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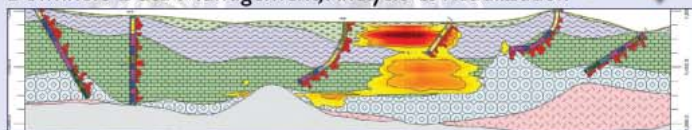
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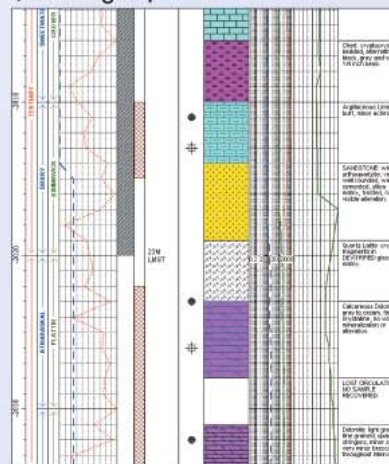
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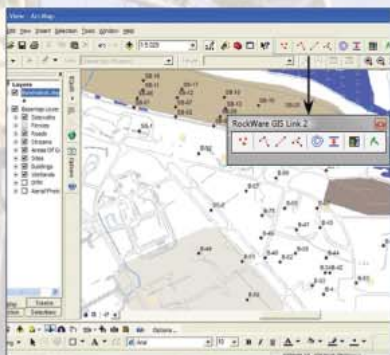
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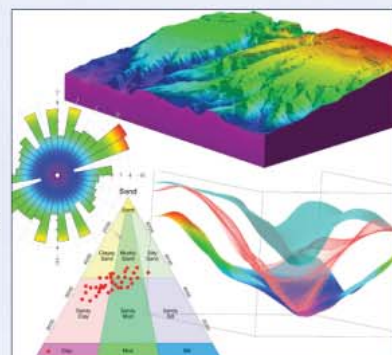
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ON THE COVER -Tucked away among the tall Ponderosa pines is one of many small natural arches in Utah's Bryce Canyon National Park. The red, iron-rich sandstones and mudstones of the Eocene-age Claron Formation provide beautiful contrast against the winter snow. Photo by Dan Heidenreich, CPG-10085.

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How Students Can Become Technically Proficient Employees

Robert Carvalho, P.G. CPG-10588
and Heather Martin

ABSTRACT: Students often leave school with a lot of information, yet with little direction as to how to apply it. This article outlines some of the ways to approach the technical and the new job experience in order to excel and be of benefit to your employer, and eventually become a technically proficient employee.

KEY WORDS: Students, Recent Graduates, Employers expectations, Advice for Recent Graduates, Career advice, Work advice.

If you have just finished school, you probably have a lot of information. Technical data from your chosen field of study, knowledge of how to take tests, and piles of books reminding you of everything you have learned while in school.

But the chances are, there is still a lot you don't know. How do I get a job? What do I do when I get a job? And now that I have one, why didn't school prepare me for real-life technical situations?

If you are lucky, your education provided you with real life experience in your field. But for many of us, school was just the beginning, and work brought us new problems to solve or unfamiliar technical areas. The following are some recommendations for how to adapt to the workplace environment, and to become a successful and technically proficient employee.

How to Get Started on the Right Foot

The key to transitioning from student to employee is understanding some basics about the workplace.

First and foremost, you want to be professional and on time. Professionalism includes your manners as well as your dress. Every company has different rules and regulations, so you will find it helpful to ask what the expectations are for workplace dress and other protocol. If you spend a lot of time in the field or on sites, your office may welcome your casual dress and steel-toe boots at the office, knowing that you need to be dressed appropriately for technical work.

However, if your role is both technical and involves client presentations, you may need to be prepared for either scenario. For example, you might wear a business suit or business casual attire to the office, and keep a pair of boots, hard hat and change of clothes in your car.

This will allow you to serve your clients and employer in various fashions, and be prepared for different meetings at a moment's notice. By accommodating both requirements, you become more valuable to your employer and show them that you have a "can do" attitude.

This also highlights an important part of the workplace. In addition to being professional and dressing appropriately for your role in the company, attitude is also a very important feature of becoming a valuable and technically proficient employee.

A positive, upbeat attitude indicates to your employer that you want to work hard and that you are ready to learn. It will also help you stay motivated as you adapt to the new role of "professional." Being eager to learn is critical. It will help you grow for your own and your employer's benefit. It is not always comfortable to be in situations where we do not know what we are doing. But for many students turned employees, this is a critical part of establishing the foundation for technical proficiency.

The Path to Technical Proficiency

One has to go through the learning curve to get more technically savvy. Understand that the only way to become technically proficient is to go through the period of not knowing things. Technical proficiency is only learned by doing.

When you first begin a position, keep a positive attitude and your desire for learning. You will be asked to go to sites, learn new data, and write reports for scopes of work which were not covered in your classes. One of the keys to getting through this period is being dedicated to spending the time to do a good job.



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consolidated list of questions. The reason for this is it will help you cover all the questions efficiently and get the answers you need to get your job done. Also, your supervisor is probably busy with their own to-do list, and they will appreciate you taking an efficient approach to their time and expertise.

Keep Up the Good Work!

All in all, remember, every company has its own particular culture, expectations and formats. Be willing to learn and try something new, and do your best at all times. If you follow these guidelines you will soon find yourself to be a technical expert in your field.

Robert Carvalho is the President/CEO of EAI, Inc. Environmental based in Jersey City, NJ. EAI Inc. performs environmental consulting and specialty contracting services.

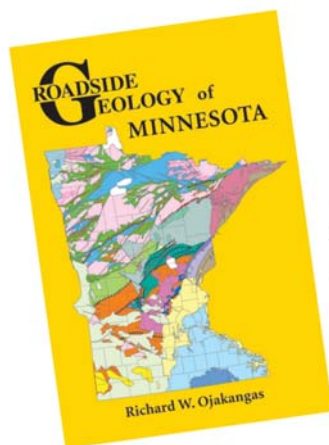
Heather Martin is the Vice President of Sales for EAI Inc. She has a background in brownfield redevelopments involving the use of the Liquid Boot vapor barrier in the Northeast region of the U.S.

Pay attention to details, especially for report writing. Often it is the most basic items such as the name of the client, site address or dates that we most easily ignore.

Ask for sample reports to review in your free time, or to help you understand the format that is desired by your

company to present to clients. Be patient with yourself, and realize that it will take time to get up to full speed. You will have many questions, but try your best to understand something before asking questions. Then when you have done your due diligence, you can go confidently to your manager or supervisor with a

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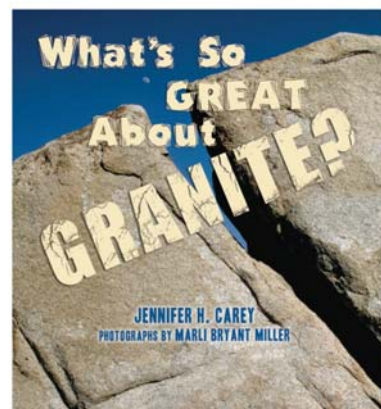
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Advice To Students

First, I would like to congratulate those students pursuing a degree in the area of geological studies. The success that leaders will have solving many of today's critical issues will require a sound understanding of basic earth science principles. Our world drastically needs capable geoscientists to help educate decision makers who often are forced into making huge decisions on minimal information.

The knowledge base developed by the student studying the fundamentals of geology will allow you to become a leader in managing and protecting the planet on which we live. It will be your responsibility to reach out to those decision makers unaware of the natural earth cycles, resource potential and environmental concerns that are second nature to a well rounded geologist. I strongly encourage each student to take this responsibility very seriously. We are not serving our profession well if we do not make the effort to share our expertise.

Make sure your education provides you a strong background in basic fundamental geologic principles. The natural history of our planet told through studying the activities of our geologic past will help reveal the truths about how severe man's influence is changing the world around us. So many major economic and environmental issues need to be evaluated by the unbiased geoscientific professional before poor decisions create only high costs with minimal benefit or low costs with major environmental consequences. Never before has the expertise of the geologist been more valuable to the well-being of mankind.

I urge you to take advantage of every opportunity to learn outside the traditional comfort of the college classroom. Employers often offer special challenges, projects and training options. My advice is to take advantage of all that you can. Never stop learning! Practical experience and hands-on educational situations are often more valuable and applicable than what is read in a book or taught in a classroom. Do not be intimidated by a challenge. Rather accept the challenge as a way to make you a better geoscientist. Your knowledge base, prac-

tical experience and positive attitude are keys to a successful career that also helps to improve the world around us.

Mimi Garstang, CPG-10185, is a retired State Geologist from Missouri. Mimi worked with the Division of Geology and Land Surveying (DGLS), Missouri Department of Natural Resources (MDNR) for more than 27 years and is one of a few women in the United States to hold the position of state geologist. Mimi began her career with DGLS in 1979 and has served as Missouri State Geologist and division director since June 2000. Prior to joining the department, she worked as an environmental geologist for the White Consulting Engineering company in Memphis. Mimi's career has touched some of Missouri's biggest environmental challenges, including the Times Beach dioxin sites, interstate river issues, the Weldon Spring site in St. Charles County and evaluating earthquake risk in the New Madrid Seismic Zone in southeast Missouri.

Having spent 40 years in the geology business world, first in engineering geology, followed by stints in industrial minerals exploration and some environmental geological work, and finally 15 plus years in mid-level and senior level mine management, several things stand out. I believe strongly that every geology major should have certain training in their educational portfolio:

1. Take at least one course in speech. The ability to organize one's thoughts and make a concise and understandable presentation, be it in the working environment or the interview, will pay dividends.
2. Take math through calculus and chemistry up through introductory organic. Take the demanding classes, not the soft courses taught for environmental science classes that give an overview. You will work harder, perhaps get a lower grade, but you learn to think!
3. Learn to write clearly. Take a course in literature. See what the great

writers did with the language. Study how they managed to help you, through words, create an image in your mind.

