Anton Anderson Memorial Tunnel, known locally as the Whittier Tunnel. There, Gordon Burton the DOT&PF Facility Manager will guide the tour through the tunnel. The 2.5 mile long tunnel is the longest highway tunnel in North America. The single-lane tunnel is shared by both vehicle and rail traffic. The tunnel tour will last approximately 2 hours.

Hard Hats and Safety Vests are required for the tunnel portion of the tour. Comfortable shoes and outdoor weather appropriate clothing (if you plan to hike at the BBVC) is recommended.

1964 Great Alaska Earthquake: Geologic Causes and Effects’

Date: Tuesday, September 22, 2015
Time: 8:00 pm to 12:00 pm
Cost: $59 Early/$79 Regular
(includes snacks, water & transportation)
Leader: Dr. Kris Crossen

4-hour field trip beginning with a presentation of the 1964 earthquake damage in Anchorage. Field trip to several landslide locations, Earthquake Park, and Bootlegger Cove clay. Discussion of landslide mitigation and city zoning. Examples of how Anchorage was rebuilt after the earthquake.

Be ready for a bit of walking; hiking boots or shoes suggested, as well as rain gear and day packs.

Backstage Tour of the New Alaska Geological Materials Center

Date: Tuesday, September 22, 2015
Time: 10:00 pm to 11:30 pm
Cost: $59 Early/$79 Regular
(includes transportation)
Leader: Kenneth Papp
Limited: Maximum 25 participants

The bus will take you on a 20 minute drive to the new Alaska Geological Materials Center. The tour of the new facility will last approximately 45 minutes with 15 minutes for conversation in the main core viewing room. The tour will highlight: a history of the Alaska GMC, its role in natural resource research and discovery in the state, how samples are acquired, organized, and processed, the challenges of relocating the entire archive from Eagle River to Anchorage, unique renovations made to the old Sam’s Club warehouse, how industry and geoscientists utilize the facility, and the center’s role in educating the general public.

Please consider wearing comfortable shoes for the tour.

Exhibitors and Sponsors

Are you interested in promoting your company? Join us by being an exhibitor or sponsor at the AIPG Annual meeting in Anchorage.

Exhibitors $ 595

Sponsors

McKinley Level $5,000
Denali Level $2,500
Iditarod Level $1,500
Kenai Level $1,000
Welcome Reception $ 750
Lunch $ 500
Breaks $ 250

For more information contact Cathy Duran at cld@aipg.org at call (303) 412-6205.
AIPG 2015
National Award Recipients

Ben H. Parker Memorial Medal
David M. Abbott, Jr,
CPG-4570
Denver, Colorado

Martin Van Couvering Memorial Award
James J. Jacobs,
CPG-7760
Mill Valley, California

Award of Honorary Membership
Dennis Pennington,
CPG-4401
Maple Glen, Pennsylvania

Outstanding Achievement Award
Karl E. Karlstrom
Albuquerque, New Mexico

Outstanding Achievement Award
Laura J. Crossey,
Albuquerque, New Mexico
## Registration

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### FEES AND PAYMENT INFORMATION

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<td>2-day Field Trip — Denali National Park and Usibelli Coal Mine Tour (Sat., 9/19, 8:00 am – Sun., 9/20 6:30 pm)</td>
<td>$575 Single Room $525 Dbl Room</td>
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<td>2-Day Field Trip — Glacial Geology of the Upper Kenai Peninsula (Sat., 9/19, 8:00 am – Sun., 9/20 6:00 pm)</td>
<td>$475 Single Room $425 Dbl Room</td>
<td>$575 Single Room $525 Dbl Room</td>
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<td>Matanuska Glacier (Sun., 9/20, 8:00 am – 5:00 pm)</td>
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<td>Transect of the Mesozoic Subduction Complex, Southcentral Alaska (Mon., 9/21, 7:30 am – 5:30 pm)</td>
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<td>Backstage Tour of the New Alaska Geological Materials Center and a Tour of the Alaska Volcano Observatory (Mon., 9/21, 10:30 am - 5:00 pm)</td>
<td>$99.00</td>
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<td>Turnagain Arm Geology Tour (Tues., 9/22, 8:00 am - 5:00 pm)</td>
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FIELD TRIPS (Must be Registered for the Conference) | Amount | After 8/1/2015 | Amount
---|---|---|---
1964 Great Alaska Earthquake: Geologic Causes and Effects (Tues., 9/22, 8:00 am - 12:00 noon) | $59.00 | $79.00 | $79.00
Backstage Tour of the New Alaska Geological Materials Center (Tues., 9/22, 10:00 am - 11:30 am) | $59.00 | $79.00 | $79.00

SOCIAL EVENTS/DONATION (Must be Registered for Conference) | Amount
---|---
Welcome Reception (Sun., 9/20, 6:30 pm – 8:00 pm) | Included with Registration
Awards, Dinner and Entertainment (Mon., 9/21, 6:30 pm – 8:30 pm) | $55.00 | $55.00
Make a Donation to the Foundation of the AIPG | $ | $ | $79.00

TOTAL AMOUNT DUE $79.00

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

- AIPG National Executive Committee Meeting (9/18) - Attending yes / no
- AIPG 2012 Advisory Board Meeting (9/18) - Attending yes / no
- AIPG 2012-2013 Joint Executive/Business Mtg. (9/18) - Attending yes / no

Full AIPG Registration Includes: Welcome Reception, Technical Sessions, Student Poster Sessions, Exhibits, Registration Materials, Continental Breakfast, Lunch, and Breaks on Monday, and Tuesday.

I understand that by registering for the 2015 AIPG Conference & Exhibition, I release and agree to indemnify The American Institute of Professional Geologists (AIPG), 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 is 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 the authority to utilize any photograph taken of me at the conference for conference related publicity (e.g., web site, TPG, videos, etc.).

Hotel Information: Hilton Anchorage, 500 West Third Avenue, Anchorage, Alaska 99501-9963, (907) 272-7411. For reservations call 1-800-HILTONS and be sure to use the group code AIPG15 to receive the reduced conference rate of $137 a night, which will be honored until 9/19/15.

Photo on page one: Flattop, by Roy Neese.

TOTAL AMOUNT DUE $79.00

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 7/31/2015. Cancellations made by written notification received between 8/1/15 and 9/10/15 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 9/10/15 or for no-shows after the meeting. Substitutions welcome. Based on the decision of AIPG, field trips are subject to cancellation due to lack of participation. Notification and a full refund for field trips will be given in case of required cancellations.
I was honored to receive a call from the AIPG National Nominating Committee several weeks ago asking whether I would accept a nomination for 2016 National President-Elect. After giving the decision some careful thought, I agreed for the very reason that my service on the National Executive Committee aligns with my personal philosophy of giving back to an organization that has given so much to me. I look forward to the challenges it will bring, and would like to thank the Nominating Committee and the Executive Committee for approving my nomination.

I believe strongly in AIPG as an organization that supports professional geologists and has much to offer those of us who have selected this career, and I am grateful for all of the opportunities I have had to give back on both the state and national levels. As 2016 National President-Elect, I will bring this commitment to serve and will do my very best for AIPG.

During my 16 years as an AIPG Certified Professional Geologist, I have taken an active role as a leader and participant in the Michigan Section and National activities, because I feel that you only get out of an organization what you put in.

One of the biggest issues facing our organization is the decline in membership. We have enjoyed a bit of a rebound in member numbers; however, I am concerned with the continued decline of CPGs. This is an alarming trend caused primarily by the aging and retirement of the existing CPGs, and by CPGs that do not renew their membership because they do not see the value of the organization compared to the cost of the annual dues. Several individuals that I have talked with have indicated that since their company did not pay the cost of the annual dues, they could not afford to continue their membership. I feel that members need to be reminded of the benefits of AIPG, and encouraged to more actively participate in its activities.

In 2009, while I was an Advisory Board member, I was part of the subcommittee tasked with reviewing and updating AIPG’s strategic plan; this plan is still current today. The primary objective of the strategic plan is to fulfill the vision and to provide value to members. This objective has been recognized to be the most important of the issues facing AIPG.

Communication is key... If elected as President Elect, I would like to first focus efforts on getting the word out that AIPG does provide good value to our members. Many members already enjoy the benefits of the organization through active participation, yet there are still too many who do not. The benefit of regular participation in AIPG activities increases the value to the individual member in a number of ways.

Second, I plan to focus on continuing to increase membership. During the last few years, great progress has been made in attracting students to AIPG. I have personally seen and encouraged this with the creation of two new chapters in Michigan at Wayne State and Western Michigan universities, both have excellent geological sciences programs. This needs to continue, and more student chapters should be chartered. Equally important to attracting the students in the first place is providing incentive for those students to remain as AIPG members as they enter the workforce. More effort should be made to keep contact with the students as they graduate and become Young Professionals. Only a small percentage of students remain AIPG members after they graduate; I would like to see the number of students that remain active members increase, and I believe that direct communication with those students is a key to achieving this goal.

I would also like to try to understand why members (particularly CPGs) elect to voluntarily discontinue their membership. With a little effort, I believe that the Executive Committee can determine whether individual members share common reasons and perhaps we can find ways to support them and encourage them to re-establish their AIPG credentials.

I believe that AIPG provides many benefits to its members; the members just need to become fully aware of everything AIPG has to offer and take advantage of it. Annual Meetings, local Section meetings, technical presentations, field trips, and networking are among a few of these benefits. I know firsthand that active participation in AIPG has helped members that have sought employment (either for the first time or after becoming unemployed) readily find new positions; this would not have been possible if those members had not been AIPG members.

In conclusion, AIPG must look to the future and for opportunities to be the best organization to represent and support professional geologists. I am dedicated to looking for new opportunities to provide added value to both current and prospective members.

I feel that my experience at the state and national levels would greatly benefit our AIPG organization. It is our organization, and it becomes what we give back. I have proven my dedication to the organization and look forward to continued commitment to making AIPG the best supporter of professional geologists. I look forward to the opportunity to serve AIPG as 2016 President-Elect, and would be honored if you would consider voting for me. Please contact me if you have any questions; my email address is heft@pbworld.com. Thank you for your consideration.
I want to thank the Nominating Committee for considering me as a candidate for the position of AIPG’s President-elect for 2016. When Past-President Ron Wallace called and asked if I would consider running for the office, I could not think of any greater opportunity and honor, than to serve my fellow geologists through AIPG.

My President-Elect statement may sound like a rehash from previous statements, but that is because my ideas and concerns remain unchanged. I became a member of AIPG and CPG about eleven years ago, not because I had to or because someone made me, but simply because I felt, as a professional geologist, it was the right thing to do. It was a matter of pride, letting those around me know that I had taken the extra effort to do the things I needed to do to become certified. I know I am speaking to the choir, but I believe as an organization we need to continue to promote the ideals of AIPG to our fellow geologists. That certification does mean something, whether you “need it” or not. Our membership records show a tremendous growth in student members, which is great. We have had a transition membership from student to young professional for several years and the numbers in this category are also increasing. This is great news and I strongly support these membership categories, but what have we done lately to promote membership at the professional level? Numbers of CPGs over the last years have been declining. When was the last time you asked one of your fellow geologists to join AIPG and become a CPG? As President-Elect, one of my goals will be to develop a strategy to engage working professional geologists, while continuing to support our students and young professionals.

Fifty years ago, Richard Proctor wrote “AIPG was founded (in 1963) to promote the profession of geology and to provide certification for geologists as a vehicle for establishing a standard of excellence for the profession,” A History of AIPG, 1963-2003. Last year I challenged each of you to “promote the profession of geology,” by finding one new member that can become certified, and thus elevating the standard of excellence we are all judged by. Interestingly, as a result of my challenge an old acquaintance contacted me and asked me to sponsor him as a new CPG. So my challenge this year is to sponsor two new CPGs. I challenge you to do it, too.

During my tenure as an Advisory Board Member, I saw the rebirth of The Foundation of the American Institute of Professional Geologist (The Foundation). Painful times but with rebirth comes growth and great opportunity. The Foundation is a great vehicle to promote the ideals of AIPG through educational grants for students and teachers, promoting field trips, and providing online educational opportunities for geologists and the general public. One of my goals will be to work with The Foundation’s Board to promote donations from our members and member associations and to continue the development of online educational programs.

Finally, I want to encourage and promote attendance at our annual conference. I was elected during my first convention to the Executive Board as an Advisory Board Representative and then again the next year. If you want to get involved you can, if not, I guarantee you will have a good time, learn something new, and meet some great new friends. At that first convention, I met Andrew Stone with the American Groundwater Trust, which led to a water resources conference in North Carolina. I met and have become good friends with Ron Wallace in Georgia, which has led to trips to Wilmington, Asheville, and Charlotte, North Carolina to represent AIPG at regional and national GSA conventions and to Co-host a session on careers in geology at the GSA national convention. This year I traveled to the Southeast GSA in Chattanooga, Tennessee to speak to students about careers in geology and attended several mentoring programs with Ron. By attending conferences, I have made new professional contacts and have made new life long friends from Illinois, Florida, Virginia, Kentucky, Ohio, Oklahoma, New York and others.

If elected, I promise that I will continue to serve AIPG and its membership to the best of my ability. I will attend to my duties in a professional manner, attending all meetings, and represent AIPG both nationally and internationally. I will support the ideals of AIPG, both at the National and Section level. I am concerned about the plight of struggling sections, and I want AIPG to continue a strong student and young professional membership push, but not at the expense of our professional members, and I want to see our membership become more involved in The Foundation and annual convention.

Again thank you to the Nominating Committee for having faith in me and the other nominees. I look forward to serving you, the AIPG membership once again. Please contact me with questions or comments at jstewart1@ecslimited.com.
Candidate for AIPG National Vice President

Christine F. Lilek, CPG-10195
Juneau, Wisconsin

A few of us whispered at the 2015 Tucson Gem Show, “I prefer to collect my own rocks” as we were dazzled by the variety and magnitude of rocks from all over the world. So, how could one little piece of sandstone I collected at the birth place of Tucson compare to all the glory of the Gem Show?

The answer is: When I found and collected that little bit of Tucson, I became a part of the rock’s story; and the rock became a part of my life story. Geology continues to have a deep personal connection to my life.

Serving our AIPG membership as National Board Members, we must remember that providing individual learning experiences is just as important as providing economic and professional development resources.

As Vice President of our Association, I would highlight and encourage replication of the personal learning experiences our Sections and other earth science organizations are providing throughout our nation. I would also encourage matching young professional geologists with mentors and advisors. Paper and web documents provide a wide variety of learning experiences, but if you can connect the student and young professional with a real life location and teacher, we can provide a deeper, life-long connection to geology and to our Association.

We’ve taken the local geology/human connection concept seriously in Wisconsin. One of the programs that our Section helped create was the Wisconsin State Master Naturalist training program. Geology is now one of prominent portions of the training program for nature educators. We teach our educators and the educators then teach students of all ages that Wisconsin geology is a living part of our state. It is not only a beginning point, but geology changes and supports us through time. It is enduring part of the Wisconsin story.

A local/human connection is also being made at my place of employment – the Department of Natural Resources (DNR) – Horicon Marsh Education Center. At the newly constructed Horicon Marsh Education Museum, we have a walk-in glacier, which depicts the story of glacial geology in our place. As a volunteer Master Naturalist myself, I will be able to share glacial geology with our visiting students as they touch, hear and see realistic glacial processes as experienced through the physical model, and make that part of Wisconsin geology a part of their life story.

These connections have been made throughout my geology career: groundwater well drilling around the UW-Milwaukee campus and exploring the deep storm water tunnel drilling project as an undergraduate, providing Yahara Watershed Basin and Wellhead protection training events as a graduate student, to siting and remediating landfills, wastewater storage locations and land application sites as a hydrogeologist and licensed geologist (PG) at the Wisconsin DNR, Wisconsin Electric Power Company and Mid-State Associates.

Our AIPG Section in Wisconsin has been working hard over the past five years to provide geology connections to many different people in Wisconsin through our: Geology Day at the Capitol, Door County Field Trip, Work on the Ice Age Trail, Frac Sand Webinar, Earth & Water Student Presentation Day, and the upcoming Field Demo Day and 3rd Student Presentation Day at Riveredge Nature Center. UW-Whitewater has agreed to become an AIPG Student Chapter in exchange for a mentor/advisor offering from Section members. I have helped lead these efforts by serving as the Section’s Vice President, President and New Letter Editor.