4. Understand the concept of team work. It is not always necessary to be the star. Support of others can bring huge rewards for everyone involved. Participate in a college sport or some intramural activity.
5. Lastly, but perhaps most importantly, listen! You can learn from everyone, regardless of their position or education. Never, ever, think you know more than everyone else.

These are lessons I have learned. Some I learned because it was a requirement - thank goodness someone else was guiding my education! Others I have learned "on the street." Perhaps I learned them after the wounds healed.

George W. Love, MEM-1753, Assistant Bureau Director, Pennsylvania Bureau of Topographic and Geologic Survey. Love earned his BS in Geology from Penn State, an MS in Geology from Franklin and Marshall, and has numerous credits in soil mechanics and business administration. His early geologic career focused on geotechnical evaluations of large industrial sites, earth and rock-fill embankments, and grass roots mine development. As he migrated into the mining industry, he participated in and managed surface and subsurface exploration programs to evaluate various commodities including industrial minerals, coal, and precious metals in North and South America. His operations experience includes mine management and reclamation of several phosphate mines and the grass-roots start-up and operation of 3.5 million tons per year phosphate beneficiation plant, surface mine and drying-shipping facility, all in central Florida. Subsequent to that, he managed the preliminary evaluations of limestone deposits throughout the US and southern Canada, and the detailed evaluation and acquisition of chemical grade limestone reserves in KY, PA and AL. Upon retirement, Love joined the PA Geological Survey where he enjoys the camaraderie of real geologists.

Keeping Your Glass Half Full: Transitioning from Graduate School to the Work Force

Brent V. Aigler, SA-1358

Keywords: Career, Network, Internship, Graduate School

When I began preparing for graduate school two years ago, the economy was steady and the demand for geologists, especially in the energy sector, was ripe. One year later, upon entering into graduate school at the University of Colorado at Boulder, something changed: the economy tanked and the demand for geologists dropped significantly. What happened to the uplifting speeches from my college professors about geologists being swept off their feet by a company of their choice? I began to envision a transition from “when can you start?” to “don’t call us; we’ll call you.”

Despite the current economic turmoil and hurting job market, I haven’t given up hope. The economy slowly is rebounding (so I’m told) and many of my colleagues have managed to secure internships and careers for themselves. At a recent job fair I interviewed with a number of oil and gas companies for

a summer internship. I was told by one recruiter that the two screening criteria he used were grade point average, or GPA, and previous experience in the industry. Although the GPA criterion didn’t surprise me, the prerequisite of prior experience for an internship caught me off guard. But then I realized that employers can afford to be picky in a struggling economy where the supply of labor far exceeds its demand. My research focus is not directly related to petroleum geoscience, and I spent this past summer progressing in my thesis research. However, my friends who are petroleum students or who have experience in the industry received multiple offers before the recruiters packed up to return home.

Why am I telling you this? If you are in graduate school or plan to enroll in the future, make sure you get your foot in the proverbial door whenever the opportunity presents itself. I would recommend networking as often as possible when

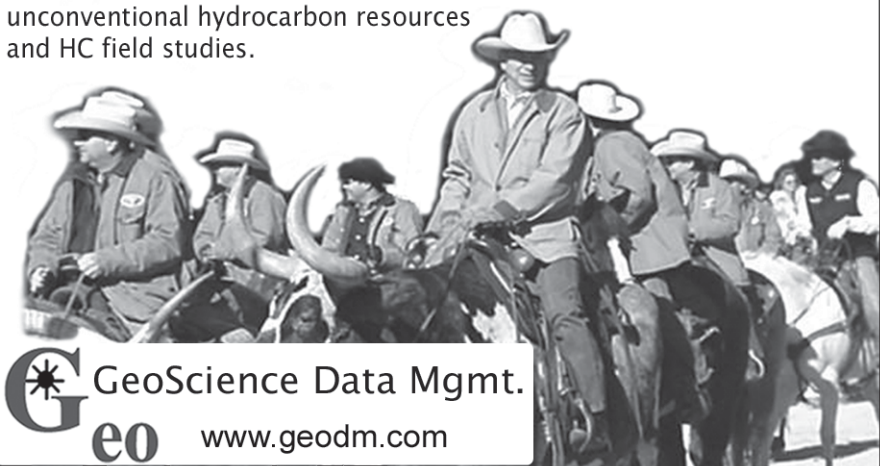
you attend conferences such as AIPG, GSA, AGU, etc. Another great way to rack up experience points and convince your prospective employer that you have marketable skills is to complete a geologically oriented internship. But above all, network, network, NETWORK. Hone your applicable skills and keep in contact with geologists you meet at work and at conferences. Make sure you can back up your GPA and academic achievements with practical experience. When push comes to shove, the geologist who excels both inside and outside of the classroom will come out on top.

Brent Vickery Aigler, SA-1358, is currently a Master of Science candidate in Geological Sciences at the University of Colorado at Boulder, where he is studying mountain watershed hydrogeology and groundwater sustainability. He received a Bachelor of Arts degree in Geology from Colby College in 2008. Upon graduation he hopes to pursue a career in the energy industry or in environmental consulting. He can be reached at brent.aigler@alum.colby.edu.

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Volcanoes to Vineyards, Pizza to Smoothies: A Student's Take on GSA

Stephanie Jarvis, SA-1495

What does it mean for your sanity when a professional conference feels like a vacation? Because that's definitely what Geological Society of America's Annual Meeting (GSA) was for me, although it wasn't exactly relaxing. There was just too much to do. From talks on orchids and the water table ("Groundwater and native orchids in Alberta: Is there a link?", Benjamin Rostron), fungus and iron nodules ("Evidence of fungal weathering of primary minerals in a marine terrace chronosequence, Santa Cruz, California", Marjorie Schulz) to presenting my poster and catching up with my summer co-workers, I barely managed to squeeze in a run along the river and see a little of Portland (chocolate monkey smoothies from Burgerville are awesome, American Dream Pizza was definitely worth almost getting lost, and, for future reference, you cannot get into the Moon and Sixpence after 9 p.m. if you are underage, no matter how much you've been looking forward to seeing Foghorn Stringband). I didn't even get a chance to look up where AIPG's booth was until the last day, and then I realized they had already closed the exhibition hall.

Needless to say, I had a great time at my first conference. I had been a little hesitant, not knowing what the dynamic was like and presenting my research for the first time, which I had done as part of the Eastern Kentucky University/University of Kentucky Appalachian Headwaters NSF Research Experience for Undergraduates program. When I saw people walking around in jeans, boots, and daypacks, however, I was reassured that I was in the right place. The supportive environment put at ease any rookie-butterflies I had; I received a lot of positive feedback and had many interesting conversations.

GSA was like a breath of fresh air. As I begin to think of possible topics for my

Senior Independent Study (The College of Wooster's senior thesis project), and toy with the idea of grad school, the chance to see the wide breadth of opportunities in the field of geology filled me with a sense of limitless possibilities and renewed excitement. The GSA's Mentoring Programs, while also providing really good (and free!) lunches, added to this sense by expanding my view of job options and giving me the information I need to know to pursue those that appeal to me. As a geology-biology double major, it was also really reassuring to find a whole community of people working in a variety of ways at the interface of geology and biology and to be supported by them.

Those four busy days I spent in Portland were definitely the highlight of my semester. Though I didn't get to see the world's smallest park, didn't make it to the coast, and only got to hear about 30 seconds of Foghorn, I had an amazing experience at GSA and am already looking forward to Denver (Red Rocks, maybe?).

Stephanie Jarvis, SA-1495, is a 2009 AIPG Scholarship Winner. She is junior at The College of Wooster double majoring in geology and biology. Originally from Shelbyville, KY, Stephanie is very interested in water quality issues, especially those pertaining to her region. Among other things, she enjoys being an

assistant coach for the Wooster YMCA swim team and working on dilapidated bikes as part of her school's Community Bike Program. Stephanie loves music, going to



shows far more often than she should, and will someday learn to play the mando.

Watch for Stephanie's Student Column in future issues of *TPG*. Stephanie has agreed to write a column for the *TPG*. If there are any other students who wish to contribute an article for the *TPG*, please contact Vickie Hill at vlh@aipg.org. You can find the information about submitting articles on the AIPG website (www.aipg.org) under publications.

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What Are You Going To Be When You Grow Up?

Greg Smith, CPG-08348
Marathon Oil Company
Gillette, Wyoming

I heard the question a thousand times before I graduated university. It starts out when you're a bright 5 year old and you answer an adult who is just trying to make conversation. The normal answers come out easily..."I want to be a Fireman!", "I want to be an Astronaut", etc. Time passes and experiences shape a youngster's thinking. Some have a good idea of the type of work they would like by the time they reach high school, or they may be like me and think "I'll know it when I see it".

Around the 3 week mark of my first semester of GLY201 (Physical), I knew I had just found something I was truly interested in studying-experiencing-knowing. Questions like 'Exactly how quickly does the earth weather/erode?' were very intriguing. Everything changed at that time for me and I hope the students reading this had that epiphany experience like I did. It was truly exciting to finally realize the answer to that age-old question 'What are you going to be when you grow up, little boy?' I wanted to be a geologist.

Now that I knew what I was going to do as a profession, I had to figure out where I was going to work to utilize my newly developed skills. The new question was even more daunting because I was only a few years from graduating. I developed a sense of urgency about where I could find geology-related summer work. I subscribed to journals such as the AAPG Journal, Science and the GSA Bulletin. Mt. St. Helens erupted at the end of my freshman year of college, so the journals were filled with articles regarding this event. Oil companies were laying off geologists by the dozens in the early '80s, so I spent vacations and every spare moment exploring the rocks and visiting different workplaces where geologists were still employed. As an undergraduate I even took on a special

topics course (of my own design) to utilize the instruments in the geochemistry lab to understand the changes in clay mineralogy due to weathering. I was a glutton for punishment...I was paying my dues.

One day in college, out of the blue, a senior geology major advised me to take all the groundwater courses that were offered, both in the course of pursuing my bachelors and masters degree. His reasoning was simple - "The EPA is making this environmental stuff a big issue, and it will continue to get bigger throughout our careers." It was the single best piece of advice I've ever received and if I could find him today I would thank him for taking the time to tell me his opinion.

However, after landing my first job (1985) I wasn't convinced I had made a good choice. I ended up at a geotechnical engineering firm with a new title...'technician'. It wasn't really what I wanted to do, but it became a stepping stone to bigger and better jobs and assignments. Soon the company realized I had a skill that could be parlayed into something worth more than a technician's wage. I was given progressively more responsibility and eventually got a chance (5 years after graduating) to join an oil company on their environmental staff. I got to learn groundwater and soils investigations from some of the best consultants in the industry by hiring them to work on the company's UST, bulk terminals and pipeline sites. I spent the first 10 years there working petroleum remediation sites. After a while I felt a little stymied so I made an effort to change my knowledge base from strictly organic cleanups to inorganic geochemistry based activities within the company. I moved to Wyoming and hired consultants to deal with the management of sodium bicarbonate dominated groundwater being used beneficially to

help ranchers grow alfalfa and provide water for cattle. I moved from the environmental department to production and now manage all water production for a major player in the Powder River Basin's Coal Bed Natural Gas industry.

What's the point of sharing my story...everyone has a story like that, right? Yes, nearly everyone who is a Professional Geologist has worked their way up the ladder to the job they now occupy...but they didn't start there. My advice to graduating geology students is to continue to pursue your passion throughout your career. Don't be disappointed when you aren't offered that \$100,000 salary right out of school. Develop your skills and let people get to know YOU, your work ethic and your passion for the study and application of geology.

I now work with many young geologists and petroleum engineering graduates who only reluctantly accepted their present job. Another graduate bragged on her Facebook page that she got more money at the big company and now my new coworkers are feeling a little cheated. It's not true of everyone, but Generation Y is known for wanting it all, and right now. Buck that unfortunate stereotype and be the one who appreciates the opportunity to pay off those student loans and make a good living pursuing your passion.

Just like I did, you're going to have to pay your dues. My advice is pay those dues with enthusiasm for learning. Do your job just for the passion of utilizing and exercising your developing skills. Working in industry, academia, wherever, is just as much about being happy where you are right now as it is about being the best geologist at the best company and making the biggest salary. I always tried to approach my job with the attitude of 'I can't believe they are

paying me to do this significant work... it's actually fun!'. That attitude has carried me through a lot of ups and downs in my career. Always be a pleasure to work around, be a team player and know your stuff...the rest comes easy. Career advances are as much about personality as skill. If you now know what you want to be when you grow up, and you are pursuing your studies with that passion, you're halfway to a career in geology. The other half is using what you learned in kindergarten as a bright 5 year old!

Greg Smith, CPG-08348, is Project Manager – Water Management Dept. for Marathon Oil Company's Powder River Asset Team in Gillette, WY. He holds a BS degree in Geology from Marshall University and has been working as a geologist for 24 years. He is licensed as a Professional Geologist in Kentucky (#348) and has worked throughout the Appalachian Basin, the Great Lakes region and Wyoming during his career. He currently manages water production in Marathon's Coal Bed Natural Gas operations in the Powder River Basin and models water distribution/beneficial use.



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Field Camp: The Next Adventure

Mark W. Spindler, SA-1211

Are you nearing the end of your academic career and wondering what facet of geology you want to focus on? There are so many options – which direction will you choose? Personal interest in groundwater systems and geothermal power inspired me to search for a field camp that would provide training in field techniques related to these topics of study. Undergraduate geology students are required to take a field techniques course, which is more commonly known as “field camp”. Employers will expect you to obtain field data and organize it with little or no guidance. Prior experience composing the geologic story of an area is truly invaluable! Field camp is the most significant hands-on class of a college career because it prepares students for the duties of an entry level geologist. This article will discuss what you can expect from a typical field camp, some features of the field camp that I attended, and why your choice of field camp can be so important.

We'll begin with a discourse about the fundamental attributes of a geology field camp. Field camps are offered by most universities that offer undergraduate geology degrees. The majority of field camps take place in the states of Colorado, Idaho, Nevada, South Dakota, Utah and Wyoming. The rocks in these areas are well exposed, allowing for easy visual access to the local geology and beautiful scenery. David Rodgers, a former field camp director for Idaho State University maintains that the focus of most camps is construction of geologic maps using traditional field skills, although, fieldwork incorporating Global Positioning and Geographic Information System technology is increasingly more common. Students are expected to be prepared for all kinds of weather because most days are spent outside. Gear lists are normally provided that outline necessary and possible items that are highly recommended for each camp. You need to be in decent physical shape because

hiking is always involved in geologic field studies and is more strenuous in mountainous terrain.

Here is an overview of my field camp experience. I attended a field camp offered annually by the University of Minnesota which focuses on the hydrogeology of northern Minnesota. According to Jim Berg from Minnesota's Department of Natural Resources, northwestern Minnesota's geology is made of sedimentary deposits left behind by the advance and retreat of continental glaciers creating a stacked system of poorly connected aquifers, wherein sandy layers produce the most water. These circumstances made for an ideal field site location to study the interaction of water and rock layers beneath the earth's surface. We went into the field daily to collect geologic and hydrologic data using techniques that were taught in and out of the classroom. Some of my favorite techniques were electromagnetic analysis of near-surface rock layers, construction of a groundwater monitoring well, water table mapping, digital elevation surveying and groundwater flow modeling. After conducting a multiple well aquifer test, we wrote a final report using numerical values of aquifer properties and correlation of the near surface hydrogeology to extrapolate the geologic story of the field site.

Now, why is your choice of field camp so important? The amounts of time and money that are available to you will be large factors in your decision. On average, field camps will last from 3 to 6 weeks and cost about \$1,000 per week. This cost will include tuition, room, board and travel expenses. Field camp is one of the last courses you take, providing a capstone component to your undergraduate degree. It is where you link your classroom studies to field observations and analysis. Some field camps prepare students for specific careers, such as mining, engineering and hydrology. You may be able to clearly

define your career path by choosing a camp that is best suited to your geologic interests.

In this article, I explored what you can expect from a typical geology field camp, reflected on my experience at a hydrogeology field camp from the University of Minnesota, and why choosing a specific field camp is one of the most important considerations you will make. Field camp is an awesome adventure and will be an essential link between your academic and career success. Investigate, decide and get ready to rock!

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Mark Spindler, SA-1211, is a 2009 AIPG Scholarship Recipient. Mark is Undergraduate of Geological Sciences at the University of Alaska Anchorage. Mark is the President of the Geology Club.



We Are All Students

Michael Bersch, CPG-11008
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If you are a geology student then it is unlikely you have any recollection of October 19, 1987. Black Monday – the Dow Jones Industrial Average (DJIA) dropped 508 points or 22.61% in a single day. But like extinction events, Black Monday repeated on September 15, 2008, with news of Lehman Brothers bankruptcy filing, the DJIA dropping 504 points, but this time the one day drop was a mere 4.4%.¹ Still it was the single worst day in a bear market that started after the DJIA peaked at 14,164 on October 9, 2007. By March 9, 2009, the DJIA bottomed at 6,547 about 46% of its high seventeen months earlier. Although, the DJIA (as of this writing late October) has recovered significantly to around 10,000, many people believe the stock market recovery masks the dire condition of the country's economic health: bank closings top 100, credit remains tight, unemployment is worsening (officially at 9.8%),² housing default and delinquency rates continue to increase,³ General Motors and Chrysler bankruptcies, and the United States deficit.

What does all of this mean? I don't know; but I am trying to learn, and in the spirit of collegiate discussion I offer some guesses as to what current economic conditions mean for some sectors of our profession.

Environmental, Engineering, or Hydro Geo-types:

The United States Department of Labor, Bureau of Labor Statistics publication, *Occupational Outlook Handbook, 2008-09 Edition*, states that "employment

of environmental scientists is expected to increase by 25 percent between 2006 and 2016, much faster than average for all occupations."⁴ That is good news, but is it still true? (I presume the current edition was written before 2008.)

In the midst of the current economic recession credit markets froze. Even with massive government intervention most reports I have seen indicate that credit is still tight. This is a problem because unlike our personal use of credit, which we use to make life easier and better; credit is the life blood of business. Without credit, businesses, especially small businesses, must operate on a cash basis, making it difficult to function, much less grow and hire. So, it seems to me that if you are in a geo-environmental based business that depends upon contracts from private companies, you are likely to see a downturn in the number of projects. Maybe, though, with government stimulus programs we might expect an increase in government sponsored work? President Obama signed the American Recovery and Reinvestment Act in February, 2009.⁵ The Act authorized \$275 billion for contracts, grants, and loans. So far, \$45 billion has been distributed. Much was made that these funds were for "shovel ready" projects, so there would seem to be little opportunity for environmental or engineering geological work, as this work is usually done in the "pre-shovel" phase. A perusal of contracts awarded to date seems to indicate that indeed this is so. Undoubtedly, Federal spending will continue to increase so opportunities may increase for government contracts in 2010. It also appears that most state

budgets are in shortfall (Does anyone want to be paid with a California IOU?), so it appears that state project curtailment will be the name of the game in 2010. Thus, my guess is hydrological, environmental and engineering geological work will be more difficult to come by in 2010. If you are focusing your study in this part of the profession then by all means carry on. Employment in the geo-environmental and geo-engineering areas will be in great demand when the economic growth returns, but in the short term demands may be soft.