As one of your National Board Advisors for the past couple years, I worked hard with the other advisors to reach out to the Sections and share resources and ideas between the Sections. Many of the Sections are now joining together to sponsor events and resources and the advisory board continues to spread this support throughout our Association.

It would be an honor and privilege to serve as your National Vice President and support the increase of personal learning experiences for all categories of AIPG members and grow a mentoring program for our students and young professionals. I believe providing these personal connections will ensure life-long connections to geology and AIPG!

From the AIPG National Executive Committee

AIPG members please be advised that Dr. Robert Stewart is no longer with AIPG headquarters. Recruitment efforts for the position of AIPG Executive Director are currently underway. Former AIPG Executive Director William Siok has agreed to come out of retirement to serve as Interim Executive Director until the search for a new AIPG Executive Director concludes.
I am grateful to be nominated for the elected office of AIPG’s Vice-President for 2016. My AIPG membership goes back to August of 1987 when I obtained my CPG. Since obtaining my CPG, I have found professional stability, growth and leadership within my professional career through my affiliation with AIPG. My involvement and active participation with AIPG began when I attended a small (5-member) section meeting one cold night in Chicago in 2008. At this meeting we discussed our collective desire to re-kindle the Illinois/Indiana Section meeting attendance and increase the general level of activity. Shortly after that meeting, I was nominated and elected Section President and agreed to work on the goals for the section. I was fortunate because there was a good core-group of Professional Geologists who were in the area, had been active within the section and were interested in the growth of section activities as well. This re-kindling effort also came at a time when numerous regulations were being developed that directly affected our profession and included related licensure (Illinois Geological Licensing Act). By taking a leadership role in the development of regulations and by stepping-up to act as a liaison among other professional geological societies in Illinois, AIPG quickly became recognized among non-member peers and relevant to our state governments. With some outreach, the section board grew, as did our meeting attendance and section participation. It was understood that a seat on the section’s board was a service commitment to the geological community and our profession. We established semi-annual meetings with contemporary topics and quality speakers. We created vendor night events to assist in fundraising for the section and also to provided contractor demonstrations and related hands-on training opportunities. We host geological field trips, short-courses with continuing education credits and published semi-annual newsletters.

In 2011, the Illinois/Indiana section was selected to host AIPG’s 48th Annual National Conference. I served as Conference General Chairman. This volunteer position provided me with an opportunity to work with AIPG’s staff to create, develop and host the conference. This opportunity was far-reaching. I was fortunate to work with AIPG’s management team and interact with so many accomplished Professional Geologists; truly a very rewarding experience. These collective efforts have produced results. We met our initial goals to improve the activity in our section and regularly have over 75 professionals attending our meetings. This level of activity has increased involvement and participation from within the section membership which has allowed for the creation of new student chapters within our section.

After six years a serving as section President and my experience with the national conference, I wanted to serve on the National Advisory Board and eventually serve on the Executive Committee. I was elected in 2014 by the national delegates to serve on the National Advisory Board and again in 2015. I have served and continue to serve on the National Advisory Board and feel that I am up-to-speed with the activities and issues required to seek a candidacy for Vice-President.

Since this elected position is primarily to serve as the liaison between the Executive Committee and the Sections, it is most important to have effective communications. One goal that I wish to set is to develop and improve the communication and interaction with student chapters; with one focused goal to improve the retention of students into active AIPG membership after graduation. I believe the transition from a student to a practicing geologist can be improved for a higher retention into membership while still continuing to assist in mentoring. In addition, I wish to work with the National Advisory Board members to assist with supportive outreach to dormant sections and increase student chapter growth. The success and future of AIPG, and our profession, rests upon the collective efforts of so many dedicated AIPG members who understand that contributing to our profession is important and rewarding. My efforts in volunteering to serve AIPG is a rewarding contribution of my time and talents to assure the profession is recognized for its significance in society both now and for future generations of geologists to follow.
I believe that education is the key to the future success of the American Institute of Professional Geologists. A partnership with education, at all levels, will keep the professional geologist relevant in society.

Of course the establishment of student chapters is fundamental to growing the number of members within AIPG, but it also allows the professional geologist to establish a relationship with prospective employees as well as the professors that are shaping the minds of future geologists. Establishing a working relationship with college and university faculty is as important of a connection as the relationship with the students. By providing the connection to student and faculty, the professional geologist becomes a resource not only for the student, but also for the faculty.

But college and university level outreach is only the beginning. We, as professional geologists, have a responsibility to educate society as a whole. The world is an ever-changing place, and with the changes throughout the world, there are local, regional, and global-scale issues that people are trying to understand. What is going on with climate change? How does our current consumption of water resources affect our life and the economy? What is hydraulic fracturing and why is it used? What role does geology play in the world today? As geologists, we can provide an educated perspective on many of these topics and more as I have only brushed the very surface. But in order to do that, we need to provide service in the form of education to society, as well as to prospective geologists.

As of late, I have been speaking to a variety of groups. These groups range from first graders to church groups. With both ends of spectrum, it was easy to hold the attention of the audience. There is a fundamental desire to understand how the world works. Children see it in each rock they pick up. The “shiny” rock that caught their youthful imagination years later becomes a wonderful hand-sample of potassium feldspar and a cleavage plane that reflects light. Adult, non-geologists see it in the world that they currently live in with the climate changing or mining activities near their home or the price of gas fluctuating. Having a conversation with an adult, non-geologist can be challenging; however, when provided information about how geology and earth resources are integrated into almost every aspect of our modern lives, then an “ah-ha moment” occurs when the proverbial light bulb turns on over their head and they step back, to look at the world with new eyes. Sometimes it is as simple as asking questions and letting non-geologist adults discover the answer that they previously had not considered. For the non-geologist adult, it is a question of stewardship: how do we live in this world and still leave a suitable place for our children?

Regardless of which path of education we trod, it is by providing service to our local communities that we can grow the Institute. It can take the form of mentoring students and young professionals, acting as a resource for academia and government officials, or providing people with a geological worldview that allows for the shaping of educated opinions regarding local or global issues. Our stewardship as ethical, geological educators of society is a responsibility that we need to embrace. My focus within the Minnesota Section is on education of fellow member, new members, and society as a whole. I would bring this focus to the National-level as Secretary, and I believe that focusing on education is in-line with the future goals of the Institute. By leveraging our diverse knowledge and skills, we can provide consultation to those making decisions and shaping our world.

VOTE FOR THE LEGO GEOLOGIST KIT

One of the joys of Lego toys is that they can be used to create anything you can imagine. Since 2008, the Japanese company Cuusoo has been helping Lego fans worldwide to create their own kits, and, with enough votes, get them produced by Lego. Recently, user “circieverba” submitted her design for a geology themed kit. Her objective is to share some of her career activities and research tools as a way to build awareness of what geologists do. The kit come in two portions, a field section where two geologists are examining the stratigraphy of a cave, and a lab portion with a scanning electron microscope. The kit also includes essential geologic items such as a Brunton compass, a rock hammer, and a field dog.

To be released as an official Lego kit, the idea must receive 10,000 votes within a year. At the time of writing, the proposal has just over 2000 votes less than a month after it was submitted. If you would be interested in seeing this kit in stores in the future, please, lend your support. It takes less than five minutes to support the project, and this could become an important educational tool for our industry.

Link to the page: https://ideas.lego.com/projects/93813.
Candidate for AIPG National Secretary
Keri A. Nutter, CPG-11579
Anchorage, Alaska

I am greatly honored to be nominated for the position of AIPG Secretary for 2016 and 2017. Over the past two and a half years, I have been drawn into active participation with AIPG on the National and Section levels. AIPG supports so many great efforts, but what has really spoken to me in the short time I have been actively involved is the interaction between students and young professionals with the professional and CPG members. The resources that are offered to students through AIPG are invaluable. I have been privileged to be a part of it through speaking to the Young Professionals at the 2014 meeting in Prescott, or discussing career opportunities with students at my local university.

I knew I wanted to be a geologist beginning my freshman year of high school. I chose a geology course on a whim and found an unexpected passion. From there, I completed my undergraduate studies at Washington State University with the dream of being a volcanologist. However, the reality of a career in geotechnical engineering was presented to me and the first ten years have been fulfilling and rewarding. It was my career as a field geologist that taught me to ‘just say yes’ in order to find new and exciting opportunities. The opportunities started small, with getting to see a village I would have never known existed otherwise, and grew as I became more involved in a professional society because someone asked me to help out one day.

When I heard that the AIPG Executive Committee would be meeting in Anchorage in May 2013, I figured it was my chance to meet some folks and see how I might be able to get involved with AIPG locally. I never imagined the warm welcome I received from the 2013 Executive Committee when I walked into the conference room that snowy May morning, but it was the start of a new and rewarding path for me. It was those AIPG leaders that encouraged me to participate and showed me opportunities to get involved. They also had enough faith in me to nominate a newcomer to serve on the National Advisory Board that I have had the honor to serve on over the past two years. Receiving such encouragement and support to a newly minted CPG felt inspiring.

My service as a representative on the National Advisory Board over the past year and a half has led to many continuing opportunities and expansion of my professional network, but also personal growth as I find comfort in spending time with others who share my enthusiasm and passion to further the profession. I have become active in the Alaska Section, serving as the Vice President and co-chairing the 2015 Annual meeting planning committee (in Anchorage!!!), and started to interact regularly with geology students at the University of Alaska Anchorage. AIPG has even afforded me the chance to face my public-speaking fears head on and present to other young professionals at the 2014 meeting in Prescott; the support before, during, and after one of the most intense 20 minutes of my professional career was amazing and gave me the confidence and inspiration to submit an article (and get published!) in TPG.

As Secretary, I look forward to being able to continue growing the relationships and connections I have established with many of AIPG’s section leaders and facilitating knowledge sharing and maximizing resources between our local sections. I will also continue to be an advocate for support and involvement from our students and young professionals; I was provided with the encouragement and support of my professional peers early on, and I want to pass on what I can to the newest up and coming professionals.

This journey has been incredibly rewarding, even if overwhelming at times. The opportunities that I have been afforded since first meeting with the Executive Committee in May 2013 are priceless and I look forward to many more in the future. AIPG has become an incredibly important part of my professional and personal life, and the work being done is endlessly rewarding. I appreciate your vote to serve as Secretary and continue with the efforts over the past year and a half, as well as taking on new challenges.

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.
Candidate for AIPG National Editor

Jean M. Neubeck, CPG-11438
Clifton Park, New York

It has been my pleasure to serve as TPG Interim Editor during the past several months, and I hope you will allow me to continue as AIPG Editor next year. My vision for AIPG is to communicate the role of geology to the public and promote the profession through outreach, media, and personal contact; to advocate for the professional and ethical practice by qualified geologists through AIPG certification and state licensure; and to communicate to members and new recruits AIPG’s role in representing the profession.

I declared my geology major later than most, during my third year as an undergraduate, after realizing the man-made business of accounting was not portable and worse, was illogical. I was fortunate as a junior and senior to work summers as a field geologist, and after graduating accepted some insecure positions that offered me the opportunity to learn and travel. With more experience under my belt, I later helped start and operate a private consulting practice, which has educated me in the ways of business, management, and government. More recently, I have made time to serve in local and state professional groups to foster communication and cooperation among geological organizations.

As a member of the Northeast Section AIPG, I recently organized joint meetings with local and state geologic organizations in 2013 and 2014 to promote networking, participation, and awareness. Helping to communicate in nongeological terms and educate various stakeholders also was key to bolster support for the 2014 passage of a geology practice law in New York that licenses geologists and recognizes geology as a profession.

Visibility and Communication are two areas where I envision AIPG can enhance its status as the national organization that represents all Professional Geoscientists. Visibility is critical to create awareness, relevancy, and value for the profession by recognizing geologists’ contributions to society. AIPG can raise its visibility by developing scientific statements that appreciate societal needs and educate the public; networking with related professions and technical organizations to work cooperatively; continuing to provide and support educational opportunities; and by representing the profession publically.

It is my opinion that geologic communication must focus on scientific methods and facts to inform and educate. Communicating geologic principles also will help promote innovative solutions that address society’s needs and concerns. It is unrealistic to respond negatively, or to proselytize or prohibit activities. We should not attempt to impose specific values or formulate public opinion. By avoiding political policy and agenda, we will help maintain our scientific credibility and will encourage public trust for geologic input, which will benefit both society and successive generations of geologists.

I have heard some geologists contend that there is no future value in AIPG because they hold a state-issued P.G. license. We need to better communicate our message to members that (in accordance with the bylaws) AIPG is the national organization that “protects the public from unprofessional practices,” and also serves and represents the individual geologist.

Recruiting and retaining students and young professionals is critical, and our efforts must be supported by continuing to offer or increase services, such as facilitating mentoring, increasing awareness, and communicating the role of geology to the public. AIPG should continue to engage professors and help bridge academia with business and industry needs to develop responsive programs. AIPG can continue to promote the professional and ethical practice of geology through direct communication with the public and related professions.

As Editor and a member of the Executive Committee, I welcome all your input, especially criticism and new ideas. My vision for TPG and eNews includes supporting visibility and communication by providing links to student papers and theses; disseminating industry developments that affect the profession; providing a forum and encouraging dialogue among students, professionals, and employers; communicating AIPG’s relevancy and services to members; continuing to publish awards and interviews; and creating more appreciation of geologists’ contributions by highlighting the headlines to promote awareness of critical issues such as geologic hazards, water supply, energy, minerals, environmental quality, and infrastructure, among others.

I respectfully ask for your vote of support to continue as TPG Editor. Thank you for your consideration.

www.aipg.org
Adam W. Heft
CPG-10265
Holt, Michigan

Statement of purpose or goals you have for AIPG: My goals as President-Elect are to communicate the value of AIPG membership to members and non-members, and to work at increasing membership numbers of students, Young Professionals, and CPGs alike.

Universities Attended
- Central Michigan University B.S. Geology and Earth Science 1990
- Michigan State University M.S. Geology 1993

Company
- Peterson Environmental Services Field Geologist 1993-1994
- Fitzgerald Henne & Associates Project Manager 1994-2009
- Parsons Brinckerhoff Senior Supervising Geologist 2009-Present

AIPG Activities
- AIPG Michigan Section Assistant Newsletter Editor 1999-2007
- AIPG Michigan Section Award-Significant Contribution Award 2007
- AIPG Michigan Section Newsletter Editor 2008-2009
- AIPG National Advisory Board Representative 2009
- AIPG National Secretary 2010-2011
- AIPG Annual Meeting Michigan Section Delegate 2011
- AIPG Representative NC GSA, Kalamazoo, MI 2013
- AIPG Annual Meeting Michigan Section Delegate 2014
- AIPG National Section Leadership Award 2014

John M. Stewart
CPG-11115
Greensboro, North Carolina

Statement of purpose or goals you have for AIPG: My goals as President-Elect are to: develop a strategic initiative to re-evaluate the structure of the Sections to improve membership numbers and retention; continue to work with struggling and disenfranchised Sections; to continue a strong student and young professional membership push, but not at the expense of our older members; and to see our membership become more involved in the Foundation.

Universities Attended
- Texas A&M University B.S. Wildlife & Fisheries Science 1978
- University of Texas - Austin Undergraduate Geology 1982
- University of Missouri - Columbia M.S. Geology 1984

Company
- (Southwest) MO State University Instructor 1984 to 1987
- NC Dept. of Environment, Health, and Natural Resources Hydrogeologist II, Supervisor 1987-1989
- BPA Environmental & Engineering Hydrogeologist 1989-2001
- Tricon Engineering/Klinefelter Senior Hydrogeologist 2001-2011
- ECS Carolinas, LLP Branch Manager, Principal Geologist 2011-2014
- ECS Carolinas, LLP Chief Geologist 2014-Present

AIPG Activities
- AIPG Carolinas Section President 2006-Present
- AIPG National Advisory Board Representative 2010 and 2011
- AIPG Carolinas Section Co-Chaired Water Resources Conference 2011
- AIPG Representative SE GSA, Wilmington, NC 2011
- AIPG Representative SE GSA, Asheville, NC 2012
- AIPG National Position Statement Committee 2012
- AIPG National Co-Chaired “Careers in Geology” Session - National GSA 2012
- AIPG National Student Outreach Committee 2013
- AIPG Representative SE GSA, Blacksburg, VA 2014

Letter from AGI

Dear Member Society President/Executive Director/Council Representative,

As part of the American Geosciences Institute’s mission to bring together the wide array of geoscientists, we see EARTH Magazine as a means to relate the breadth of the science to everyone in our community. To this end, we seek your help in offering a free 90-day (3 issues) digital trial to EARTH Magazine for your members. As you are probably aware, AGI has published EARTH since 1956 (formerly Geotimes until 2008) and, now with the U.S. publishing landscape shifting rapidly to digital, we are in a position to offer three months of the digital edition of EARTH FREE to all the geoscientists belonging to our 50 member societies.