Energy Geo-types:

Green energy is in. Just a couple of years ago as oil prices began climbing to triple figures⁶ headlines read, "Texas oil tycoon plans largest wind farm – 2,000 turbines over 200,000 acres at cost that could reach \$6 billion."⁷ But oil prices didn't stay above \$100 per barrel, natural gas prices fell from the heady \$12 per MMBTU, and spot coal prices plummeted after rocketing to around \$140 per ton. Thus, just a few months ago new headlines, "T. Boone Pickens scraps huge wind farm."⁸ Still "Green Energy" is the thing. The President is for it, Congress is for it, I'm for it. Heck, everybody is for it! But can IT deliver? I doubt that a significant fraction of our energy needs in the foreseeable future can be met by solar and wind. More importantly, except for site engineering aspects, I think these energy initiatives hold little promise for geological employment. These energy initiatives need meteorologists, climatologists, and physicists, not rock-jocks. So, I do not

1. Interestingly, at least to me, the second worst percentage drop was another Black Monday, October 28, 1929.
2. U.S. Department of Labor (www.dol.gov)
3. Reuters, October 8, 2009, Tom Brown report.
4. www.bls.gov/oco/ocos050.htm
5. See www.recovery.gov
6. Oil prices peaked in July, 2008, reaching slightly over \$145 per barrel for WTI.
7. Associated press June 20, 2007.
8. San Francisco Business Times, July 8, 2009 – sanfrancisco.bizjournal.com

see an increase in demand for geologists here.⁹

Okay, you might ask; what's the outlook for those green-house-gases (GHG) emitting fossil fuels, the ones we need and use in great abundance?

I have a simple long-term view of energy and most other “non-renewable” commodities, the stuff you pump or dig out of the ground. That view being: everyday there are more and more people, all wanting more and more of the stuff, that is harder and harder to find, and harder and harder to produce. Thus, all such commodities, in the long term, should be good investments and should hold good careers opportunities for geologists. The problem, of course, is price cycles which lead to employment cycles. Let's look at one of these energy commodities, oil.

Figure 1,¹⁰ shows imported crude oil prices in both nominal and real (current) dollars; note that oil prices have fluctuated significantly especially in terms of real dollars. This fluctuation actually began in 1973 with the Yom Kippur war and the oil embargo by the Middle East oil producing states. Before that time, oil prices had remain fairly steady at \$20 or less (in real dollars) since the 1930's. I interpret these price fluctuations as an indication that the world is at priced-peak oil production,¹¹ and current world demand and world production are nearly equal. Thus, small changes in demand or production result in supplies gyrating between shortage and oversupply which in turn results in large price fluctuations as speculators move in and out of the market. If correct, or even partly correct, then applying the “more people wanting more stuff” argument, long-term oil prices must rise. I assume as oil prices increase so will other fossil fuel commodities, and thus I conclude it is a great time to be studying or working

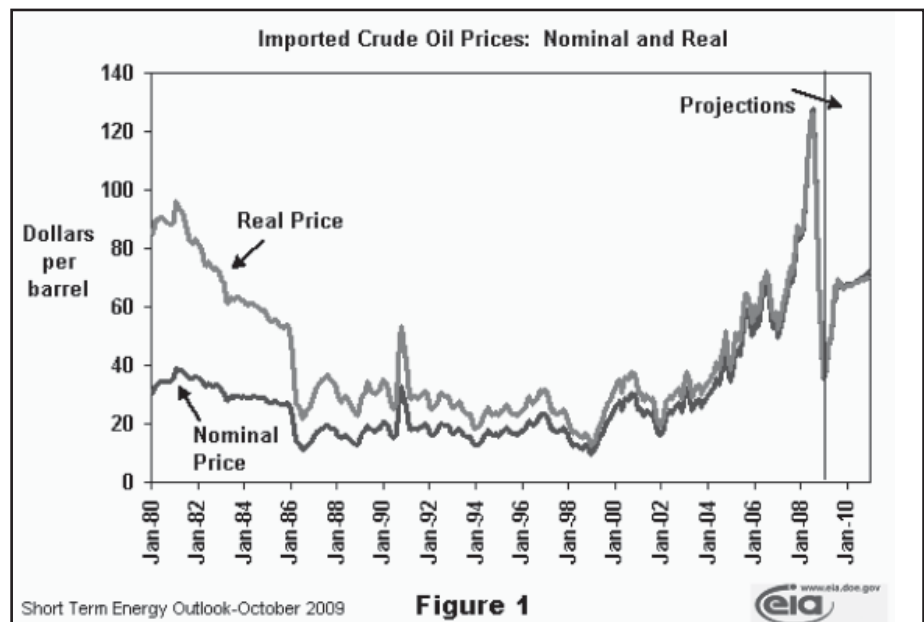
in the energy sectors of our profession, and the outlook for the future is even better.

Metals Geo-types:

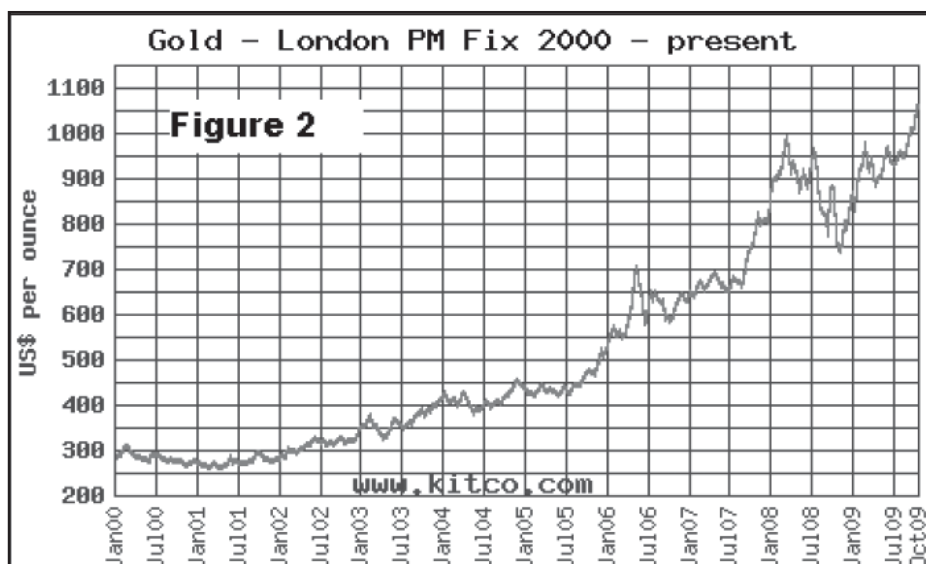
If you are studying what traditionally has been called (albeit incorrectly) economic geology, then my advice is to watch the metal prices closely.

Precious Metals: The federal budget deficit for fiscal 2009 (ended September 30) was \$1.4 trillion,¹² up about \$950 billion from the previous year. The official public debt is just shy of \$11.9 trillion.¹³ The present public debt is about \$34,000 for each man, woman, and child in the country.¹⁴ The projected deficit for fiscal 2010 is \$1.6 trillion.¹⁵ So, next year we will add another \$4,600 per person, and the Congressional Budget Office projects the public debt will be about 60% of our gross domestic product in fiscal 2010, slowly increasing thereafter through fiscal 2019.¹⁶ So, what is your

worry factor? If you think our deficits are unsustainable and foreign investors will stop buying our bonds, then you are betting against the US dollar, and you are not alone. For example Reuters reported Henri Guaino, special advisor to French President Nicolas Sarkozy, said that the United States was “flooding the world with liquidity,” and worried about the risk of an inflationary cycle; “if we loose control of inflation and there is hyperinflation, it's a catastrophe for everyone.”¹⁷ If the price of gold is an indicator of this worry, then the general worry factor has gone up. Figure 2¹⁸ shows that gold entered a bull market in 2002-2003, around the time of the start of the US-Iraq war and the accompanying multi-hundred billion dollar yearly U.S. deficits. I cannot foresee any change in the fundamentals that are driving this market, so I conclude that precious metal prices will continue their upward climb, which in turn means you are perfectly



9. I have left geothermal out here. It does not seem to get the attention of other green energy, but does, I think, hold significant promise to reliable energy in certain sectors of the country. Plus, you need geologists!
10. Energy Information Administration, www.eia.doe.gov/emeu/steo/pub/fsheets/real_prices.html
11. By this I mean maximum production of oil that can be produced profitably at a given price. For example, I would contend that production of oil that can be profitably produced at \$30 per barrel oil is at a maximum; new discoveries of \$30 per barrel oil cannot replace production. However, if the price of oil were \$150 dollars per barrel increased production is possible.
12. Associated Press, October 07, 2009.
13. As of October 26, 2009; www.treasurydirect.gov.
14. Assumes a U.S. population of 350 million people.
15. Congressional Budget Office Summary – The Budget and Economic Outlook: An Update (find it at www.cbo.gov/ftpdocs/105xx/doc10521/2009BudgetUpdate_Summary.pdf)
16. Fiscal 2019 is where the chart terminates. See “The Budget and Economic Outlook,” September 2009, CBO Director Doug Elmendorf's presentation to the National Economists Club.
17. Henri Guaino, as reported by CNBC, October 20, 2009
18. Chart courtesy of KITCO; see www.kitco.com, used with permission.



placed if you work or hope to work in this sector.

Base metals: I have to admit, I am surprised by the rebound in base metal prices. With the housing sector down, automobile sales down, industrial production down 6.1% from last year,¹⁹ I would have guessed that base metal prices would be down for an extended period. Yet, copper, lead and zinc are running at about 65% of their price highs, this even in the face of increasing warehouse stocks. What's going on? I don't know. For example, with copper there is talk of "structural tightness" in production (whatever that means) and demand in China, but who knows. My guess is that unless there is a near-term worldwide economic recovery, current base metal prices are likely to decline leaving employment prospects in doubt.

Industrial Geo-types:

This is an even bigger guess as this category encompasses such a wide variety of materials. For example, if you are working in the dimension stone industry, business may be slow for some time until economic recovery is well underway; after all, there is a lot of empty office space out there, and it looks like a lot more on the way. However, if you work in the aggregate sector, you might be very busy especially if some of the "shovel ready" projects can keep you going until the economy recovers.

So, there you have it, some guesses as to how the economy is, or will, affect various parts of the geoscience profession. Geoscience professionals, like professionals in other disciplines, provide

intellectual and technical services. But unlike medical or legal professionals that seem to have an endless supply of willing clients, or managerial and financial professionals that seem to easily recast themselves to fit different sectors of the economy, we work in a specialized profession not easily recast and with a fairly restricted client base. The recent economic crisis has been a loud alarm that our profession is inextricably linked to economic conditions. It is important to keep abreast of economic activity, because it undoubtedly will affect your personal and professional life. Keep in mind that like the assembly line workers who through no fault of their own find they have no jobs, economic conditions can make the geosciences professions very good one day and nothing but red ink the next. So, keep studying, keep learning; in uncertain times like these, we are all students.

Michael Bersch is currently employed as (consulting) Chief Geologist for Alberta Star Development Corp. Prior to this he served as Assistant to the V.P. for Research, Director of Central Analytical Facility, and adjunct professor of Geology at The University of Alabama. He was VP of Exploration with Moruya Gold Mine NA, and Director and VP of Exploration of Pangea Resources Ltd. He is a licensed professional geologist (Alabama), AIPG CPG, and a Fellow in the Society of Economic Geologists. He received a Ph.D. in geology from the University of New Mexico, and holds a Law Degree from The University of Alabama School of Law and is a licensed attorney.

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The Changing Face of Geoscience Knowledge Requirements for Certification and Licensure

Robert A. Stewart, CPG-08332

Larry Austin's article in this issue of CPG mentions the basic academic requirements for certification as a CPG: a baccalaureate or higher degree in geology and a minimum of 36 semester hours or 54 quarter hours of coursework in geological sciences. As a longstanding volunteer on the National Screening Committee (NSC), I can tell you that the reality of evaluating this requirement is often more complicated than it may seem. In my experience, applicants possessing a Bachelor of Science degree in geology typically possess the requisite number of credits, and the coursework includes an appropriate variety and depth of courses. The screening committee presently checks, but does not require, that each candidate has successfully completed a basic array of courses distributed as follows:

1. Physical Geology
2. Historical Geology
3. Stratigraphy
4. Mineralogy/Petrology
5. Structural Geology
6. Field Instruction

The NSC takes a practical approach to this evaluation, and we are flexible in viewing these categories loosely. For instance, absent a course entitled "stratigraphy," paleontology and sedimentology likely provide a general equivalent of knowledge. The fields of mineralogy and petrology include several sub-disciplines – crystallography, mineral phase relations, igneous/metamorphic/sedimentary petrology, etc. Structural geology, if not present as a stand-alone course, often appears to be at least partially captured by courses in tectonics and geophysics. Field instruction varies from formal field camps to internships. The core geology courses are typically supported by courses in higher mathematics (analytical geometry and calculus, matrix algebra, differential equations) and collateral sciences (biology, chemistry, physics).

Problems arise from curricula that have been reduced from traditional geology programs to interdisciplinary programs, and which de-emphasize advanced training in geology at the undergraduate level. An applicant may present a transcript that includes the minimum number of credits in geology; however, most courses are at the introductory level, and may not include some of the basics. We see structural geology and formal field training as common omissions. Other courses include some element of "geo" in their title, and determining whether the content is principally geology can be problematic. In these cases, we resort to college and university websites for the capsule description of such courses, and may ask the applicants to explain the subject matter if the total number of credits in geology is in doubt. In fact, the basic geology degree is often reduced to a "geoscience concentration," or something similar, within an earth science or environmental science degree. The NSC sincerely attempts to give due credit to the many permutations of geoscience and related interdisciplinary programs that lead to an appropriate degree, as well as the supporting course work. This issue has become a trend over the last 5-10 years, and among ourselves, we have been contemplating what, if any, fundamental criteria are applicable to a geology degree.

The Canadian Council of Professional Geoscientists (CCPG) has considered this question in some detail, and its recommendations are published in *"Geoscience Knowledge and Experience Requirements for Professional Registration In Canada"*.¹ This document, published in 2008, supersedes the CCPG's *Recommended Minimum Requirements of Geoscience Knowledge and Work Experience for Professional Practice*, issued in 2000. The CCPG recognizes three educational streams: geology, environmental geoscience, and geophysics, and there is a compulsory array of four courses common to each group:

1. Field Techniques
2. Mineralogy and Petrology
3. Sedimentation and Stratigraphy
4. Structural Geology

Continued on page 36

1. <http://www.ccpge.ca/pgeoreg/index.php?lang=en&subpg=geoknowledgereqs>, accessed December 7, 2009.

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Vaughn Thompson

Get out there and find that job.

The job slump has hit everyone. We all know it. We also know that economies are cyclic, so sharpen your skills, get out there and find that job.

I was inspired by Joseph Fiore's, SA-01164, positive and powerful article, "The Market... is YOURS," in the January/February 2009 issue of *TPG*. To quote Mr. Fiore: "you are a commodity my friend; going into such a great job market; rather than going for the first job available." Although these words were written during a time of job abundance, they are still applicable today. We as geoscientists have a particular advantage, one that will keep us employed even in bad times: we are versatile, trained in diverse disciplines, and most importantly we can solve problems. In our work we are expected to overcome technical, personal and financial difficulties that impact our company, fellow employees and our community. Hard times pass and – faced properly – we emerge a little wiser, with more life experience and new skills.

A couple of years ago, students were virtually guaranteed a job before they even completed their degrees. Now, there are fewer job offers and students have to fight hard to get noticed by recruiters. This change in the job market is reflected by the conversations of students. Many of those I spoke with shared a generally negative outlook on the current job market. On a positive note, students are confident that within two or three years, recruiters will once again have their hands full. The feeling amongst international students was more negative. Time and financial restraints imposed by visa application regulations compounded by U.S. companies generally being reluctant to apply for work permits does not make getting into the U.S. job market easy. This leads international students to accept jobs in other countries although their training was in the U.S. Unfortunately, these international hiring issues result in a loss of cultural diversity and geosciences skills transfer in U.S. based companies.

During several recent phone calls, I had an opportunity to discuss the state of hiring with U.S. recruiters. According to them, students were very uncertain of their immediate future and what they would do once they graduated. The recruiter's advice to students and young professionals was to sharpen your skills, make sure your resume stands out and follow up on any networking conversations, because the market will recover.

As a young professional in the petroleum industry, I have heard this story many times: "during the 80's, well those were hard times, I had to go back to school and get my PhD." Even though the low oil prices in the past, and the current job market slump do not share similar origins, it seems to me that the 80's are upon us again and we are repeating the cycle. Just as then, things will improve. According to the latest International Energy Agency prediction, world oil demand is forecasted to grow from 85 million barrels of oil per day (bopd) in 2008 to 105 million bopd in 2030. As much as 97% of this increase will be due to increased fuel needs from mostly China and India. The Energy Information Administration predicts the WTI (West

Texas Intermediate) price to average \$77 per barrel between October 2009 and March 2010, and that it should rise to \$81 per barrel by December 2010. These predictions are positive for long term project planning and this should result in more consistent hiring of graduates in 2010/2011.

We are already seeing oil prices rise and the need for creative, sophisticated modern geological and geophysical techniques make the young geoscientist a significant asset.

Don't forget the rocks, guys! Many recruiters scan your resume for a reputable field school. If you are caught in a down recruiting year, volunteer at a State or National Park to write a geology guide, be a field assistant for your colleagues still in graduate school, or take field schools with your local or national geological society. Furthermore, when 401(k)'s recover and we jump to even higher retirement rates, coupled with the generation gap most organizations face, recruiters will once again have their hands full. Demographics are in our favor.

Although times are tough, we as geoscientists find ourselves in a unique and exciting time. Take advantage of the cyclic nature of the job market and plan, dream, sharpen your tools and fight a good fight.

To help you plan, remember strong structures have good foundations:

- Get involved; join professional societies. For students, membership is often free.
- Present your thesis at meetings. It is a great way to show off your technical skills and network.
- Find your skill, market it and follow up on links and contacts.
- Create, commit and challenge yourself.
- Invest in yourself by reading books on people skills, management, interviewing etc.
- Do what you say and deliver results on time.
- Don't take no for an answer.

If you follow these rules, when companies are ready to hire again you will be ready. In the meantime, make sure you stand out and compete for the available jobs that are out there. The petroleum industry is acutely aware of the need to refuel its workforce and despite uncertainty in both gas and oil prices, companies continue to invest in recent graduates. The training and mentoring of new-hires to fill the shoes of the experienced professionals approaching retirement will make working as a young professional a rewarding experience. Go for it!

Vaughn Thompson is a recent graduate working as a Research Scientist at the Energy & Geoscience Institute based in Salt Lake City. He received his MS in Geology from the University of Utah. His research involved potential-field forward modeling and petroleum systems modeling in order to elucidate the nature, timing and hydrocarbon potential of the volcanic margin formed during the continental break-up of the southernmost South Atlantic.

Geopolicy Summer Interns Broaden Their Perspectives as Congress Deals with Whole Earth System Issues

**Linda R. Rowan, AS-0029, AGI
Director of Government Affairs**

The geopolicy summer interns expanded their horizons from class work and research to the geoscience policy of everything related to climate change and energy resources. Dozens of hearings were held and summarized by the interns on renewable energy, unconventional fuels like shale gas and methane hydrates, the energy-water nexus, comparative costs of energy resources, clean energy job growth, reducing greenhouse gas emissions, enacting climate change legislation, global cooperation on climate change and even a hearing on geoengineering. The breadth of topics kept the interns on an expanding learning curve and excited to see what aspect of earth science legislators would consider next.