All we ask is that you make your membership aware of this offer and provide them with the following URL http://www.earthmagazine.org/trial

which goes to a web page with easy to follow instructions where they can sign up for free three months of EARTH in their favorite digital format. For those that already subscribe, they will get 3 free months added on to the end of their existing digital subscription! There is absolutely NO obligation to your members. Those that sign up for the trial will be provided the opportunity to renew as a regular subscriber. EARTH is only $20 annually in digital format, anywhere in the world.

We appreciate your time and consideration. If you are willing to participate, please email John Rasanen at jr@earthmagazine.org and he will assist you.

Sincerely,
P. Patrick Leahy, Ph.D.
Executive Director
Christine F. Lilek
CPG-10195
Juneau, Wisconsin

Statement of purpose or goals you have for AIPG: As Vice President, I would highlight and encourage replication of the personal learning experiences our Sections and other earth science organizations are providing throughout our nation. I would also encourage matching young professional geologists with mentors and advisors. Paper and web documents provide a wide variety of learning experiences, but if you can connect the student and young professional with a real life location and teacher, we can provide a deeper, life-long connection to geology and to AIPG.

David G. Pyles
CPG-7364
Westmont, Illinois

Statement of purpose or goals you have for AIPG: My purpose in seeking this Vice President position is to continue to improve the function and reach of this elected office; which is to be an effective liaison between the Executive Committee and the Sections. The goal will be to add and/or create more standardized and frequent communications with the sections, including the student sections.

Social Events

Welcome Reception
Date: Sunday, September 20, 2015
Time: 6:30 pm to 8:00 pm
Cost: Included in Registration

This is a chance to get to know your fellow colleagues attending the annual meeting. This Sunday evening reception is the perfect opportunity to renew acquaintances, meet new people, and visit exhibitors. The reception will feature a cash bar and hors d’oeuvres.

AIPG Awards and Dinner
Date: Monday, September 21, 2015
Time: 6:30 pm to 8:30 pm
Cost: $65 per person. All attendees welcome.

Monday evening will be a pleasant one in the company of friends and colleagues. The festivities will begin with the AIPG National Awards presentation. Dinner will follow. This event is intended to informal, relaxing and an opportunity for all attendees to meet and socialize.

Business Meetings

AIPG Executive Committee Meeting
Date: Friday, September 18, 2015
Time: 8:00 am to 12:00 pm

AIPG Advisory Board Meeting
Date: Friday, September 18, 2015
Time: 1:00 pm to 4:30 pm

AIPG 2015-2016 Joint Executive Committee Meeting & Business Meeting
Date: Friday, September 18, 2015
Time: 4:30 pm to 5:00 pm

The AIPG meetings are open to all registrants/
Nathan D. Gruman
CPG-11688
Bloomington, Minnesota

Statement of purpose or goals you have for AIPG: My goal is to increase awareness of AIPG within the community, specifically within colleges and universities by ushering graduates into the practicing professional world.

Universities Attended
University of Minnesota

Degrees Granted
B.S. Geology

Company
J. River, Inc.
American Petrographic Srvs, Inc.
West Central Environmental Consultants, Inc.
Braun Intertec Corporation
Braun Intertec Corporation

Title
Product Manager
Petrographic Technician
Geologist
Staff Geologist
Corporate Safety Specialist

Dates
2004
1996-2001
2004-2005
2005-2006
2008-2013
2013-present

AIPG Activities
AIPG Minnesota President-Elect
AIPG Minnesota President
AIPG Minnesota Past President
AIPG Minnesota Section Educational Chair

Keri A. Nutter
CPG-11579
Anchorage, Alaska

Statement of purpose or goals you have for AIPG: Students and young professionals are incredibly important to the continuing success and growth of AIPG. It is my primary goal to encourage the engagement of students and young professionals through opportunities with AIPG at both the local and national level. I would also like to encourage continued coordination and communication between AIPG sections and the National Executive Committee through regular discussions and partnerships of events.

Universities Attended
University of Alaska Anchorage
Washington State University

Degrees Granted
Undergraduate Studies
B.S. Geology

Company
DOWL

Title
Staff Geologist
Geotechnical Engineering Manager

Dates
2004-2013
2012-2013
2013-Present

AIPG Activities
AIPG Annual Meeting Alaska Section Delegate
AIPG Annual Meeting Speaker
AIPG National Advisory Board Representative
AIPG Alaska Section Vice President
AIPG Annual Meeting Co-Chairman

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In-Situ Inc.
Innovations in Water Monitoring
Jean M. Neubeck
CPG-11438
Clifton Park, New York

Statement of purpose or goals you have for AIPG: To raise the visibility of geologists by communicating the role of geology to the public and promoting the profession through outreach; to advocate for the ethical and professional practice through AIPG certification and state licensure; and to communicate AIPG’s role of representing geologists to its members and new recruits.

Universities Attended

<table>
<thead>
<tr>
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<th>Dates</th>
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<td>State Univ. of NY at Binghamton</td>
<td>B.S. Geology</td>
<td>1981</td>
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<tr>
<td>Rensselaer Polytechnic Institute</td>
<td>24 graduate hours Geology and Civil Engineering</td>
<td>1983-1986</td>
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Company

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<tr>
<td>Engineering Science, Inc., and</td>
<td>Geologist</td>
<td>1993</td>
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<tr>
<td>Phillip J. Clark Engineers</td>
<td>Research Assistant, Civil Engineering</td>
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<tr>
<td>Rensselaer Polytechnic Institute</td>
<td>Research Assistant Hydrologist</td>
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<td>United States Geological Survey</td>
<td>Senior Geologist</td>
<td>1986-1989</td>
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<td>Dunn Geoscience Corporation</td>
<td>Senior Geologist/Hydrogeologist</td>
<td>1991-Present</td>
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<td>Alpha Geoscience</td>
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AIPG Activities

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<tr>
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<tr>
<td>AIPG Northeast Section Fall Meeting Committee</td>
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<tr>
<td>AIPG Northeast Section Fall Meeting Committee Chair</td>
<td>2014</td>
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<tr>
<td>AIPG Annual Meeting Northeast Section Delegate</td>
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<tr>
<td>AIPG Northeast Section Executive Committee Member</td>
<td>2013-Present</td>
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<tr>
<td>AIPG National TPG Interim Editor</td>
<td>2014 (Oct-2015)</td>
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An Update from the NYS Council of Professional Geologists, Transition Committee Chair and Past-President John M. Nadeau, CPG-11181

The law that establishes the profession of geology in New York State was signed by Governor Cuomo in November 2014. This law is identified as Chapter 475 of 2014. As a requirement to signing that legislation, the Governor noted that three specific Chapter Amendments were needed to 1) correct a typographical error, 2) allow flexibility in administering future exams, and 3) to appoint geologists to the joint Professional Board for Engineering, Land Surveying, and Geology, in order to facilitate the regulation-writing phase in a timely manner. Those Chapter Amendments that were requested by the Governor passed both legislative houses in early March, and then were forwarded to Governor Cuomo’s office where he signed the amendments on March 16, 2015. The amendment legislation was codified into law as Chapter 9 of the Laws of 2015.

To appoint representative geologists on the Licensing Board, the State Education Department, Office of the Professions reviewed the applications of several geologists during January and February. Three people were referred to the NYS Board of Regents and were approved at their March 2015 meeting. The approval by the Regents and the Governor’s signature on the Chapter Amendments were the final hurdles to geologists being added to the Licensing Board. We are pleased to announce that David A. Franz, Ph.D., William J. Kelly, Ph.D., and Jean Neubeck, CPG-11438, were confirmed by the Regents on March 17, 2015. Now that three geologist representatives have been added to the joint Board, a committee will be formed to prepare the regulations for the State Education Department.

The NYS State Education Department portal to download applications, review the (pending) regulations, once those are established, and other information for the Profession of Geology can be accessed at http://www.op.nysed.gov/prof/geo/. As always, you are welcome to contact John at jnadeau@alphageoscience.com with questions regarding the process of the Law’s establishment and implementation.
Official AIPG 2015 Ballot
National Officer Election

PRESIDENT-ELECT -
( President in 2017)
☐ Adam W. Heft, CPG-10265
   Michigan Section
☐ John M. Stewart, CPG-11115
   Carolinas Section

VICE PRESIDENT -
( Term of Office 2016)
☐ Christine F. Lilek, CPG-10195
   Wisconsin Section
☐ David G. Pyles, CPG-7364
   Illinois/Indiana Section

SECRETARY -
( Term of Office 2016-2017)
☐ Nathan D. Gruman, CPG-11688
   Minnesota Section
☐ Keri A. Nutter, CPG-11579
   Alaska Section

EDITOR -
( Term of Office 2016-2017)
☐ Jean M. Neubeck, CPG-11438
   Northeast Section
☐ ____________________

Election of officers shall be by a ballot. The ballot shall be sent to all Members by May 15. Election shall be by the majority of all qualified ballots cast. In order to be counted, ballots must be received at Institute Headquarters on a date named by the Executive Committee, which date shall be no later than June 30.

Only AIPG CPGs, Members and Young Professionals are authorized to Vote.

 ballots must be received at Headquarters
by JUNE 30, 2014. Your AIPG Name and
Member Number Must Be Printed Below
For The Ballot To Be Valid.

Name ____________________________
Member Number __________________

Mail your ballot to:
AIPG
12000 Washington St, Suite 285
Thornton, CO 80241

Vote Online or Mail in this ballot
<table>
<thead>
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<th>University</th>
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<th>CPG-number</th>
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<td>Bowling Green University</td>
<td>2004</td>
<td>Robert K. Vincent, MEM-0216</td>
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<tr>
<td>Central Michigan University</td>
<td>2003</td>
<td>Eric Wallis, CPG-09518</td>
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<td>Colorado School of Mines</td>
<td>1999</td>
<td>Graham Closs, CPG-07288</td>
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<td>Columbus State University</td>
<td>2011</td>
<td>Ron Wallace, CPG-08153</td>
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<td>Eastern Illinois University</td>
<td>2013</td>
<td>Craig McCammack, MEM-1295</td>
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<td>2006</td>
<td>Walter J. Bolt, CPG-10289</td>
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<tr>
<td>Florida Atlantic University</td>
<td>2014</td>
<td>Anne Murray, CPG-11645</td>
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<td>2013</td>
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<td>James Madison University</td>
<td>1998</td>
<td>Cullen Sherwood, CPG-02811</td>
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<td>Ohio State University</td>
<td>2004</td>
<td>Robin Roth, CPG-09264</td>
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<td>Metropolitan State University of Denver</td>
<td>2013</td>
<td>Thomas Van Arsdale, CPG-11073</td>
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<td>Middle Tennessee State University</td>
<td>2014</td>
<td>Todd McFarland, CPG-11348</td>
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<td>Temple University</td>
<td>2006</td>
<td>Dennis Pennington, CPG-04401</td>
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<td>University of California-Davis</td>
<td>2010</td>
<td>James Jacobs, CPG-07760</td>
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<td>University of Georgia</td>
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<td>University of Nevada-Reno</td>
<td>2008</td>
<td>Jonathan G. Price, CPG-07814</td>
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<td>University of Northern Colorado</td>
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<td>Willam Hoyt, CPG-07015</td>
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<td>University of South Dakota</td>
<td>2013</td>
<td>Derric Iles, CPG-10986</td>
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<td>University of St. Thomas</td>
<td>2015</td>
<td>Sara Nelson, MEM-2505</td>
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<td>University of Tennessee-Chattanooga</td>
<td>2014</td>
<td>John R. Sewell, MEM-2487</td>
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<td>University of West Georgia</td>
<td>2010</td>
<td>Eric Lowe, MEM-0385</td>
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<td>Wayne State University</td>
<td>2012</td>
<td>John Barkach, CPG-09121</td>
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<td>Western Michigan University</td>
<td>2015</td>
<td>John Barkach, CPG-09121</td>
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<tr>
<td>Wright State University</td>
<td>1996</td>
<td>Thomas Berg, CPG-08208</td>
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</tbody>
</table>

Your section needs to start a **Student Chapter Today**. Contact Vickie Hill at AIPG Headquarters for more details. vlh@aipg.org
Thank You for 25 Years!

The following members have received their 25 year pin and certificate. Your dedication to AIPG throughout the years is truly appreciated. It has ensured the growth and success of the Institute. Please join AIPG headquarters in thanking these members for their continuous support.

<table>
<thead>
<tr>
<th>Name</th>
<th>Certification</th>
<th>City</th>
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<td>Bennett Bearden</td>
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<td>Robert Braunstein</td>
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<td>Karen Burnett</td>
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<td>Craig Cox</td>
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<td>Plain City</td>
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<td>CPG-07691</td>
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<td>Roger Fisher</td>
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<td>David Fitch</td>
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<td>Judith Flook</td>
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<td>Eric Floyd</td>
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<td>Curtis Hudak</td>
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<td>Brian Martinek</td>
<td>CPG-07640</td>
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Thank You for 25 Years!

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<tr>
<th>Name</th>
<th>City</th>
<th>State</th>
<th>CPG-Number</th>
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<td>Robert McCurdy</td>
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<td>Mary Pankratz</td>
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<td>Ronald Parratt</td>
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<td>Anthony Petres</td>
<td>Rapid City</td>
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<td>Marilyn Plitnik</td>
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<td>Clifford Pollock</td>
<td>Pasadena</td>
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<td>Dennis Prezbindowski</td>
<td>Syracuse</td>
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<td>George Reid</td>
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<td>Jonathan Sprecher</td>
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<td>Michael Stamper</td>
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<td>Donald Stevens</td>
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<td>Guy Swenson III</td>
<td>Marcellus</td>
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<td>John Tomik</td>
<td>Virginia Beach</td>
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<td>David Trainor</td>
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<td>Scott Depot</td>
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<td>Robert Turka</td>
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<td>Jeffrey Valvik</td>
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<td>Rudy Vogt III</td>
<td>Louisville</td>
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<td>Dean Wilton</td>
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<td>Eric Windesheim</td>
<td>Cascade</td>
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<td>Henry Wise</td>
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<tr>
<td>Sandra Zelen</td>
<td>Chestnut Hill</td>
<td>MA</td>
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You, as an AIPG Member, are invited and encouraged to submit a presentation to be given online for the Geoscience Online Learning Initiative (GOLI). AGI and AIPG have teamed up to build a portfolio of online learning opportunities to help support the professional development of prospective and early-career geoscientists as well as addressing topics of interest to the broader geoscience profession. GOLI courses support both synchronous and asynchronous online learning, and count toward continuing education units (CEUs).

A $200 stipend and 10% share of registration fees are provided to the presenters (details on presenters guide).

If you are interested please read the GOLI - AGI/AIPG Presenters Guide and Guidelines and Suggestions for Webinar Presentations on the AIPG National website (www.aipg.org).

AIPG, 303-412-6205
www.aipg.org
As I write this, New York State is in an 18-month process of crafting the regulations that will govern the newly-established profession of geology and licensing geologists that will take effect in November 2016. It’s an exciting time for those of us who worked for many years to achieve the professional status in NY that approximately 30 other states have already established. So I have been thinking about what professional status means and the reasons that we want to obtain our license.