Stephanie Prais, originally from Buffalo, New York, graduated in May from the University of Michigan, Ann Arbor with a B.S.E. in Earth Systems Science and Engineering, concentrating in climate physics. She dove wholeheartedly into the details of hundreds of pages of climate change legislation and discussions on these measures in hearings and briefings on the Hill. During the busy summer she found time to meet with Senator Debbie Stabenow from Michigan and Representative Candice Miller, who represents the district that includes Shelby Township.

Stephanie was joined by Rachel Potter, the second summer intern, about a week after Stephanie's arrival and the two had many opportunities to carry on their own debates about the policy making process. Rachel received her B.A. in Earth Sciences from Boston University and recently completed her M.S. in Geology from the University of

Maryland. As a geology student, Rachel was able to explain working "in the field" and weekly "beer gatherings" of geology departments to Stephanie, who had spent her undergraduate days in an engineering department.

Stephanie and Rachel took some time to meet geoscientists working in Congress, at the U.S. Geological Survey, at the National Science Foundation and at the Department of Energy. They were able to learn more about the research and development being conducted by federal agencies and in many cases its relevance to current policy discussions. AGI's Government Affairs staff also quizzed the interns regularly on AGI's 46 member societies and gave them the opportunity to meet many diverse geoscientists from these societies. Ultimately, Stephanie was fully immersed in geology through a field trip for AGI staff and interns with the Bureau of Land Management's National Paleontologist to Douglas Point, Maryland. It was Stephanie's very first field trip and she hopes to be part of more field trips in the future.

Breaking with the tradition of having three summer interns in the summer, the third intern, Joey Fiore, arrived in the fall. Many *TPG* readers may recognize Joey, who is an active student member of AIPG and writes a regular column for *TPG*. Coming from Boston, Joey has just completed work for B.S. degrees in geology and history from Northeastern University. He is now transitioning from a student to a professional. Joey hit the ground running up and down the Hill, quite literally running from one congressional office to another, helping more

than 50 geoscientists conduct congressional visits in one day in September. He also participated and helped organize AGI's annual Leadership Forum, where the discussion on climate change and energy brought together geoscientists and decision makers on shared concerns. Like Stephanie and Rachel, Joey has attended many hearings and briefings on the hill, visited with policy makers and geoscientists and learned about the geoscience research and development programs of many federal agencies.

Will Nuclear Power Grow in a Low Carbon Economy?

By: Stephanie Prais

Climate change is now front and center on the national policy stage. Both houses in Congress as well as the White House have acknowledged that we need to address this challenge and legislation that would push the U.S. toward a low carbon energy portfolio is under consideration in 2009. A critical part of such a low carbon energy portfolio is nuclear power, which already supplies about 20 percent of the nation's electrical generation. Although nuclear energy is critical, U.S. policy regarding nuclear energy remains uncertain and until longstanding issues are resolved, it is uncertain whether nuclear energy can grow to fulfill the nation's energy needs.

Nuclear power generation results in essentially zero carbon emissions. Around the world successful operations of numerous nuclear power plants have occurred for decades. The United States operates more than 100 nuclear power

plants, while France operates the second largest number of plants at more than 60. France now generates about 80 percent of their electricity from nuclear power.

The arguments against expanding nuclear energy in the U.S. remain significant with safety and security topping the list of concerns. There is always a fear of catastrophic accidents and a fear of nuclear weapons proliferation that must be balanced against any expansion of new nuclear power plants for low carbon energy.

Economically, it is very expensive to build a new nuclear power plant with current estimates of capital costs at \$4,000 per kilowatt compared to \$2,300/kW for a new coal plant.¹ This expense would be coupled with the enormous cost of increasing the number of reactors needed to keep up with the energy demand of a growing U.S. population. Right now there are 103 old nuclear power plants generating about 20 percent of our electricity and we would need to build about 100 new nuclear power plants to double this percentage and keep up with new demand.

If capital costs can be constrained, then nuclear power becomes more competitive with coal-fired power plants because nuclear power has much lower fuel costs. The total cost for nuclear drops from 8.4 cents per kilowatt hour to 6.6¢/kWh, while coal power is about 6.2¢/kWh. In addition, if a carbon charge of about \$25 per ton of carbon dioxide is initiated, then coal power costs rise to 8.3¢/kWh.¹

Environmentally, nuclear power plants produce nuclear waste that is dangerous and has long-lived consequences. Nuclear power plants are also water hogs and require 33 percent more water than a coal-fired power plant. Most water is returned to its source at a higher temperature, but between 0.4 and 0.72 gal/kWh can be lost in a nuclear power plant through evaporation. There is also waste water to consider, environmental issues associated with uranium mining and indirect carbon emissions from the mining, transport, building, maintenance and waste disposal of such plants.

Unfortunately, U.S. policy on nuclear power generation has shifted with different administrations over the past 60 years and now seems particularly

lost in regard to the growing problem of nuclear waste disposal and whether newer recycling processes that reduce the total amount of waste should be allowed for new plants.

Congress passed the Nuclear Waste Policy Act in 1982 which tasked the Department of Energy (DOE) with finding, building, and operating a geological repository for permanent nuclear waste disposal. This process ultimately led to Congress directing DOE in 1987 to only study Yucca Mountain in Nevada, a site about 90 miles from Las Vegas. In 2002, President Bush authorized DOE to establish a repository at Yucca Mountain, despite local opposition to the site due to groundwater and public safety concerns. DOE submitted a license application to the Nuclear Regulatory Commission (NRC) as a final step in the authorization.

In February 2009, President Obama requested a halt to funding for the Yucca Mountain repository and asked Congress to change the law, so that the building of the Yucca Mountain repository could be halted legally and permanently. The DOE has formed a blue ribbon panel to pursue alternate options to deal with the nation's nuclear waste instead of establishing a permanent repository at Yucca Mountain.

The controversy surrounding Yucca Mountain and the need for more low carbon energy has renewed interest in nuclear fuel reprocessing, which would reduce the amount of high level radioactive waste. Reprocessing allows nuclear fuel to be used for power generation several times before it is disposed of as waste. France uses reprocessing to limit the amount of waste produced at most of their power plants. The U.S. has historically prohibited reprocessing for commercial nuclear power generation, with some exceptions, due to fears of weapons proliferation. In 1981, President Reagan lifted a ban on commercial reprocessing activities, a policy that was reversed with the Clinton administration. Recently, President Bush's 2001 National Energy Policy recommended the development of reprocessing and fuel development technologies that are more efficient and more proliferation-resistant.

Two major energy bills enacted into law in the past two Congresses pro-

vided incentives for the development of new nuclear power plants without specifically dealing with nuclear waste or nuclear reprocessing. The Energy Policy Act of 2005 authorizes loan guarantees for nuclear power plants to encourage new plants through financing and for "innovative technologies" which could include advanced nuclear power plants. The Energy Security and Independence Act of 2007 included a provision for an unlimited number of government loan guarantees for "clean" power generation, which could pave the way for new nuclear power plants in the U.S. The law also instructs the Secretary of Energy to establish a Next Generation Nuclear Power Plant Project based on fourth generation nuclear power plant research and development.

While the outlook for future U.S. policy on commercial nuclear power is uncertain, there is growing consensus that it must be part of the energy equation. The U.S. is working to reduce greenhouse gas emissions while balancing its growing energy needs with economic and security concerns. There has been new discussion concerning reprocessing in the current Congress because it conserves uranium resources, results in less high level waste (but more low level waste), and reduces the need for a permanent geologic repository.² Additional discussions focus on whether reprocessing should be implemented now, or in the future after better technologies have been developed.

In June 2009, the American Energy Act (H.R. 2846) was introduced in the House, primarily by Republicans, which sets the goal of building 100 new nuclear power plants within 20 years. It would also accelerate the regulatory process for obtaining licenses from the NRC to build new plants, allow the NRC to finish its review of Yucca Mountain, and allow recycling of spent nuclear fuel. In the Senate, Senator Lamar Alexander (R-TN) has repeatedly expressed his support for adding 100 nuclear plants over 20 years to the national grid.

Clearly the debate about Yucca Mountain as a nuclear waste repository is not quite over and renewed congressional discussions will ensue once the DOE blue ribbon task force completes

1. All costs estimates are in 2007 constant dollars and were determined in "Update of the MIT 2003 Future of Nuclear Power." MIT Energy Initiative. Web. 03 Aug. 2009. <<http://web.mit.edu/nuclearpower/pdf/nuclearpower-update2009.pdf>>.
2. *Advanced Technology for Nuclear Fuel Recycling*, 111th Congress, 12 (2009) (testimony of Dr. Alan S. Hanson). Print.



Stephanie with her senator (Senator Debbie Stabenow, Michigan).

their report on long-term nuclear waste storage options.

Many questions remain on where the U.S. is willing to go with nuclear power and how the nation will deal with nuclear waste and nuclear reprocessing. There are clear benefits when considered within the problem of climate change, but concerns remain about the cost and safety. Nonetheless, the fact that policymakers are talking about building new nuclear power plants, that the Administration is studying nuclear energy and waste options and that recent legislation supports Yucca Mountain and reprocessing indicates potential near-term growth for nuclear energy within the U.S. energy portfolio.

Policymakers Making Waves About Ocean Acidification

By: Rachel Potter

The recent increase of carbon dioxide in the atmosphere has sparked furious debate among policymakers over its causes, implications and possible mitigation and adaptation strategies. Until recently, less attention has been given to increases of carbon dioxide in the oceans. This is starting to change as ocean acidification, an effect of the increasing carbon dioxide, is becoming more prevalent in public discourse and policy debates. Once the subject of only a few researchers and those whose livelihoods depend on the seas, ocean acidification is now getting attention from federal agencies and Congress.