There are many licenses that one can obtain - a driver’s license is obvious, in addition to state programs (in NY for example) that license water well drillers, real estate services, cosmetology, security guards, and home inspectors, among many others. These licenses allow one to legally provide services, but these careers are not designated as “professions.” So when the New York State Council of Professional Geologists sought licensure for geologists, some legislators asked why geology should be considered profession. After all, isn’t licensure itself sufficient? It became clear that there are licenses, and there are licensed professions. It was, and still is, important that geology to be recognized as a profession, as the practice of geology directly affects human health and the environment.

The myriad of geologic contributions to all aspects of life is obvious to us. When we study the occurrence and properties of rocks and minerals, earthquakes, terrains and morpholoses, karst, surface and ground water, marine and coastal processes, subsurface structures, glacial processes, volcanoes, etc., we are contributing directly and indirectly to benefit society. These contributions take the form of understanding the earth and its processes. Geologists apply that knowledge to locating earth materials (minerals, petroleum, building stone, energy resources); predicting events and mitigating damage (earthquake intensity and displacement, building codes, floods, coastal shoreline and soil erosion, land subsidence); and developing and protecting water supplies (drinking water, industrial and commercial use), to list just a few.

Geologic contributions impact broad and global sectors - economics, energy, geopolitics and strategy, civil works, social issues, agriculture, environmental stewardship, climate and land use, among others. Because geology contributes to and affects so many aspects of life, it is reasonable to be professionally licensed to practice geology. Having justified the profession, the question is, for what reason do geologists want to hold a professional license?

The legal purpose of licensure is (ostensibly) to protect the public and provide a level of assurance and liability, that the licensee holds the minimum requirements to competently practice and provide services to the public. Licensure is for those accepting the responsibility of being in charge - stamping a design, drawing, or document. In fact, there is pressure in the private sector to have credentials, pressure for public employees to raise their pay grade, etc., not to mention perception and ego. But all geologists do not need to be licensed. Like many engineers, many geologists work in research and development, public sector, academia, or practice under licensed professionals their entire career. (I am licensed in two states and have yet to be required to stamp a geologic document or drawing, although I have signed non-design documents as a licensed geologist.)

This leads me to the point about the status of the professional practice. We want to be considered professionals and have our work be recognized as a professional product, but there is internal and external pressure to practice conservatively. Once we obtain a license and have to “sign here,” we tend to avoid risk by conforming to standards or meeting criteria developed by others including legal and non-geologic professions. Some professionals rely on “look up” tables, regulatory policies, or other practices that are legally defensible, but often, we understand from our work that the science and geologic conditions support a unique solution.

Of course, it is understandable to meet legal requirements and we want to keep our jobs, but we if we wish to be professionals then we should practice as scientists. This means communicating clearly and supporting our interpretation with facts, which likely involves some degree of uncertainty, e.g., professional risk. It tested my patience recently to argue an environmental issue where a consultant insisted that a client sample soil quality from a tank closure 27 years ago even though we had 25 years(!) of ground water monitoring data – how could I be so confident that there isn’t significantly contaminated soil?

Guy Swenson, CPG-07574, wrote a good piece about the geologic profession and accepting risk in the May 2015 newsletter of the Central New York Association of Professional Geologists. With Guy’s blessing, I am borrowing some from his President’s letter, but our thoughts are similar. To indelicately restate Guy’s key point and add my take, it is human nature to avoid unnecessary risk, but we did not work so hard to achieve professional status just to allow the status of the profession to devolve into a box-checking, hedge-wording, risk-adverse, milquetoast profession.

Guy writes “...[risks] expose us to critique by regulatory agencies, clients, other professionals, and lawsuits. So we find ways to minimize these risks by collecting extra data... just presenting data with little interpretation... getting insurance, and relying on presumptive remedies. As scientists
1. In paleontology and concerning the hierarchy that applies to the Linnean system of taxonomical classification (for the animal Kingdom), what rank lies between “Class” and “Family”?
   a) “Genus”
   b) “Phylum”
   c) “Order”

2. Which of the following radioactive dating techniques for determining absolute geologic time involves beta decay of the parent element with a half-life of about 5,730 years?
   a) Uranium 238 to Lead 206 (and helium)
   b) Rubidium 87 to Strontium 87
   c) Carbon 14 to Nitrogen 14

3. Which of these terms, indicative of environments of deposition, pertains to a marsh or swamp?
   a) Littoral
   b) Lacustrine
   c) Paludal

4. The mathematical theory of elasticity is applicable in developing solutions related to seismicity and rock mechanics. Among the key elastic properties of rocks a critical quantity is Poisson’s Ratio, or the negative ratio of transverse to axial strain, or the percentage of expansion divided by the percentage of compression. Poisson’s Ratio can be expressed directly as a function of the ratio of P-wave to S-wave velocity! Now, let (λ) and (μ) be the Lamé constants, (E) be the Young’s Modulus, (o) be Poisson’s ratio, (Vp) be the P-wave velocity and (Vs) be the shear wave velocity. Given the well-known relationships:

\[
\frac{V_p^2}{V_s^2} = \frac{\lambda}{\mu} + 2 \tag{1}
\]

\[
\lambda = \frac{E(1-\nu)}{(1+\nu)(1-2\nu)} \tag{2}
\]

\[
\mu = \frac{E}{2(1+\nu)} \tag{3}
\]

Which of the following equations expresses Poisson’s Ratio (\(o\)) as a direct function of \(\frac{V_p}{V_s}\)?
   a) \(o = \frac{[(V_p^2 / V_s^2) - 3]}{[(3V_p^2 / V_s^2) - 2]}\)
   b) \(o = \frac{[(V_p^2 / V_s^2) - 4]}{[(4V_p^2 / V_s^2) - 1]}\)
   c) \(o = \frac{[(V_p^2 / V_s^2) - 2]}{[(2V_p^2 / V_s^2) - 2]}\)
   d) WHAT? Gag me with a spoon!

5. From the equations given in problem 4, it is possible to calculate a range for Poisson’s ratio (if Poisson’s Ratio is a positive number, as it is expected for rocks). What is this range?
   a) \(o = 0 \text{ to } 0.25\)
   b) \(o = 0 \text{ to } 0.50\)
   c) Man, this is going from bad to worse!
In this column I would like to consider some of the ramifications of the recent downturn in the petroleum industry with respect to students and young professionals in the geosciences. I remember a similar situation in the mid-1980s when I had just completed a Bachelor of Science degree in Geology at about the same time that a slump in the petroleum industry occurred, layoffs ensued, and job opportunities were scarce. To compound the problem, many recent graduates and young professionals (including me) were electing to enroll in graduate programs to broaden their skills and delay their entry into a slow job market which meant that acceptance into graduate programs was more competitive as well. I was initially interested in the petroleum industry; however, at that time I found greater opportunity in groundwater related fields, and eventually I went on to complete a doctorate in groundwater hydrology which led to an extremely interesting and rewarding career. During that timeframe I also saw numerous student colleagues and young professionals elect to leave the geoscience field for seemingly more lucrative alternatives. I mention these events because similar considerations and choices may be facing many geoscience students and young professionals today.

In light of these current challenges, I want to offer a word of encouragement and support to geoscience students and young professionals. Stay the course! Although job opportunities may be fewer in some sectors for a while, in the long term the outlook for geoscience jobs is excellent, and a more fascinating and rewarding field of study and career path simply does not exist. Furthermore, the importance of natural resources, natural hazards, and other geoscience fields will only increase in the future, along with the need for knowledge and skills in locating, managing, and conserving these resources and geologic features. Society needs you. Your work is critical, and the benefits of working in the geoscience fields are tremendous. It is well worth the effort!

I also encourage AIPG members who are farther along in their careers to offer a helping hand to students and young professionals through job networking, mentoring, career planning, and other supportive activities. Now is the time when a helpful suggestion or encouraging word can go a long way with young geoscientists. Perhaps connecting them with a job opportunity in another area, or suggesting an alternative geologic career path they had not considered. Perhaps helping to retain them in the field of geosciences where they are greatly needed. It certainly is in the best interest of AIPG and the geologic profession to support our young geoscientists, and it is extremely beneficial to the students and young professionals.

In closing I would like to relate this message to my recent visit to the joint AIPG Florida/Georgia Section meeting and field trip in conjunction with the Southeastern Geological Society. What a delightful group of people and what an interesting two days of field trips! I was especially impressed with the student members in attendance, and I had the distinct honor of presenting the very first William J. Siok Graduate Scholarship to Karen Vyverberg, SA-6287, from the University of Florida. The excitement and energy radiating from all of the students I met was highly contagious, and I came away from that meeting with renewed invigoration for geology and heightened confidence in our future geoscientists. What a treat to listen to the students’ future plans and to realize that the sky is the limit for these budding geoscientists. What a pleasure it also was to listen to the more seasoned veterans and to absorb their knowledge and perspective during the field trips and presentations. This exchange of experience and energy is transformational for all parties and is vital for the future of our science.

I urge all of our members to make connections with colleagues in your sections and in your disciplines, whether you’re a student just starting a geoscience degree or a retiree with decades of experience. You’ll be glad you did.

J. Foster Sawyer, CPG-10000
foster.sawyer@sdsmt.edu
Answers:

1) The answer is choice “c”, or “Order”. In the Linnean system of taxonomical classification, for the animal Kingdom, the hierarchy is as follows:
   - Kingdom
   - Phylum
   - Class
   - Order
   - Family
   - Genus
   - Species

2) The answer is choice “c” or “Carbon 14 to Nitrogen 14. The following table depicts the main radioactive dating techniques and the related half-lives:

<table>
<thead>
<tr>
<th>Parent element</th>
<th>Daughter element</th>
<th>Half-life in years</th>
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</thead>
<tbody>
<tr>
<td>Rubidium 87</td>
<td>Strontium 87</td>
<td>4.88 x 10^10</td>
</tr>
<tr>
<td>Uranium 238</td>
<td>Lead 206 and helium</td>
<td>4.47 x 10^9</td>
</tr>
<tr>
<td>Potassium 40</td>
<td>Argon 40 and calcium</td>
<td>1.25 x 10^9</td>
</tr>
<tr>
<td>Uranium 235</td>
<td>Lead 207 and helium</td>
<td>7.04 x 10^8</td>
</tr>
<tr>
<td>Carbon 14</td>
<td>Nitrogen 14</td>
<td>5.73 x 10^3</td>
</tr>
</tbody>
</table>

3) The answer is choice “c” or “paludal”.
   Littoral environments equate to coastal, intertidal and beach zones.
   Lacustrine environments relate to lakes and inland wetlands with deep-water/fresh-water habitats.

4) The answer is choice “c”, or “\( \sigma = \frac{\left( \frac{V_p^2}{V_s^2} \right) - 2}{\left( \frac{2V_p^2}{V_s^2} \right) - 2} \)”. The proof follows:

   We are given:

   \[
   \lambda = \frac{E \sigma}{(1+\sigma)(1-2\sigma)} \quad (2) \\
   \mu = \frac{E}{2(1+\sigma)} \quad (3)
   \]

   To find the answer that we seek, we substitute (2) and (3) into (1) and solve for (\( \sigma \)):

   \[
   \frac{V_p^2}{V_s^2} = \frac{\lambda}{\mu} + 2 \quad (1)
   \]

   \[
   \frac{V_p^2}{V_s^2} = \frac{2 \lambda}{(1 - 2\sigma)} + 2 \quad (4)
   \]

   \[
   (\frac{V_p^2}{V_s^2}) - 2 = \frac{2 \lambda}{(1 - 2\sigma)} \quad (5)
   \]

   \[
   [\frac{V_p^2}{V_s^2}] - [\frac{\lambda}{(1+\sigma)(1-2\sigma)}] = 2\sigma \quad (6)
   \]

   \[
   2\sigma = [\frac{V_p^2}{V_s^2}] - 2 + 4\sigma \quad (7)
   \]

   \[
   2\sigma = [\frac{V_p^2}{V_s^2}] - 2 + 2[\frac{V_p^2}{V_s^2}] - 2 \quad (8)
   \]

   \[
   2\sigma = [\frac{V_p^2}{V_s^2}] - 2 + 2[\frac{V_p^2}{V_s^2}] - 1 \quad (9)
   \]

   \[
   \sigma = [\frac{V_p^2}{V_s^2}] - 2 + 2[\frac{V_p^2}{V_s^2}] - 2 \quad (10)
   \]

   \[
   \sigma = [\frac{V_p^2}{V_s^2}] - 2 + 2[\frac{V_p^2}{V_s^2}] - 1 \quad (11)
   \]

   Equations (14) depicts the answer that we seek and coincides with our choice “c”. Thus, to emphasize, Poisson’s Ratio may be expressed directly as a function of the ratio of P-wave velocity over shear-wave velocity!

5) The answer is choice “b” or “\( \sigma = 0 \) to 0.50. The proof follows:

   Refer to equation (2) in problem 4:
   \[
   \lambda = \frac{E \sigma}{(1+\sigma)(1-2\sigma)} \quad (2)
   \]

   If \( \sigma = 0 \), then \( \frac{E \sigma}{(1+\sigma)(1-2\sigma)} = 0 \).
   If \( \sigma = 0.50 \), then \( \frac{E \sigma}{(1+\sigma)(1-2\sigma)} = \infty \).

   Thus, as long as \( \sigma \) is positive, its value lies between 0 and 0.50. For most rocks, Poisson’s Ratio (\( \sigma \)) typically ranges from 0.15 to 0.40. A value of Poisson’s Ratio of 0.25 may be commonly applied in first-approximation calculations.
Reflections on the 2015 Student TPG Issue

The annual student issue in the January TPG always contains a variety of articles of interest to students and young professionals. Those of us with a few years of experience can also learn from these articles. Wayne Hamilton, CPG-6833, provides a number of career and life lessons he’s learned in “Pouring my cup into yours’ or what to expect in your career.” Jan Horbaczewski, CPG-9369, provides an excellent outline on “How to become a valued employee” that could be subtitled “how to keep your job when things get tough.” Keri Nutter, CPG-11579, describes her transition from college to becoming the head of a geotechnical engineering department, an area she knew little about while in college but has come to love in “Ten years and a million lessons.” Kyle Johnson, YP-106, also describes his transition from college to jobs in Arizona and Alaska and provides 5 important tips for the process in “To Students and young professionals.” Michael Orobona’s, CPG-11099, “Realistic advice for the new geologist” provides some interesting tips and describes some of the differences between technical work and management tasks, both of which become parts of most geoscience careers. William Hoyt, CPG-7015, and Michael Urban, MEM-1910, provide an excellent summary of “The value of professional internships.” Jean Neubeck’s, CPG-11438, “Advice for life from the flight crew” is both fun and contains solid advice for one’s career. My column 153 contains discussions of several short suggestions like getting some business cards while you’re in school, the deductibility of professional equipment, dues, etc., the importance of professional flexibility, and the importance of field camp as part of your basic geoscience training. Stephanie Jarvis, YP-125, reflects on her “Master’s Saga” and the various lessons she learned during the process in “Lessons learned.” Finally, Kristina Pourtahib’s, SA-3410, “Writing essentials” contains important writing advice regardless if you’re writing grant proposals or professional reports.

Report Ownership and Client Confidentiality

A CPG called me about a report he had written several years previously for a company that is no longer in existence and that company was not merged or otherwise succeeded interest by another company. He recently received a request for a copy of that report from a third party and wondered whether he could provide the third party with a copy of the report. The CPG noted that there was a possibility, which he intended to check, that the report had been made public, possibly by being filed on the Canadian SEDAR system. If the report had indeed been made public, then there would not be a problem with the CPG providing a copy of the report to the requestor.

The issue of report ownership, including the data and opinions expressed therein, was discussed extensively in column 136 (Nov/Dec ‘11). That column pointed out that our professional reports are ‘instruments of service’ and traditionally have remained the ownership of the person who prepared them. There is an important distinction between an ‘instrument of service’ and a ‘work product’ that we all should remember. A ‘work product’ is subject to much greater legal liability for which it is only necessary to prove that there is some sort of defect in the ‘product’ in order to win a lawsuit. By contrast, for an ‘instrument of service’ liability must be proven by demonstrating professional negligence, something much harder to prove. So professional reports remain the property of the professional(s) who prepared them. However, the client confidentiality provisions of Rules 3.2.1, 3.2.2, and 3.2.3 of AIPG’s Code of Ethics all apply.

Rule 3.2.1—A Member shall not use, directly or indirectly, any confidential information obtained from or in the course of performing services for an employer or client in any way which is adverse or detrimental to the interests of the employer or client, except with the prior consent of the employer or client or when disclosure is required by law.

Rule 3.2.2—A Member who has made an investigation for an employer or client shall not seek to profit economically from the information gained without permission from the employer or client, unless it is clear that there can no longer be a conflict of interest with the original employer or client.

Rule 3.2.3—A Member shall not use his or her employer’s or client’s resources for private gain without the prior knowledge and consent of his or her employer or client.

Returning to the initial question I received, can a CPG provide a third party with a copy of a report prepared for a company that is no longer in existence? When there is no succeeding company (via merger, acquisition, etc.), as appears to be the case here, then the confidentiality provisions of Rules 3.2.1, 3.2.2, and 3.2.3 do not apply. There is no adverse or detrimental interest to a company that no longer exists. Likewise there can no longer be any conflicts of interests. Nor does a client exist who can grant or deny consent. Given these circumstances, it may be permissible to provide the third party with a copy of the report.

Diversity, Equality, and Inclusion

Diversity, equality, and inclusion are the topic of the moment for a number of geoscience professional societies. The
learn more about the diverse make-up of its Fellows. The questions asked about gender, gender at birth, disabilities, ethnicity, sexual orientation, and religion (in very broad categories). Knowing the current situation provides a starting point for determining whether efforts to increase diversity and inclusiveness are successful.

Should AIPG conduct a similar survey? If so, the one question I would ask is age range in 5-year intervals. I would expect that AIPG’s younger members are more diverse than the older membership. A related metric would be years of professional experience because experience is an element of pay. But expectations aren’t data.

Aside from collecting data that shows changes in diversity and inclusiveness over time, the tougher question is, how can AIPG promote increasing diversity and inclusivity? Entry into the geoscience profession starts with obtaining at least a bachelor’s or master’s degree in geoscience. Increasing the numbers of underrepresented groups involves increasing the number of these groups majoring in geoscience. How is that accomplished? Certainly significant numbers of the unrepresented groups are attending college but apparently are not interested in or drawn to geoscience. I know that this question has been pondered by many people far more qualified than I am. Do you have any suggestions?

In addition to addressing issues around entry into the profession, what problems exist once entry is gained? This is where the issues such as gender pay gap and advancement into management ranks appear. The details of these issues quickly become complicated. However, the complicated nature of the issue is not a justification for not addressing it.

Getting Paid by Clients

One of the periodic problems with consulting is getting a client to pay your invoices. I have had unpaid, or only partially paid, invoices over the 19 years I’ve been a consultant and I expect most other consultants have as well. What can you do about it? I last addressed this issue in column 57 (Aug ’00). Unfortunately, non-payment is generally a commercial dispute that is not readily addressed by the AIPG Code of Ethics and generally must be resolved through arbitration or litigation.

I was recently contacted by an AIPG member (member A) whose company had a contract with another firm headed by another AIPG member (member B) that specified that member A’s firm was to bill member B’s firm rather than the ultimate client for whom the work was done. Subcontracting in this manner is not an uncommon arrangement. However, despite that member A’s firm have submitted timely invoices and subsequent requests for payment, the only response from member B’s firm has been that “the check is in the mail”; it isn’t. Member A also knows that another consulting firm working for member B’s firm on the same project was paid. This is evidence that member B’s firm was paid by the client and so member B’s firm should have the money to pay member A’s firm.

In this case where an AIPG member, member B, is responsible for paying member A’s firm and has received payment from the client, there may be a legitimate matter for inquiry pursuant to AIPG’s Code of Ethics, specifically Canons 3.0 and 4.0 and Sections 3.4, 4.1, and 4.2. These provisions deal with performing duties diligently and in a timely manner; respecting the rights, interests, and contributions of professional colleagues; and being accurate, truthful, and candid in all communications. Life happens and with it unpleasant and unforeseen events. When such events happen, being accurate, truthful, and candid in all communications is particularly important in your dealings with colleagues and may permit some needed flexibility. But to get this flexibility, you have to be accurate, truthful, and candid in all communications.

Whether successfully bringing a Disciplinary Proceeding against member B would result in payment to member A is unknown—legal action may still be required. However, a Disciplinary sanction could adversely affect member B’s professional standing. Regardless of whether an AIPG Disciplinary action is warranted in such cases, failures to pay subcontractors (or employees) will result in the word of the non-payments getting around and will adversely affect the professional reputation of the non-paying individual or firm.

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1. In my view for the purpose of looking at ethnic minorities, I focus on US-born minorities rather than those born in other countries who are now working in the US.
C.W. Fetter Endowed Geology Research Fund Update

Christine F. Lilek, CPG-10195
Christine.Lilek@wisconsin.gov

The C.W. Fetter Endowed Geology Research Fund was established in honor of Dr. Charles W. “Bill” Fetter, Jr. (Sayner, WI), who died on September 10, 2011 after a brief battle with cancer. Bill spent his professional career at the University of Wisconsin-Oshkosh, as a Professor of Geology from 1971-1996, including 16 years as department chair. Bill was an internationally recognized expert in hydrogeology, working on more than 200 national consulting projects in groundwater supply and contamination.

He is the award-winning author of Applied Hydrogeology, the standard textbook for university courses on the subject, which has been in continuous publication for more than 30 years. He also authored Contaminant Hydrogeology in 1993, which has undergone several newer editions since 1993.

Bill played a very important role in forming the WI section of AIPG. He also played a very important role in organizing the 2000 AIPG Annual Meeting by attending practically all the organizational meetings over a three year period and then served as treasurer for the meeting!

Bill continues to support geology students in Wisconsin through the C.W. Fetter Endowed Research Fund at the UW Oshkosh Department of Geology. Since 2007, the UW Oshkosh Department of Geology has provided an annual competition for undergraduate research grants to their undergraduate geology majors.

Funds for this purpose are available thanks to the C.W. Fetter Endowed Research Fund, established in 2011, through gifts from Dr. Fetter, emeritus faculty members, alumni, current faculty members, and friends. Each year, two to five students have been awarded grants from the fund.

Past research topics have included: “Geochemical Variations in Basalts of the Poison Lake Chain, Lassen Volcanic Center”, “Microbial Destruction of Calcium Carbonate Gastropod Shells During the Pleistocene,” “Using Oxygen Isotopes to Characterize Mantle Processes Beneath the Southern Cascades,” “Volcanic Rocks of the Lassen Peak Area in California,” and “Volcanics of the Lake City Caldera in Southwestern Colorado.”

More information about the C.W. Fetter Endowed Research Fund and how to donate to this worthy cause can be found on the UW Oshkosh Geology Department website at: http://www.uwosh.edu/geology/about-the-program/scholarship-opportunities-1/the-c-w-fetter-endowed-research-fund.


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 pep/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.

Attention Student Chapters

How would you like to attend the AIPG Annual meeting in Alaska???

The deadline for the Student Chapter of the Year award is June 1, 2015.
Feedback to TPG - Opinion of Shale Gas Production and Seismic Activity in North Texas

Editor’s Note: In the 2014 Oct-Nov-Dec issue of TPG, AIPG contributor Robert G. Font, CPG-03953, responded to the controversy of induced seismicity in north Texas and commented that further objective scientific investigation is needed to evaluate the relationship of seismicity to shale gas production. Dr. Font opined that we have the technology to responsibly develop our energy resources and that geologists should contribute their knowledge to accomplish safe waste disposal practices.

Another AIPG geologist responded to Dr. Font’s piece and submitted comments, which we have summarized below. Although atypical, the responding geologist wishes to remain anonymous due to his/her employment in the public sector, with responsibilities related to the petroleum and natural gas sectors. This CPG also indentifies water resources as an area of expertise, in addition to their employment that is directly related to shale gas development. The responding geologist presents a different perspective on source rock exploitation itself and operational practices.

TPG welcomes readers’ comments and opinions. In this case, the anonymous contributor initially did not wish his/her comments to be printed, but we thank both this geologist and Robert Font for graciously agreeing that there is value and interest in sharing our observations and opinions. After all, productive discussion (and debate) demonstrates the multi-dimensional nature of earth science and ultimately increases the value that geologists contribute to society.

Understanding Source Rock Exploitation and Induced Seismicity: An anonymous geologist offers the following points for consideration regarding hydraulic fracturing and source rock exploitation:

1. Source rock exploitation is not economical, even at $100/bbl from the upstream side. Crashing oil and gas prices will clarify this concept. The economics are extremely tight (tighter than the source rocks) and are best demonstrated from the downstream side. The simple economics of rapid decline rates and expensive drilling/completion costs dictate that sufficient profit must be realized on the downstream side to justify the upstream investment. Consequently, risky and complicated economics render the notion of “energy independence” to be elusive.

2. Hydraulic fracturing is not all it is “cracked-up to be.” Whereas the recovery efficiency of gas-phase source rocks can be respectable, quite the opposite applies to liquid-phase source rocks where hydraulic fracturing has a dismal recovery record of 1–2% of in-place oil. Enhanced recovery is not an option, because each lateral is isolated by the effects of the fracturing job itself, which creates a permeability-barrier front of migrated organic carbon and sludge. In other words, the free (adsorbed) gas is the reservoir energy and once that is depleted, “it’s over.” The average economic life of a lateral (gas or oil) is three years.

3. The old adage of “haste makes waste” holds for source rock plays. A myriad of operational challenges has been created by the frantic rush of well drilling/completion to maintain cash flow in the face of rapid production decline-rates, which easily outpace drilling/completion rates. With unlimited horsepower on a pad, operators can drill (jet) at 200-500 feet per hour. This rate of penetration surpasses the effectiveness of any mud system to seal porous formations. Cement seals the pipe, but not a porous formation. Only a good bentonite mud system can effectively seal a porous formation, which could contain protected groundwater, saltwater, and/or hydrocarbons. The Texas Eagle Ford play has experienced some spectacular (post-completion, behind cemented pipe) blowouts from shallow gas zones, disposal zones, and fracture zones connecting deep geopressured-freshwater. Such problems can be minimized by drilling slower and incorporating careful drilling practices.

4. Air-drilling is just as problematic as jetting. Increased stray gas issues in protected groundwater can be attributed to both drilling techniques. The delay in the appearance of impacted groundwater could take years. “Baseline” is a misnomer because the pre-drilling conditions in groundwater are dynamic. Nonetheless, pre-drilling conditions should be documented and monitored for any dynamics that could be associated with O&G operations. Negative consequences can occur from pushing the technology to speed the drilling/completion time and maintain cash flow.

5. Concern about fracturing fluids escaping beyond the target zone is highly overrated. The fracturing fluid will be produced as flow-back or bonded (adsorbed) to the new fracture surface of the created reservoir. The risk of break-through is from inadequate operations, such as poor cementing, casing/tubular failure, and compromised old well-bores.

6. Flow-back consisting of fracturing fluid is a sign of a rushed job. Good hydraulic fracturing should produce no flow-back water. The frac-water should be allowed to absorb (bond) to the fresh fracture surface. If the fractured zone is not allowed to “soak” for several weeks, the adsorbed (free) hydrocarbon will bond to the new surface and become absorbed and unrecoverable. This represents lost producible hydrocarbon and in the case of gas, it is lost reservoir energy.

7. Pore pressure is not the issue regarding seismicity in the Fort Worth Basin. The disposal zone is the Ellenberger Limestone, a huge karst, saltwater-bearing formation. None of the disposal wells indicate pressure buildup. SMU researchers have done an excellent job in collecting seismic data, including micro-seismic events. Their work should be published soon, although research likely will continue to focus on the pore-pressure hypothesis, despite conflicting data. All the seismic events are associated with deep basement faults, which are located well below the Ellenberger. It is difficult to conceive that an impervious, crystalline basement is affected by disposal into the Ellenberger. If pore pressure from the Ellenberger is accountable for basement seismicity, it has had a very long geologic history (preceding present-day disposal operations) to have realized an impact.

Note: The above represent the responding geologist’s opinions only, and do not reflect those of any government agency, or private or public organization.

Dr. Font appreciates the responder’s comments and reiterates his following points, as previously published:

1. The combination of horizontal drilling and hydraulic fracturing has dramatically increased our domestic recoverable reserves which are enormously critical to our country’s energy needs.

2. In the north Texas area, there is an apparent strong correlation between increased hydraulic fracturing activity and the timing and occurrence of local seismic events that needs to be fully studied and addressed with scientific impartiality and without presuppositions.

3. Fulfilling our responsibility to public safety and satisfying our energy needs are both essential and certainly not incompatible.
Rainfall/runoff relationships are important in arid regions. **What are the flash-flood hazards? How large should that culvert be?** **What is the water budget?** Engineers have developed procedures for determining runoff in different scenarios. These involve multiple tables and graphs or curves for theoretical cases. Most of these methods were developed under humid conditions, as encountered in the eastern United States.

I wanted to study actual rainfall/runoff events, especially ones unlikely to be covered by these traditional schemes: those in the arid Southwest. To do this I instrumented two watersheds in southern New Mexico in cooperation with the U.S. Geological Survey. This included a Class A weather station as well as several paired stream and rain gages (the usual spelling in hydrology).

The project yielded useful results. The local engineers were tickled to get some real data for local conditions. They never believed that the theoretical curves in their handbooks really applied to their arid setting. The study showed that the cookbook methods overestimated runoff. It had never been challenged because no one ever complains if the dam is too high or the culvert too big. Well, maybe the accountant would.

Another aspect of that project deserves a mention. Ever get the feeling that when you tell people about your work, they don’t really get it? To keep the evaporation pans associated with the Class A station topped off in that dry environment, I toted a lot of water. This involved filling numerous 5-gallon cans in my driveway with the garden hose on the nights before trips to the field. I suppose seeing someone fill water cans in the desert seemed a bit ominous, so one evening my neighbor asked what I was doing. **Was the water going to be shut off or something?** Being enthusiastic about my project, I explained in some detail that I was measuring various parts of the hydrologic cycle on the other side of the mountains, including flow in the dry arroyos. When I had finished, he was quiet for a moment and then said, “It’s too bad it’s so arid here that you have to take your own water to measure stream flow.” And he sounded serious!

I never figured out the best approach to getting stream flow with a Gerry can. Maybe that’s why I’ve worked mainly with ground water. **TIPS:** Cookbook methods should cover all climates. Also, no matter how carefully you explain your project, some people will never really understand what you’re doing.

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 at wstone04@gmail.com.

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**AIPG Membership Totals**

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**New Applicants and Members** can now be found on the AIPG website at [http://aipg.org/membership/newappsmems.html](http://aipg.org/membership/newappsmems.html)

**Section News** can now be found on the AIPG website at [http://aipg.org/sections/sectionnews.html](http://aipg.org/sections/sectionnews.html)

For those who need only an occasional search of the GeoRef database, it is easy to request a GeoRef custom search. A member of the GeoRef staff will conduct the search according to your specifications. The search results will be delivered by email.

To order a Custom Search, contact Jim Mehl at [jmp@agiweb.org](mailto:jmp@agiweb.org), (703) 379-2480 ext 236 or Monika Long at [ml@agiweb.org](mailto:ml@agiweb.org).

The cost of a custom search is $225.00 plus $.45 per reference.

Please mention **AIPG** when ordering your custom search.
Famed Geologist Dick Jones Dies at 67

For some people, the simplest measure of a meaningful life is their work. This is true for Richard W. Jones, retired coal geologist and editor of the Wyoming State Geological Survey (WSGS), who died at the age of 67.

Dick’s contributions to the geologic knowledge of Wyoming represent his passion for his work. He was thorough in his research, always striving for excellence in his technical writing, and worked countless hours on his geologic maps to make sure they were perfect prior to production.

“Dick tended to be a perfectionist when it came to editing,” says Alan VerPloeg, head of Energy and Minerals at the WSGS. “I worked with Dick throughout his career at the Survey, and I was always impressed by his knowledge of Wyoming geology and with his coal research,” VerPloeg says. “Dick edited many of my reports and maps, and I always knew they were in great shape with no errors when they went to the printer.”