As the atmospheric concentration of carbon dioxide increases, exchange

with the ocean increases the amount of carbon dioxide in the ocean. This exchange was originally considered a positive way to reduce the climbing atmospheric concentration, because the ocean acts as a sink by pulling carbon dioxide out of the atmosphere. A study by researchers at the National Oceanic and Atmospheric Administration (NOAA) Pacific Marine Environmental Laboratory (PMEL) estimates that the oceans have absorbed a third of the anthropogenic greenhouse gases emitted. However, this increase in carbon dioxide has caused the acidity of the oceans to increase by 30 percent since the industrial revolution, and the adverse effects of this ocean acidification are now evident.

Ocean acidification is the decrease in pH associated with the increase in dissolved carbon dioxide. It is caused by the reaction between carbon dioxide and water molecules that ultimately produces more H^+ ions. This greater acidity is disrupting the ocean ecosystem in ways not seen before. A more acidic ocean dissolves carbonate shells, which form the protective exoskeleton for mollusks, shellfish and plankton. It also decreases the amount of carbonate ions in ocean water, making it harder for these organisms to create their shells. The corrosive environment dissolves and kills coral, destroying the underwater habitat for marine life and important barriers that protect coastlines from storm surges. Fish and squid can also have problems with respiration rates and blood chemistry due to the greater acidity. The effects of ocean acidification are felt all the way up the food chain, starting with the dissolution of plankton and affecting fish populations and even whales.

The reduction in marine life populations, due at least in part to ocean acidification, is taking a toll on the fishing industry. For example, North Pacific shellfish farmers are struggling to maintain their hatcheries against an onslaught of acidic ocean water. And because wild juvenile oysters have trouble creating shells, small farmers cannot rely on them and are forced to buy oysters already attached to shells to stock their farms. When PMEL researchers found that the upwelling of acidic ocean water into the hatcheries was killing the larvae, the farmers changed the way water is piped into the hatcheries, improving the survival rate of juvenile oysters.

Research and monitoring of ocean acidification by federal agencies and universities is helping the fishing industries and others who rely on marine resources deal with what appears to be a relatively rapidly changing ocean. Even so, the increasing ocean acidity is unlikely to stop any time soon as more carbon dioxide is put into the atmosphere every year. The outcry from scientists and those affected has spurred policymakers to hold hearings and consider legislation on ocean acidification. Most of the discussion focuses on increasing research and monitoring to better understand the problem rather than consideration of any direct mitigation or adaptation strategies.

Members of Congress have been pushing for legislation to address ocean acidification for the past few years. In 2007, the House and the Senate introduced bills with a catchy acronym, the FOARAM (Federal Ocean Acidification Research And Monitoring) Act. FOARAM would establish an ocean acidification program within NOAA and an interagency committee to develop a plan for ocean acidification research and monitoring. Neither bill made it to a floor vote in the last Congress, so in January of 2009 Congressman Brian Baird (D-WA) re-introduced the bill in the House and Senator Frank Lautenberg (D-NJ) re-introduced the bill in the Senate. The FOARAM Act of 2009 moved quickly through the new Congress and was signed into law on March 30th, 2009, as Title XII, Subtitle D of the Omnibus Public Land Management Act of 2009 (H.R. 146; Public Law 111-11).

The FOARAM Act notes that ocean acidification is caused by inputs from the atmosphere, including carbon dioxide, and funds ocean acidification programs within NOAA, the National Science

Foundation (NSF), and the National Aeronautics and Space Administration (NASA) through 2012. It requires the Joint Subcommittee on Ocean Science and Technology, part of the President's National Science and Technology Council, to establish an interagency working group and coordinate federal ocean acidification activities. The interagency working group is to be chaired by NOAA and have members from NOAA, NSF, NASA, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, and other appropriate agencies. The joint subcommittee is also charged with the development of a strategic plan for federal research and monitoring of ocean acidification. The plan will assess the impacts of ocean acidification on marine organisms and ecosystems and develop adaptation and mitigation strategies for their conservation.

Congress has continued to pursue discussion of ocean acidification, emphasizing the influence of oceans on the U.S. economy. In June, the Senate Commerce, Science and Transportation Committee conducted a hearing entitled "The Blue Economy: The Role of the Oceans in our Nation's Economic Future." Chairman John Rockefeller (D-WV) described the blue economy as industry relating to oceans, the Great Lakes and coasts that "generates more than 50 percent of our nation's Gross Domestic Product and provides over 70 million jobs to Americans." He highlighted climate change and ocean acidification as problems that affect everyone and not just coastal states, asserting, "The economic health of America is undeniably linked to the riches of our oceans and coasts." Both Rockefeller and Senator Maria Cantwell (D-WA) called for a doubling of NOAA's budget over the next four years.

The recognition of ocean acidification by policymakers and the initiative to strategically plan federal ocean research and monitoring is a step in the right direction. While changes in ocean chemistry and carbon dioxide concentrations have happened in the past, the fast pace of this change is making it difficult for marine organisms and the fishing industry to adapt. Researchers must figure out ways to sustain marine life and marine ecosystems in an increasingly acidic ocean and to reduce the rate of increase in ocean acidity. Although there are no easy fixes, some policymakers see ocean acidification as a significant problem and view reducing atmospheric emis-

sions of carbon dioxide as one step in mitigating the problem.

Ocean acidification has even become one of many springboards for arguing for emissions reduction legislation. Throughout 2009, Congress has been trying to craft legislation that directly restricts atmospheric emissions. As passed by the House in June, the American Clean Energy and Security Act of 2009 aims to reduce atmospheric emissions by implementing a cap and trade system on carbon dioxide emitters. It is unclear if this legislation will make it through the Senate or whether it might be changed as policy debates rage through the halls of Congress. What is clear is that ocean acidification is now making waves in major policy considerations with national to global consequences.

Carbon Capture and Sequestration: The Preferred Solution of Policy Makers

By: Joey Fiore, SA-01164

As the weight of December's UN Climate Change Conference bore down on policy makers this fall, climate change legislation heated up. With the stage set for a host of climate countering options, carbon capture and sequestration initiatives played a prominent role in legislation from all corners of Congress and the world. There remain, however, many questions to be answered about this young enterprise, with technology still in its rel-

atively early phases and full scale demonstrations of the complete process yet to be undertaken. Is large scale deployment of this venture feasible? Do its potential benefits outweigh its known challenges and potential problems? And if so, are policy makers providing enough support to actually make its application successful?

Carbon capture and sequestration (CCS) is a process by which carbon dioxide (CO₂) is removed from the atmosphere and stored, primarily underground in a geologic repository. The goal is to remove CO₂, a greenhouse gas that contributes to global warming, from the atmosphere. It has gained so much favor in recent years as it stands to store potentially decades to even centuries worth of CO₂, while reducing global CO₂ emissions by up to twenty percent, and doing so in a manner potentially much cheaper in the long run than alternative climate combating measures. In addition, CCS allows for the continued use of coal-fired power plants around the world. There are three options for capturing CO₂ from a point source. The first two involve cleaning and separating the CO₂ either by pre or post combustion capture and the third involves burning the coal in pure oxygen, so the only by-product is pure CO₂.

For sequestration in underground geologic repositories, the CO₂ is liquefied and transported to the injection site. Continental sites include oil and gas fields in which CO₂ can also be used for enhanced oil recovery (EOR), deep saline formations, and mineral storage



Interns Stephanie and Rachel with AGI's Executive Director Pat Leahy.

in which the CO₂ reacts with magnesium or calcium to form solid carbonates. Marine sites include deep sediments and hydrate formations or storage as bicarbonates through mineral reactions. Problems associated with sequestration include leakage, groundwater contamination, costs, known and unknown technological challenges, the amount of energy required for sequestration and local community acceptance of any particular storage site.

Despite these issues, expectations are high for the role CCS should play in mitigating climate change. The International Energy Agency prepared a Technology Roadmap for CCS deployment, listing it as one of the most inexpensive options to combat climate change and prescribing 100 large scale CCS projects globally by 2020 and 3000 projects by 2050. The IPCC advocated for CCS, indicating a potential for 220-2200 Giga-tons of total CO₂ sequestered by CCS cumulatively by 2100. Estimates between the two groups range between 30-70% overall savings in climate-related spending with CCS.

The U.S. government is making significant investments in research, development and deployment (RDD) of CCS. The Department of Energy (DOE) has initiated several small projects in CCS in the past and is now accelerating and expanding their projects with a one-time boost of \$3.4 billion in stimulus funds for 2009. Although only a small fraction of the \$3.4 billion is specifically devoted to CCS, Secretary of Energy Steven Chu is a staunch advocate and would like to see greater investments in the future. Many in Congress support CCS RDD and are including investments in the technology in appropriations, in energy bills and in climate change measures. The Waxman-Markey climate change bill (H.R. 2454) passed by the House of Representatives features a full subtitle for CCS, including provisions for overcoming "barriers" to commercialization of the process, regulation of geologic storage, and significant support for early developers of CCS. Incentives would include bonuses for the first 6,000 megawatts produced, in addition to grants for new CCS research and subsidies for continued development of CCS beyond early adopters. The corresponding Senate legislation, the Kerry-Boxer bill, increases the bonuses for early adopters from the first 6,000 to the first 20,000 megawatts produced, in addition to a \$10 billion early demonstration program, and similar subsidies to the House bill. Beyond the support and



Joey Fiore, Suzette Kimball (Associate Director for Geology, U.S. Geological Survey) and Mollie Pettit (AAPG/AGI Fall Intern) pose for a photograph after a public lecture at the U.S. Geological Survey headquarters in Reston VA.

incentives, CCS is becoming an essential technology in climate change legislation because it is key to the success of any cap and trade system.