Leaving his mark, Dick’s contributions to geology are represented in the legacy of his work at the WSGS. He joined the agency in 1982, originally as coal geologist. Coincidentally, Dick’s interest in coal had started in Laramie 10 years earlier. While he was a UW student he worked part-time for WSGS on Wyoming geology and coal deposits. As WSGS coal geologist, he was responsible for conducting geologic investigations on the state’s coal resources as well as mapping the geology and tracking coal production. Former colleague, Nick Jones remembers Dick for his passion for Wyoming geology and his enthusiasm to share his knowledge and experience with others.

“It was a pleasure to work with and learn from Dick,” says Jones, also a former coal geologist of the WSGS, who now works for UW’s Enhanced Oil Recovery Institute. “He had a unique ability to engage and encourage the people he knew and worked with. He truly was an incredible mentor for many aspiring geologists,” says Jones.

In 1992, Dick became editor and head of WSGS publications. After years of having his work, as a geologist, “hacked to pieces by editors,” he said, he enjoyed the challenge of working from the “editor’s point of view.” Dick said the biggest challenge for an editor is editing highly technical subjects and writing them so the non-geologist can understand them.

During his career, Dick authored more than 140 geology papers, articles, reports, and maps. He also gave numerous presentations, lectures, and workshops on Wyoming coal and geology.

Dick graduated from Northwest College with a degree in pre-engineering and from the University of Wyoming with a degree in geology in 1972. Prior to the WSGS, he worked for the U.S. Geological Survey and the U.S. Bureau of Land Management.

VerPloeg says, “I valued Dick as a friend and colleague, and he was a great asset to the Survey.”

Springtime Outdoor Safety and Maintenance Tips

Before we can fully enjoy spring time, we may first need to clean up some of the damage caused by winter. You can prepare for the upcoming season with these spring home maintenance tips.

- Lawn – Once the danger of frost has passed, rake your grass and give it the first fertilization of the season. It will really spruce up your landscape.
- Flowers – If last year’s flowers are long gone, plant early spring annuals. Or if your flower bed contains perennials, add mulch and fertilizer, which will encourage the plants to come back to life.
- Trees – Signs that trees require pruning include crossing, dead, or decayed branches or limbs. Perform simple pruning cuts yourself, but leave climbing trees and more extensive cutting to a certified arborist.
- Siding and Roofing – Check your siding and roofing for loose materials, chipped paint, and rot. Look for areas where caulking has weathered away, such as around the chimney. Call a roofing expert when necessary.
- Deep Cracks – Cracks in sidewalks and driveways can pose tripping hazards. Seal the cracks with concrete or mortar.
- Standing Water – Drain any areas where water collects and attracts mosquitoes or causes a backup.
- Outdoor Home Lighting – If you discover lighting that is not working despite changing light bulbs and checking the fuse box, you may have a short in the line caused by moisture, which will require the expertise of an electrician.

Complete these pre-spring home and lawn maintenance tasks, and your house will be as ready as you are for the pleasant days ahead.

To learn more about Liberty Mutual Auto and Home Insurance, or get a free, no-obligation quote, call 1-800-981-2372 or visit libertymutual.com/AIPG.

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The Petroleum Geology of NW Europe: 50 years of learning – a platform for present value and future success

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LBG Names Stacy Stieber an Associate

SHELTON, CT – February 10, 2015

Leggette, Brashears & Graham, Inc. (LBG), a professional groundwater and environmental engineering services firm, has named Stacy Stieber, CPG-11696, an Associate.

Based in Shelton, CT, Ms. Stieber’s work experience involves project management and field operations for groundwater and surface-water supply development, including performing hydrogeologic feasibility assessments, water budget analyses, and well siting studies; providing oversight of production well and monitoring well drilling and construction; and conducting long-term pumping test and aquifer tests. She has also participated in numerous soil and groundwater contamination investigations. Ms. Stieber received B.A. degrees in environmental science and biology from Boston University and is a Certified Professional Geologist recognized by the American Institute of Professional Geologists.

Leggette, Brashears & Graham, Inc. was the first consulting firm in the United States to specialize in groundwater geology. For over half a century, LBG has been a recognized leader in the development and management of groundwater resources as well as environmental and remedial engineering. Headquartered in Shelton, CT, LBG has 23 regional offices throughout the U.S.

Dr. P. Patrick Leahy of The American Geosciences Institute Awarded Prestigious Pick & Gavel Award

Alexandria, VA—The Association of American State Geologists (AASG) has recognized the Executive Director of the American Geosciences Institute, Dr. P. Patrick Leahy, CPG-10507, with its prestigious Pick and Gavel Award. This award was initiated by AASG in 1999 to recognize distinguished friends of geology who have made major contributions to advancing or facilitating the role that geoscience plays in our society.

“Many of the complex geoscience issues we face today are of significant interest to the public.” Leahy said, “Indeed, earth-science problems often involve serious conflict, have costly and long-term consequences, require timely action on the part of a policy maker, and reveal significant gaps in our knowledge and understanding.”

Following his Bachelor’s and Master’s degrees at Boston College, and a Ph.D. from Rensselaer Polytechnic Institute, he had a distinguished career at the U.S. Geological Survey with assignments including Chief of the National Water-Quality Assessment Program, Chief Geologist of the Geology Division, Associate Director for Geology and as acting Director. Leahy joined the American Geosciences Institute in 2007 as its Executive Director, and continued work on programs like Earth Science Week, facilitating coverage of Federal-level geoscience legislation with the Geoscience Policy Program, and monitoring the geoscience workforce. The recently launched Center for Geoscience and Society will continue to bridge gaps that exist between geoscientists, educators, policy makers and the general public. He also serves as a U.S. Commissioner to the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

Dr. Jonathan Arthur, MEM-0982, Florida State Geologist, and President of AASG had this to say of Leahy, “[Leahy] is a friend and vital, dynamic part of the geoscience community, and he embodies its spirit. Awareness of geosciences in this nation has been heightened significantly through effective education and communication guided by his wisdom and instilled by his enthusiasm and creativity.”

Recent recipients of Pick and Gavel awards include Congressman Ken Calvert in 2014, Congresswoman Betty McCollum in 2013, Senator Dianne Feinstein and Congressman Jim Moran in 2012, Leahy was honored with a dinner at the Cosmos Club in Washington D.C. on the evening of Tuesday March, 10th, 2015.

The American Geosciences Institute is a nonprofit federation of geoscientific and professional associations that represents more than 250,000 geologists, geophysicists and other earth scientists. Founded in 1948, AGI provides information services to geoscientists, serves as a voice of shared interests in the profession, plays a major role in strengthening geoscience education, and strives to increase public awareness of the vital role the geosciences play in society’s use of resources, resiliency to natural hazards, and interaction with the environment.

LETTERS TO THE EDITOR

Dear President Sawyer:

Thanks for the note commemorating 50 years of membership in AIPG. I have always valued my membership from day one.

Will Classen, Jr.
CPG 524

Dear AIPG Headquarters:

Just want to acknowledge receipt of my Charter/Emeritus member lapel pin and to thank you very much. I will certainly enjoy wearing it with an abundance of pride!

Glen Faulkner.
CPG-635

Dear AIPG Headquarters:

I thank you for the moments of AIPG recently mailed to me! At Age 88, I have decided to shut down my business to more fully enjoy living at the retirement center.

Ruth and I enjoyed the meeting in nearby Broomfield.

Keep up the good work!

Bob Weimer,
CPG-98

Do you need an idea for a section talk, field trip, meeting?

Have you read the AIPG section newsletters on the AIPG website?

• Job Hunting Workshop-California
• Field Demonstration Day-Wisconsin
• Outreach at Dinosaur Ridge’s Girl Scout Day-Colorado
• Geothermal HVAC Principles and Keys to Successful Projects-Minnesota
AIPG members attended the SE GSA section meeting in Tennessee. AIPG Tennessee section volunteered at the AIPG booth. From left to right, Nicole Ritchie, SA-5713, Elizabeth Gant, SA-5709, Vanessa Bateman, CPG-11016, Brandy Barnes, SA-5473, and Ron Wallace, CPG-08153. Brandy is the President of the Middle Tennessee State University Chapter.

Volunteers work the AIPG Booth at the SE GSA section meeting in Tennessee.

UC Davis Student Chapter-We had a great meeting on March 5, 2015- about interviewing, networking, finding a mentor, public introductions at technical meetings, small talk, etc. The students were quite interested. Steve Baker did a great job leading the meeting. Photos compliments of Jim Jacobs, CPG-7760, California Section President.
Robert Blair, CPG-10779, passed away on February 26, 2015, while Nordic skiing. He was 71 years old. Robert (Rob) William Blair, Jr. was born in Bossier City, LA, on November 28, 1943, to parents, Robert and Margaret MacLeod Blair. He received his BS degree in geology and a single-engine plane pilot’s license at the University of New Mexico, Albuquerque, NM. He married Patricia (Pat) E. Roberts on June 11, 1966, in Los Alamos, NM. After serving two years in the US Navy at Great Lakes, IL, he worked with Petro-Nuclear and the US Geological Survey in WY and CO. In 1968 and 1969, Rob and Pat had two children, Kurt and Katrina. In 1975, he received his PhD in geology from the Colorado School of Mines, Golden, CO. For 28 years he taught in the geology department at Fort Lewis College, Durango, CO.

He has over 50 publications including 5 books, 22 peer reviewed papers, 2 CD ROMs’s and multiple abstracts. These include: “Geomorphology from Space-A Global Overview of Regional Landforms”; “The Western San Juan Mountains, Colorado: A Guide to the Geology, Ecology and Human History Along the Skyway”; “The Eastern San Juan Mountains: Their Geology, Ecology and Human History”; “Development of Natural Sandstone Arches in Southeastern Utah”; and “Moraine and Valley Wall Collapse Due to Rapid Deglaciation in Mount Cook National Park, New Zealand”.

In 1998, he initiated the formation of Mountain Studies Institute, which was incorporated in 2002 as a scientific research/educational nonprofit organization. He enjoyed mountaineering in numerous areas of the world (all seven continents), swimming (head of the Great Lakes Naval Training swim team), running (several marathons and traversing the Grand Canyon), and Nordic skiing (American Birkebeiner), photography (repeat photography), chess, horseshoes and especially internationally showcasing mountains as a natural open-air classroom and laboratory.

Robert W. Blair, Jr.
CPG-10779
Member Since 2003
February 26, 2015
Durango, Colorado

William C. Edmund
CPG-09757
Member Since 1996
August 19, 2014
Houston, Texas

Graham R. Ford
CPG-00933
Member Since 1965
April 2015
Minneapolis, Minnesota

Brian Gavin
CPG-07849
Member Since 1990
October 29, 2014
Spokane, Washington

Scott B. McDaniel
CPG-06783
Member Since 1985
June 11, 2014
Topeka, Kansas

INSURANCE PROGRAMS

Available to AIPG MEMBERS

GeoCare Benefits Program
For information:
Life, Dental, Disability, Supplemental Insurance, and Cancer Expense
GeoCare Benefits
Insurance Plan
http://www.geocarebenefits.com/
Phone: 800-337-3140 or 805-566-9191

Liberty Mutual Insurance
Auto and Home Insurance
http://www.libertymutual.com/lm/aipg
Phone: 1-800-524-9400
Please mention client #111397 when you contact Liberty Mutual.

The Wright Group
Professional Liability Insurance
General Liability Insurance
http://www.thewrightgroupinc.com
Phone: 303-863-7788

Financial Services
The Consulting Group at RBC Wealth Management
David Rhode, Senior Investment Management Specialist/Financial Advisor
http://rbcfc.com/david.rhode/dave.rhode@rbc.com
Phone: 1-800-365-3246
Fax: 303-488-3636
In the Field

Stephanie Jarvis, YP-0125, stephaniekjarvis@gmail.com

Recently, David Abbott, CPG-4570, sent Kristina Pourtabib, SA-3410, and I an email expressing concern with something he had heard at a recent meeting: many current geology students do not like and/or are not comfortable doing fieldwork. He asked us for thoughts on this “problem” and suggested it might make a good column topic for one or all of us. Since I was in need of a topic, I decided to take the first stab.

One of the first things I thought of is the sense of outcast I’ve heard expressed by several people who are in the geosciences because they do not identify with the boot-rocking, flannel-wearing, rugged outdoors (wo)man image so often embraced by the geoscience community. They love the science and have plenty to contribute, but their comfort zone is the lab or in front of the computer running complex models. Since many of us are in the field because of the potential for remote fieldwork or time spent outside, this is a little hard to accept. Definitely, lab work requires samples to be collected, and models need to be based on good field observations, sample collection, and groundtruthed. I think we’d all agree that no good geoscience is accomplished separate from good fieldwork. However, sample collection takes a lot of resources and, often, more data is collected than can be processed and analyzed within the scope of a single project. This is evident in the overabundance of dust-collecting samples in any geoscience department where research is being performed. I was extremely fortunate to attend an undergraduate institution that valued research and to be in a department that made sure students got plenty of field experience, both in the context of classes and for the mandatory senior thesis. Then, as a Masters student, I realized that having a project that required (or allowed for, depending on your perspective) fieldwork was a coveted privilege. Many students in my department were working with samples collected on a cruise they weren’t able to go on, were working with models using data others had collected, or were looking at samples from Mars (obviously, no fieldwork there unless you’re a robot). The truth is that, while fieldwork is extremely important, in the context of research often multiple people are working on a project and it is not logistically feasible or sensible for everybody to be involved in the field efforts. It takes people willing to do the lab work or write the code for the models with data they didn’t physically collect. Those people are still “geoscientists.” For the respondents to the 2014 AGI Exit Survey, summarized by Wilson (2014), less than 65% of students reporting research experiences used field methods in their research. For graduate students, the use of field methods in research was similar or greater than the use of other methods. For undergraduates, lab methods were used slightly more than field methods. When comparing research stories of older generations of geologists, I have gotten the sense that the fieldwork aspect of the science has changed over the years. For the most part, the thought of weeks at a time spent in the field mapping is something that today’s students could only dream of. If they are in to that sort of thing, that is.

Related to the above point, it does the profession no good to make students who aren’t comfortable with the great outdoors feel unwelcomed. Most students don’t go into college planning on majoring in geology—only 25% of Bachelors graduates that responded to the AGI 2014 Exit Survey had decided on geology as a major before beginning college. For these students, a lack of interest in fieldwork may be related to the fact that it’s completely foreign territory for them. In our discussions about this topic, David sent me a copy of Nancy Price’s “Field Safety-Revisited” column from the May/June 2008 issue, where she touches on this point well: “If you grow up in a big city, like New York City, you have no reason to know outdoor survival techniques. You will learn how to use the subway and where not to go at night, but you probably won’t need to know how to keep warm in sub-freezing temperatures or that during the monsoon season flash floods are a possible hazard in the arid canyon lands of the west. Last time I checked, having outdoor experience isn’t a prerequisite for becoming a geologist. It is reasonable to expect students to learn survival skills over their career as a student, but we cannot assume that people come equipped with the knowledge of things that the more experienced outdoorsman thinks is common sense.” In other words, the field of geology should be wide open to anybody. Maybe the sense that outdoor experience is required deters some students from field-oriented ventures.

My second thought when responding to David’s email was about gender-related barriers to fieldwork. From a female perspective, there are a lot of reasons to be weary of fieldwork, particularly if you aren’t necessarily one for the outdoors. One of the most basic of these barriers struck me by surprise when I first heard discussions about it, though in hindsight it shouldn’t have: relieving yourself outside. For me, who was going in the woods as soon as I could walk, it took me a little bit to wrap my head around why this would be a barrier. Then I read about women dehydrating themselves because they were so uncomfortable with the thought of relieving themselves around a bunch of guys or didn’t always have adequate cover (an issue I have definitely come to appreciate doing fieldwork on the Front Range!). Folks, when the prospect of fieldwork involves the stress of bursting your bladder along with the
miserableness of dehydration, it’s not going to be too appealing. This topic lead to a great discussion on ESWN (Earth Science for Women Network—ladies, an amazing resource!) about urine funnels. For fieldwork, they just make sense. I had definitely heard of these and was aware of their value for avoiding hypothermia in extremely cold conditions, but had never considered them for fieldwork otherwise. I intend to check into this device for myself. There are other logistical issues for women in the field, such as biological cycles and challenges to new mothers—issues that make understanding coworkers and networks like ESWN invaluable for female geologists.

Other gender-related field issues are not so benign. Safety is the one likely to come to most readers’ minds. While definitely not a female-specific issue, it seems to weigh heavier on women’s minds than men’s. Whether it is because there are more risks for females or because we as women have that fear instilled in us at an early age, it definitely adds another level of stress. This is something I’ve become keenly aware of in my current position—we often do “low-risk” (urban, visible, not enough work to warrant two people) fieldwork solo, and I find myself always looking over my shoulder. While I know full well the statistics for our company give me no more reason to worry than my male co-workers (the only issue we have ever had was with a male), I feel like a target when I’m by myself. Nancy’s column addresses this topic very well, in the context of one of many horror stories I heard as a student.

A gender-related fieldwork issue that has been gaining a lot of attention lately is sexual harassment and assault. While not necessarily a female-specific issue, it definitely has a negative impact on more women than men. Again, even for those of us fortunate enough to have thus far not encountered sexual harassment in our field experiences (the closest I’ve come is being called “Mom” at field camp—I did not appreciate it, but in no way felt threatened by it), the horror stories remind us that it is an ever-present possibility. A recent study on sexual harassment and assault in fieldwork (Clancy et al., 2014) has taken a first step to putting numbers to these stories. While an admittedly small and biased sample size (data was collected via a survey, and women were overrepresented in the respondent pool compared to the gender ratio of field-based sciences), the numbers are discouraging. 72.4% of respondents “reported that they had directly observed or been told about the occurrence of other field site researchers and/or colleagues making inappropriate or sexual remarks at their most recent or most notable field site.” 64% had personally experienced sexual harassment, with women 3.5 times more likely than men to have had this experience, and 20% had personally experienced sexual assault. Perpetrators of harassment towards women were more likely to be superiors, while harassment towards men was more likely to come from peers. Common knowledge and plenty of research point to the long-lasting devastating effects this can have on victims, well explained by Karen James in her article “What I learned from #ripplesofdoubt,” a hash tag she created in response to revelations of sexual harassment in the science writing community.

I am unaware of any studies drawing direct connections between the issues I’ve discussed (a broadening definition of what it means to be a “geoscientist”, gender-related discomfort, and physical dangers) to the apparent decline in interest and comfort of students towards fieldwork. The 2014 AGI Exit Survey results do indicate less interest in field camp among female students than males, but there are a lot of reasons field camp isn’t ideal for some students (money, family obligations, etc.). I am also not aware of any data showing this trend of declining interest, and the most relevant I have found thus far might be indicative of the opposite: field camp attendance has been increasing (AGI Geoscience Current No. 82). If you have any insight or are aware of data pertaining to this issue, please let us know!

References:

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Coming in the next issue of TPG...
Scholarship Winner Essays!
Studying Perfection

Kristina Pourtabib, SA-3410
pour1824@vandals.uidaho.edu

Just this past weekend I was out camping and the conversation around the campfire turned into a contest of who could recite the geologic time scale the fastest which is nothing out of the ordinary when you’re with a group of geologists, and for the life of me I couldn’t seem to remember. I tried to think back to the catchy phrases I made up to help me memorize the order of the periods and epochs but much to my dismay I couldn’t even think of the name recognition pattern that I used. This then started to get me to think about the way I studied for many of my tests and quizzes during my undergrad, how many people still study today, and how studying by way of memorization is detrimental to long-term information retention.

Admit it, we’ve all done it, it’s the night before a big exam and you’ve waited until the very last minute to start studying. As much as you try and tell yourself that it will be okay, you’re scrambling to recall all of the information covered in lecture since the previous exam, so naturally, you condense down your notes as much as humanly possible and come up with a quick short cut to memorize the main points. Although seemingly effective at the time, the minute the exam is over, all of that crammed information escapes from our short-term memory and out into nothingness, never to be recalled again. Even though this may seem a bit over nothingness, never to be recalled again. From our short-term memory and out into all of that crammed information escapes the time, the minute the exam is over, points. Although seemingly effective at a quick short cut to memorize the main concepts from this material more than any other course. When you get into a more focused area of study, such as in graduate school, the courses that you’ve devoted the most time to in the past will be the material that you continue to develop, while the material that you didn’t feel as passionate about will show itself less often. The bottom line is that studying is most effective when you learn the information slowly over the course of many days leading up to the exam, rather than the night before. For some, the study technique of cramming has not shown any negative effects yet, but for others, like myself, I’m slowly starting to regret some of my nights of cramming. For the most part, the gaps in my geologic knowledge have not hindered my progress, but I know that in the future I will have to revisit some of the introductory concepts that never quite made it over to my long-term memory.

Overall, when you’re looking to retain information, the material that you find the most interesting throughout your studies in geology, and any other discipline for that matter, will be the material that you retain. Looking back, the coursework that I’ve retained the most information from is Mineralogy and Optical Mineralogy. This is directly related to the fact that these were my favorite courses taken as a geology major, so I spent the most time studying this material and have revisited concepts from this material more than any other course. When you get into a more focused area of study, such as in graduate school, the courses that you’ve devoted the most time to in the past will be the material that you continue to develop, while the material that you didn’t feel as passionate about will show itself less often. The bottom line is that to be a good geologist one needs to be well rounded, and in order to be well rounded one has to retain information from all of the areas of study in geology (from structure, to sedimentology). The study of geology is unique in that it takes information gathered from a variety of different disciplines/sub-disciplines and combines that information in order to solve a single problem. It is important to always think outside the box in geology and to pull concepts from other areas to find unique solutions to problems. When that knowledge has fallen to the wayside due to the lack of time spent committing essential fundamentals into memory, then solutions might never be found. In the end, effective studying takes time; rarely can one retain information with so little preparation. Long-term study plans are the key to successful comprehension.

Editor’s column continued from page 26.

and professionals we are expected to take risks and push the boundaries of our profession. We are considered professionals because we have the training and experience to make decisions for which there is no known correct answer... We want the same recognition to make professional judgments on projects and take on the associated risks that professional engineers currently have. We should be wary of changes in our profession that remove such risk. Without risk there is no need for professionals making decisions. ....Look-up-tables and other risk avoidance techniques do play a needed and valuable role... but they should be used conscientiously and where appropriate.”

I echo Guy’s parting words, “I encourage my fellow geologists to look at our professional lives and welcome some risk into it. Make a habit of pushing ourselves and taking professional risks. Risk can bring life and value to your job both professionally and personally.” Embrace your professional status and your duty to professional responsibility. Amen, Guy.

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Sustainable Water Management in the Texas Oil and Gas Industry

Blythe Lyons
John Tintera

Note: The authors graciously have condensed this article specifically for TPG. To download the entire paper with complete reference citations, please visit http://texasalliance.org/wp-content/uploads/2014/08/Texas-White-Paper-on-sustainable-Water-Management-by-the-Oil-and-Gas-Industry-July-29-2014.pdf

Introduction

The potential for US energy self-sufficiency, if not outright independence, will substantially depend on public acceptance, which, in turn, depends on industry demonstrating sustainable water management practices. Water is key to unleashing domestic energy resources, especially the “unconventionals.”

This article examines the varying geologic regions and water conditions in which energy production is particularly active in Texas. It discusses the water use for hydraulic fracturing, as well as the potential for water recycling, reuse, and use of non-freshwater sources in the Eagle Ford Shale, Permian Basin, and Barnett Shale regions. It highlights the role Texas legislators, regulators, and industry can play in achieving sustainable water and energy programs.

Energy-Related Water Issues

Water Use by the Oil and Gas Industry is Expected to Increase as a Result of the Shale Revolution - With the increase in production from hydraulically fractured/horizontally drilled wells, there has been a parallel increase in water use. In 2012, total water use for hydraulic fracturing was estimated to be 76,722 acre-feet. Experts predict that water usage going forward will increase to about 250,000 acre-feet between 2020 and 2030, followed by a steady decrease.

Changing Dynamics of Drought and Population - Texas faced one of the worst one-year droughts on record in 2011, with 99 percent of the state experiencing severe, extreme, or exceptional drought conditions. While conditions have improved slightly, almost 70 percent of Texas still is experiencing drought and many reservoirs, especially in west Texas, are less than 25 percent full.

Population growth is a primary contributor to the strains on Texas’s water resources. The population is rapidly increasing at a projected rate of 82 percent between 2010 and 2060. Water demand is projected to increase 22 percent by 2060, although existing water supplies are set to decrease about 10 percent during that time.

Evolving Water Management Strategies

Freshwater for Fracturing - Freshwater consumption by the oil and gas industry is estimated to reach approximately 100,000 acre-feet before decreasing to just a few tens of thousands of acre-feet by the middle of the 21st century. Alternative Non-Freshwater Source Drivers - Industry is making strides in the reuse of flowback and produced water, finding alternative sources of recycled water (from treatment plants and/or produced water from conventional wells), and in using brackish water, as technology allows the use of more saline water with additives. Cost is a major factor in determining whether to use freshwater or an alternative source of water.

Conditions supporting using alternative, non-freshwater sources are:

• a limited availability of high-quality source water;
• high quality and availability of produced or brackish water;
• a reduction in transportation and logistical costs;
• high compatibility with fracturing fluid chemistry; and,
• high compatibility with reservoir.

Challenges with using alternative water sources include:

• transportation and gathering of water (logistics, traffic, environmental concerns);
• treatment of water (cost, life-cycle environmental concerns);
• storage of non-freshwater (bacteria, corrosion, environmental concerns);
• blending of water from different sources (produced, fresh);
• consistent and predictable fracturing fluid performance (pretesting and consistent stream);
• impacts on reservoir and fracture conductivity (rock-fluid interaction and pack damage); and,
• impacts on short- and long-term field production (emulsion, scaling, corrosion).

Brackish Water as an Alternative - Brackish water is one potential non-freshwater source as recent technological advancements in chemical additives have allowed use of brackish water without the additional cost of treatment. Availability and quality will be determining factors. Texas has an estimated 2.7 billion acre-feet of brackish groundwater, with nearly every geographic region containing some amount. Brackish groundwater is more prevalent than freshwater in the southern Gulf Coast Aquifer, underlying the Eagle Ford Shale, and in many parts of west Texas, near the Permian Basin.

While brackish water is emerging as a viable alternative to freshwater use, constraints remain, including:

• increasing competition from municipalities for brackish waters of low salinity;
• acquisition costs for brackish water may be low, but handling costs are higher for brackish water than for freshwater (for no-leak transfer lines and suitable containments);
• increased liability to producers that store and/or transfer large volumes of salt water;
• potential for impacting freshwater formations by drawing down the brackish water;
• transportation costs if a source is not located nearby.

Produced Water—Using produced water as an alternative to freshwater is gaining traction within the industry. Challenges include:
• high compositional variance between wells and formations;
• the amount of flowback and produced water varies between formations;
• acquiring freshwater and disposal may be easier (there are more than 35,000 active injection and disposal wells in Texas17);
• transportation and handling costs are key site-specific factors when considering disposal versus treatment.

Some companies have begun to blend a small percentage of produced water with source water for hydraulic fracturing operations. As with other alternative water sources, it is vital to examine factors such as compatibility with the formation and the fracturing fluid, reliability and consistent results, costs, and environmental considerations in determining the potential for using produced water.18

Water Use in Barnett, Eagle Ford, and Permian Basin—Water usage in the Barnett, Eagle Ford, and Permian Basin demonstrates how factors such as the shale formation’s geology, local climate, and water sources influence the water management in specific regions. The amount of brackish or recycled/reused water has increased about 21 percent between 2008 and 2011, to approximately 17,000 acre-feet.

Northeast Texas, where the Barnett Shale is located, has a climate characterized as subtropical, sub-humid mixed savanna and woodlands.19 The shale is located at depths between 6,500 and 8,500 feet, with a thickness ranging from 100 to 600 feet.20 Although drilling operations have declined recently, the shale is still averaging gas production at 4,774,000 cubic feet per day.21 Overall, water use remains steady at 25,000 acre-feet per year.22 A majority of water used in drilling and stimulation operations is groundwater from the Edwards-Trinity and Woodbine Aquifers.23 Some water comes from wastewater treatment plants. Water shortages in this region are less of a concern than in other, more-arid regions. Compared to other shale plays, a small amount of recycling/reuse of produced and brackish water is being utilized.24

The Eagle Ford Shale formation has an average thickness of 250 feet, and is located at a depth of approximately 4,000 to 12,000 feet below ground surface.25 The Eagle Ford is currently producing an average of over 800,000 barrels of oil per day, compared to 2010, when the play was producing 15,149 barrels per day.26 Total water use is projected to be 19.2 billion gallons27 (roughly 59,000 acre-feet), averaging over 4.4 million gallons per well.28 The climate in this area is considered semiarid.29 Water is typically groundwater from the Gulf Coast Aquifer in the northern portion of the play, and from the Carrizo-Wilcox Aquifer in the southern portion.30 Water concerns in the region are high, as the shale play has the highest water use in the nation, and about 28 percent of wells are located in areas of high or extremely high water stress.31,32 A significant amount of brackish water (about 20 percent, depending on the operator) is now being used.33 Some portions of the Eagle Ford have low volumes of flowback/produced water, lowering the potential for water recycling.34

The Permian Basin contains multiple, overlapping producing formations. The area’s climate is subtropical, arid desert, but traveling north into the Panhandle, the climate becomes semiarid savanna.35 Overall water use in the Permian Basin is relatively high, at about 1,500,000 acre-feet in 2011, with individual wells using approximately 5 million gallons.36 Water scarcity is a prominent issue in this area, as a reported 70 percent of wells in the Permian Basin are located in a “high or extremely high water stress area.”37 Much of the water used is groundwater from the High Plains Aquifer, the Edwards-Trinity Aquifer, and the Pecos River Basin.38 There is a high level of competition for water from agriculture.39 Because of high flowback levels and low salinity of produced water, water recycling and brackish water use may have substantial potential.40

Factors that Impact Evolving Water Management Options

Induced Seismicity May Drive Produced Water Reuse—Concerns over induced seismicity from injection wells may encourage treatment and recycling of produced water. Texas regulators have recognized the public’s concern and concluded that more data and research are warranted.

Environmental Concerns—Concerns regarding non-freshwater sources management include accidental spillage or human error. Texas has focused on these issues by developing a Site Remediation program,41 along with the Oil Field Cleanup Fund, now called the Oil and Gas Regulation and Cleanup Fund. Contamination claims will continue.

RECRA Exemption—With very few exceptions, the EPA’s Effluent Limitation Guidelines for onshore oil and gas operations do not allow discharge of produced water resulting in a lack of NPDES permits for oil and gas flowback and produced water discharges, even when treated. With out regulatory revisions, discharge will not be a viable option for this treated water waste stream.

Regulatory Developments—RRC’s updated rules appear to be successfully encouraging oil and gas field water recycling. For noncommercial water recycling by an oil and gas operator, the authorization lies in “permit by rule,” thereby eliminating the requirement for an applicant to submit a permit application.

Landowner Challenges—Landowners may apply restrictions on water use that limit the ability of the company to recycle or use non-freshwater sources. Some operators have mentioned this limitation is an impediment to recycling produced water.

Advancements in Water Recycling Technology—There has been an increase in mobile recycling and wastewater treatment units during oil and gas field development, and RRC rules have been amended to allow for the use of such units without the need for a permit application. The table below highlights the diversity of the various water treatment technologies in Texas.

Advancements in Fracking Fluid and “Waterless” Fracking—There have been advancements toward using less water in fracking fluid and “waterless fracs,” which substitute either a gel-like substance (although some water is still used) or, in some cases, propane, for water.
SUSTAINABLE WATER MANAGEMENT IN THE TEXAS OIL AND GAS INDUSTRY

<table>
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<tr>
<th>What Texas Has Done Well</th>
<th>Source: Information compiled from presentations at the RRC Water Symposium in Austin, May 2014.</th>
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What Texas Has Done Well

Notable laws, regulations, policies, and programs Texas has done well include the Accommodation Doctrine, groundwater protection regulations, the Oil and Gas Regulation and Cleanup Fund, public outreach programs, and coordination with other state agencies.

Accommodation Doctrine Provides an Established Legal Framework-The 1971 Accommodation Doctrine protects surface owners’ rights in that it requires mineral owners to accommodate the surface owner’s existing use of the land, within reason. To summarize, the mineral estate may use as much of the surface estate as is reasonably necessary to access and produce the minerals from the tract.

In most cases, the surface owner owns the surface and subsurface water rights, unless expressly agreed upon in the severance deed or the lease agreement. Because surface owners generally have private ownership of groundwater, many ranchers and landowners sell their water to oil and gas companies, benefiting both the operators and the landowners. If the mineral rights and surface rights are both owned by the landowner, the landowners can add provisions in the lease agreement requiring that the company operating on their land must purchase water from them.

Groundwater Protection Regulations-The RRC has developed over 100 technical and complex oil and gas field regulations, and has an active inspection program. To date, there has not been a confirmed case of groundwater contamination due to hydraulic fracturing in Texas.

The RRC is a participant by statutory requirement in the Texas Groundwater Protection Committee, and annually reports all documented groundwater contamination sites to the Committee, which publishes these in an annual report.

In 2012, Texas was one of the first states in the nation to require mandatory reporting of chemicals used in hydraulic fracturing fluid. The Hydraulic Fracturing Chemical Disclosure Rule (Statewide Rule 29) requires operators to report on a public website, FracFocus.org, the chemicals and amount of water used in the hydraulic fracturing process. In 2013, the RRC adopted amendments to Statewide Rule 13, making it one of the most stringent well-integrity rules in the nation. The rule also requires that the surface casing of each well be set below the depth of usable quality water in order to further protect water from migration and contamination.

In 2013, the RRC amended Statewide Rule 8 to encourage water recycling and conservation in the oil field. The rule amendments remove regulatory barriers to water recycling, and allow recycling on-lease under the authority of the oil and gas operator, without the need for a Commission permit.

The Oil and Gas Regulation and Cleanup Fund-This Fund, based on fees assessed on the oil and gas industry and not taxpayer dollars, allows the RRC to plug abandoned wells and remediate abandoned oil and gas field sites. In 2013, the RRC completed 280 cleanup activities, including eight major cleanups, and plugged 778 orphaned wells, including 30 orphaned bay wells.

Incentives, Technology, and Representation-Texas’s regulatory environment includes several incentives designed to encourage oil and gas production and innovation. In November 2013, Proposition 6, was approved by Texas voters. It allows for the transfer of $2 billion from the Economic Stabilization Fund to the State Water Implementation Fund, to be used for loans on water projects throughout Texas.

There are many associations in Texas which serve as representatives, advocates, or discussion centers for water and energy issues. The Texas Water Recycling Association, formed in 2013, represents the water recycling industry in the state as a nonprofit voice.

Public Outreach and Stakeholder Involvement-RRC Commissioner David Porter formed the Eagle Ford Shale Task Force in 2011, the first of several groups aimed at community outreach. Others formed including South Texas Energy and Economic Roundtable and the Eagle Ford Shale Consortium. There are similar groups in the Permian Basin and the Barnett Shale. The RRC has become more proactive in establishing meetings to address public concerns.

Information Technology Systems Modernization-During the 83rd Legislative session, the Texas Legislature
approved an appropriation of $24.7 million for improving the information technology systems (ITS) at the RRC. 

**Coordination among Energy-Producing States**

Appointed government officials represent Texas in the Interstate Oil and Gas Compact Commission, which in partnership with the Groundwater Protection Council recently launched the “States First” initiative aimed at information sharing between states and created the State Oil and Gas Regulatory Exchange. Texas also participates in other national programs such as the Groundwater Protection Council, the State Review of Oil and Gas Environmental Regulations, and the Independent Petroleum Association of America.

### What Texas Can Do Better

Texas has made strides in setting up the ground rules for the oil and gas industry to continue efforts to manage its water use in an affordable, sustainable fashion. Several issues require further attention.

**Ambiguity and Conflict Exists in Some Rules** - Under the Accommodation Doctrine and with the dominance of the mineral estate, mineral owners have the right to reasonable disposal of salt water by means of injection into a subsurface formation. Since injection wells are under increased scrutiny, this right under the Accommodation Doctrine may be in jeopardy. As perception of groundwater assets evolves to include brackish water, deciphering ownership and which agency or regulations have jurisdiction over such water will become increasingly convoluted issues that must be better addressed. The permitting process and procedural requirements by the various Groundwater Conservation Districts (GCDs) across the state regarding water wells and “rig supply wells” also cause some confusion among operators.

**Public Outreach** - Both the oil and gas industry and regulators can improve their public outreach. The concern is whether the industry sufficiently acknowledges that challenges do exist.

**Legacy Wells** - Regulators should provide assurance to both industry and the public that the same diligent effort applied to orphaned wells and abandoned sites will also be applied to any mishaps or pollution violations regarding water recycling.

**Liability Protection for Produced Water Reuse** - The Texas Legislature in 2013 passed HB 2767 regarding liability on recycling produced water to address liability concerns. Further action is warranted.

### Concluding Remarks

With the increased usage of water for oil and gas production in water-challenged south and west Texas, combined with population growth, increasing costs, and public perception, the oil and gas industry has been pressed to search for ways to reduce freshwater. This has been accomplished through reuse of flowback and produced water and using alternative and brackish water sources.

More can always be done. The public, policy makers, and industry should turn their attention to discussing these issues:

- voluntary reporting water recycling data;
- recycling tax incentives;
- RECRA exemption;
- review of federal NPDES permit process;
- evaluate PBR model for other states;
- liability policy and tort reform;
- recycling advocacy; and,
- expanding the Oil and Gas Cleanup Fund program to recycling activities.

### Endnotes


2, 7, 8, 9, 18, 20, 22, 33, 36 Nicot et al., “Oil & Gas Water Use in Texas: Update.”


27 based on data from wells hydraulically fractured between January 2011 and May 2013.


32 The authors of the report note that some critics have expressed concern as to whether Ceres correctly used the WRI Aqueduct database in preparing their analysis.

41 This program also oversees voluntary cleanups by oil and gas industry, multiple district offices, and inspectors.

42, 43 If the mineral owner has an alternative that would allow mineral extraction and allow the surface owner to continue their existing use, then the mineral owner must choose that alternative.


48 16 TAC 3.13

52 States First Initiative website, About Us, www.states-firstinitiative.org/#/about/cipy

53 Another important case is the Edwards Aquifer Authority v. Day, decided on February 24, 2012.


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Blythe Lyons is an energy policy consultant. As a Senior Fellow at the Atlantic Council, she initiated the Council’s Energy Water Nexus Program. Ms. Lyons previously provided consulting services, with a focus on nuclear fuel cycle and nonproliferation, to utilities, industry, nonprofit and academic institutions, and various national and state governments since the late 1970s. Other areas of research and expertise include electric power policy, international energy trading, and energy and water issues. Ms. Lyons co-wrote the critically acclaimed book on nuclear policy by Senator Pete Domenici, A Brighter
Tomorrow (Rowman & Littlefield, 2004). Ms. Lyons’ consulting career includes her tenure at nuclear-related consulting firms International Energy Associates Limited, and Pickard, Lowe and Garrick, Inc. both based in Washington, DC, and also at Energy Resources International, Inc. Ms. Lyons has a B.S. in Foreign Service with a concentration in international relations, law and diplomacy, from Georgetown University’s Edmund A. Walsh School of Foreign Service. She studied at New York University in Paris and at L’École des Études Politiques (Paris).

Mr. John James Tintera is a regulatory expert in all facets of upstream oil and gas exploration, production, and transportation, including conventional and unconventional reservoirs. As the retired Executive Director and 22-year veteran of the Railroad Commission of Texas, he has overseen the entire regulatory process, from drilling permits to compliance inspections, oil spill response, pollution remediation, and pipeline transportation. He has been directly responsible for the state-funded cleanup of over 3000 contaminated oil field sites. Mr. Tintera has both B.S. and M.S. degrees in Geology with more than 30 years of combined technical and managerial experience. He currently serves as President of the Texas Water Recycling Association and is a partner in the energy and regulatory advocacy firm of Sebree & Tintera in Austin, Texas.
Chances are good that when you learned of the unifying theory of geology, the scientific evidence of the theory was not as easily memorized as the concept of the continuous recycling of the Earth’s surface and the gnashing of lithospheric plates. Although geologists have been fully comfortable with the plate tectonics model for more than half a century, getting familiar with the climate-related lithologic evidence that led to this extraordinary scientific achievement is less widely known. The Phanerozoic Paleoclimate: An Atlas of Lithologic Indicators of Climate (SEPM #11) provides some of the same types of information that Alfred Wegener and others used in arguing for the theory of continental drift that turned into plate tectonics. In the process of studying the paleomaps, a better understanding of the historical locations of the continents and ocean basins, the juxtaposition of mountain ranges, and historic climate all come into sharper focus.

Among the most compelling lines of evidence that Wegener used to support the concept of continental drift are: the matching of unique rocks on both sides of the Atlantic Ocean, comparing the timing and location of related mountain belts to their possible orogenic events, plotting the location of glacial regions on various continents, and matching past and present fauna and flora on opposite sides of both the North and South Atlantic Oceans. This volume, SEPM Publication #11, contains a summary in map form of the lithologic, paleontologic, and climatic data collected over the past few hundred years on all continents that supports and led to developing the unifying theory in geology. Seeing the original locations of these deposits on the 28 maps in the collection, with the continents in their proper positions, visually explains the current distribution of numerous global geologic resources.

The SEPM #11 volume is the result of decades of work by the authors, both individually and collectively as the PALEOMAP project. The work has been published in both PDF and paper version. The collection also comes with a disc containing the associated animations of continental motion from the Cambrian to the Miocene. The maps show the locations of the lithologic information and piece together the story of plate tectonics, the movement of continents over time, and matches up the long published record of lithologic and fossil descriptions and climatic associations at many of the sites that were used to develop the unifying geologic theory.

This publication is unique for combining the interpretations of two major sets of data, both of which were exceedingly time-consuming to compile. The first dataset includes the geophysical information that was used to interpret the position of the tectonic plates through geologic time. The second dataset is based on a search of the geological literature to find, record, and evaluate countless reports around the globe containing lithologic descriptions that span hundreds of millions of years of earth history during 28 time periods from Cambrian to Miocene. The symbols on the 28 global maps note the location of important rocks that represent climatically sensitive deposits, including tillite, dropstone, glendonite, evaporate, calcrete, coal, palm, mangrove, crocodilians, bauxite, laterite, kaolinite and oolitic ironstone.

One of my favorite maps is Map 19, Early and Middle Jurassic, which demonstrates the large amount of climatic and lithologic data we have for that time interval. This is one of the maps representing the time when the supercontinent Pangaea began rifting into two landmasses, Laurasia to the north and Gondwana to the south. The rifting created more coastlines and shifted the continental climate from dry to humid, as documented by the paleoclimate indicators on the map. Many of the arid deserts of the dry Triassic were replaced by lush rainforests during the Jurassic. On this map, India is still located east of Africa and north of Antarctica, and has yet to make its long trek northward toward Tibet. Besides the 28 maps, the accompanying disc of Paleoclimate Animation by Christopher Scotese included with this publication is captivating to watch, as the animation of the various maps of the planet seamlessly morph over the ages in a matter of minutes. The animation is the result of countless hours of data compilation, and like magic, the continents and global mineral resources move about the screen in smooth sequences that belie the catastrophic movements on the ground. The third PDF in the CD is 484 pages and includes various articles and extensive references that were used in compiling the detailed maps.

The interpretation of climate scenarios based on various lithologic evidence is not without some arguments. The
authors are seasoned paleogeographers and they wisely acknowledge various viewpoints in the text concerning some of the more contentious interpretations. One such scientific controversy relates to the climatic and depositional significance of dropstones. Dropstones are isolated rock fragments ranging in size from small pebbles to boulders that are found within finer-grained water-deposited sedimentary rocks. Several interpretations exist regarding the origin and significance of these features. Acknowledging this debate, alternate explanations of dropstones are provided in the text. The authors also note that “one of the most difficult problems the paleogeographer faces is the question of the original form and dimensions of the varied crustal blocks. In other words, can one rely on the present outline and dimensions of any crustal block corresponding to its original form and dimensions?” It is obvious that crustal shortening of some magnitude has taken place in orogenic belts, but the continents on the paleomaps are shown in somewhat current forms so the reader will recognize them. If only these maps and text had been available to some of Wegener’s contemporaries, some of the skeptics might have been convinced of the merits of continental drift sooner.

The four authors of this SEPM #11 volume have worked in paleogeography for many decades. Arthur J. Boucot, a retired professor from the Department of Integrative Biology Zoology, Oregon State University, Corvallis, Oregon, has conducted paleontological field work all over the globe, in North America, South America, Asia, Europe, Australia, New Zealand, and Antarctica. Chen Xu is a Professor at the State Key Laboratory of Palaeobiology & Stratigraphy at the Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences, in Nanjing, China. Christopher R. Scotese is a Professor of Geology in the Department of Geology, University of Texas in Arlington, Texas. Dr. Scotese may be best known as the creator of the magnificent Paleomap Project, the goal of which is mapping the Earth’s history over the last billion years. Dr. Scotese is credited with predicting Pangaea Ultima, a possible future supercontinent configuration. Robert J. Morley is a Sequence Biostratigrapher whose world-wide experience includes working with universities and private consulting firms in palynology and biostratigraphy.

5-Volume Plate Tectonics Series: Introduction to Global Plate Tectonics

Related to the topic of plate tectonics and paleogeography, William A. Szarzy’s 5-volume Plate Tectonics Series provides a basic introduction to the unifying geologic theory for younger readers. The 5-volume set provides an overview of the topic suitable for middle school or high school students or for those who want to share these concepts with younger friends, relatives, or novice scientists. The collection of paper books or e-books are designed as a picture guide series intended to introduce the reader to a basic understanding of global plate tectonics and the processes by which the continents were formed. The books are geared to those interested in the history of the planet and for those who do not have a technical background on the specific terminology that is used to describe plate tectonics theory. The technical terms are described in common language for ease of understanding. These publications are not intended to represent highly technical, peer-reviewed research. Rather, the collection provides a comprehensible overview and introduction into plate tectonics and the movement of the continents over time.

The five books feature the following topics: Book I: Plate Tectonics Theory, Paleogeography, and the Ocean Basins; Book II: the geologic histories of North America; Alaska; Greenland, the Appalachian Mountains; the western United States, Mexico; and the South America; Book III: the geologic histories of Europe, Russia, Mongolia, China, Korea, and Indochina; Book IV: India, Iran, Turkey, Arabia and Africa; Book V: the tectonic evolution of Australia & Antarctica. The countries selected for discussion provide a good overview of various geologic settings and make for interesting reading. Each book contains dozens of maps with arrows showing the general direction of plate movements at a particular time, as well as cross-sections and general location maps of where ancient mountain ranges formed.

The text of these books provides a description of the geologic history in paragraph form; however, the numerous original maps (as shown for Australia during the Precambrian Era) and figures (as shown in the above block model) have been developed for these books or were redrawn from published sources to provide the overall concepts of plate tectonics for introductory readers and new student scientists. Some of the figures contained in this series have been published previously, including the work of Christopher R. Scotese (see the preceding SEPM #11 book review, above). A fitting home for these volumes might be a school or public library where students and other interested parties would be introduced to the exciting topic of plate tectonics and continental-scale geology that has occurred over billions of years. What could be more interesting?
The author, William Szary, CPG-11473, has 30 years of experience practicing environmental geology. He has a passion for developing educational media to inspire those interested in learning about the geological sciences, and he has an interest in encouraging those participating in educational courses in the earth sciences.

In sum, these two reviewed publications about plate tectonics have different audiences in mind. Nonetheless, both offerings remind us how the unifying theory of geology is both elegant and dynamic and the subject should be of enormous interest to both new students and seasoned professionals alike.

Reviewer: James A. Jacobs, CPG-7760, is a Principal Geologist at Clearwater Group with more than three decades of experience. He won four Fulbright Senior Scholar awards and has co-authored four books, including two published in 2014: Oil Spills and Gas Leaks (McGraw-Hill) and Acid Mine Drainage, Rock Drainage and Acid Sulfate Soils (Wiley). He can be reached at jjacobs@clearwatergroup.com.