Large-scale deployment of CCS is essential for the long-range plans of international and American decision-makers, however the technology remains uncertain and untested. Few CCS systems have approached commercial scale, and challenges are likely to delay or even stop projects. CCS deployment so far in the U.S. has consisted of a series of sequestration projects and a handful of small scale capture and storage exhibits. Seven regional partnerships established by the DOE are testing the viability of different geologic storage options. One project in North Dakota pumps its CO₂ through a pipeline to Canada, where it is used in EOR. The first CCS project at a coal-fired power plant in the U.S. began in September of this year in a region of West Virginia known as "Megawatt Alley". Funded by private investors, this project plans to store just 1.5 percent of the emissions from the plant, but could potentially be ramped up to ninety percent emissions capture in the future. A commercial scale project called FutureGen, in Mattoon, Illinois, plans to be a coal-fueled, near-zero emissions power plant that produces hydrogen and other useful byproducts. FutureGen will cost an estimated \$1.5 billion to develop from public and private funds and the hope is that it will be a model for new power plants that can continue to take advantage of America's abundant coal

resources, while producing useful byproducts such as hydrogen. Additional funding exists from the DOE's Clean Coal Power Initiative, which is now selecting CCS projects for its third round of funding.

Many other nations are supporting CCS RDD through public and private funds. CCS will likely prove to be most important in developing nations such as China, which has large coal resources and is working to develop CCS on new coal-fired power plants. While CCS advocates argue that much greater support is necessary to get the technology "over the hump" in the immediate future, it is unclear whether any level of support can ensure the expectations for CCS in meeting national and international targets on emissions reductions. Research, technological advances and large-scale testing are still needed and the time scales of these advances are uncertain. Nevertheless, CCS has many advantages that explain the push of policy makers for its development. CCS can be cost-effective compared to other mitigation solutions, it allows the world to continue using abundant coal resources and it can reduce CO₂ emissions. Suffice to say, it is reasonable to expect that the carbon genie might actually be put back in the bottle.

Dear Chairman Talkington,

I wish to extend my deepest gratitude to you and the AIPG Foundation Trustees for the opportunity to intern this fall with the American Geological Institute's Government Affairs Program. Representing AIPG and the geologic community here has been an honor. I can assure you that the internship has been a tremendous learning experience. While spending two or more days per week on Capitol Hill, attending hearings, briefings and meetings, there was a great deal to learn about our congress and the legislative process. Beyond that there were many visits to government agencies, including U.S.G.S. headquarters, the Department of Energy, and more, and the chance to speak with top caliber scientists while there. In the process, I was constantly learning more about the geoscience issues we are dealing with and more about AGI and its other member societies.

In addition, living in the nation's capitol was an extremely cool and valuable learning experience in itself. Overall, my time here was very valuable. I feel much

better acquainted with the operation of our federal government, and much better prepared to interact with it from the perspective of the geosciences in the future. Thank you again for this amazing opportunity. I pledge to take what I have learned here and leverage it to help bridge the gaps between policy makers and geoscientists in whatever ways possible in the future.

**Joey Fiore, SA-01164, Intern,
Government Affairs Program**

Have You Paid Your 2010 Dues?

**In accordance with Article 8,
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Annual Membership dues are
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Date: _____



Robert G. Font, CPG-03953

1. Certain mathematical expressions are important to those of us who study and practice the geological sciences. Of the choices provided below, which depicts the proper format of “Euler’s Equation” defining the elastic “buckling” or folding of a layer?
 - a) $\rho = R * L/A$
 - b) $R = g * \alpha * \beta * t^4 / h * \gamma$
 - c) $\sigma = \pi^2 * E * I / L^2$

2. We are studying worldwide exposures of columnar basalt. Pertinent to the choices presented below, where would we go to do just that?
 - a) “Enchanted Rock”, central Texas, USA.
 - b) “Giant’s Causeway”, Antrim, Northern Ireland.
 - c) “Lange Anna”, Heligoland, North Sea.

3. Our task is the analysis of biostratigraphical assemblages in Cretaceous strata. Of the following genera, which does not belong to the time frame that we are concentrating on?
 - a) Gryphaea.
 - b) Lyropecten.
 - c) Exogyra.

4. We are exploring for accumulations of zeolite minerals. Which of the following choices defines one of our targets?
 - a) $K(AlSi_2O_6)$
 - b) $MgSO_4 * 7 H_2O$
 - c) $Na_2(Al_2Si_3O_{10}) * 2 H_2O$

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by Robert Font, Ph.D., CPG, PG, EurGeol

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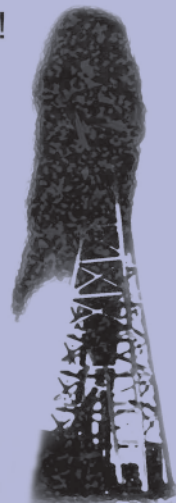
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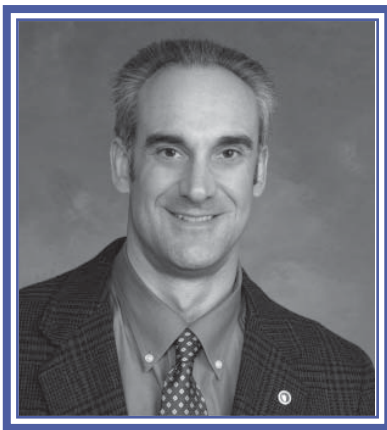
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Answers on Pages 32



Michael D. Lawless, CPG-09224

Looking Forward

The American Institute of Professional Geologists is well positioned for another productive year in 2010. Members of the Executive Committee along with other volunteers are working together on several initiatives that will further the Vision and Mission of AIPG.

David Abbott, CPG-04570, is leading an important initiative to evaluate the Rights and Privileges of the various categories of Members and Adjuncts, particularly with regard to Certified Professional Geologists (CPG) and Members. As AIPG's membership increasingly comprises Members with a decreasing proportion of CPGs, should the Rights and Privileges of Members be revised to more effectively govern the Institute in the future, as well as to continue to attract members?

Specifically, CPGs are currently the only membership category who can hold the National offices of President, President-Elect, Vice President, Past President, Secretary, Treasurer, and Editor, as well as the Section offices of President and Vice President. Members can serve at the National level if they are nominated by their Sections to run for Advisory Board representative positions. These restrictions on who can hold elected offices have been most acutely felt at the Section level where it has been difficult to recruit candidates that are CPGs, but in some cases Members are willing to run for office.

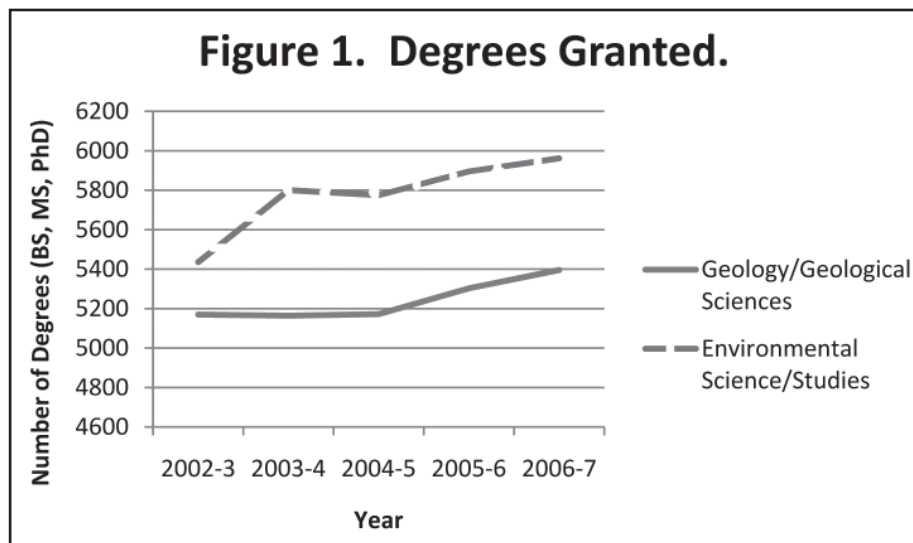
Based on membership statistics published in *TPG* and compiled by Mr. Abbott, the percentage of the membership comprising CPGs has dropped from 100% prior to 1997 to 78% as of April 2009 while the percentage of Members has increased to 17% as of April 2009. This indicates that the problems experienced at the Section level do not appear to be imminent at the National level; however, the identified concerns will

likely manifest themselves throughout the organization eventually if current trend continues. Should the Rights and Privileges of Members be revised to allow Members to be elected officers at the Section and National levels? If such changes are made, are changes needed to protect the Rights and Privileges of CPGs? As with most issues, "the devil is in the details." However, with your input and the work of our volunteers, we can arrive at a solution that is in the best interests of the future of the organization. Therefore we would like to hear comments from those of you who have an opinion on the matter; please contact Mr. Abbott at [dimageol@msn.com](mailto:damageol@msn.com).

Other initiatives underway this year include evaluating the educational requirements to qualify as a CPG, preparing audit and enforcement procedures for the Continuing Professional Development program, preparing a position statement on evolution and earth history, and evaluating strategies for promoting student involvement in AIPG, among others. Clarifying the educational requirements to qualify as a CPG

has become an increasingly prevalent issue in the past several years as the number of applicants without geology degrees, but with some geology coursework, has increased. This has resulted from the broadening of academic programs to include environmental science and hydrology, as well as merging of some geology departments into other academic departments. In some cases geology degrees are no longer offered. The degrees offered are in environmental science or earth science, and the number and variety of core geological courses varies significantly among university programs. This trend reflects the growth in the environmental consulting profession, the proliferation of environmental science programs at colleges and universities, as well as cost-cutting measures throughout academia.

As illustrated on Figure 1, based on U.S. Department of Education statistics, environmental science/studies degrees have outpaced geology/geological sciences degrees since at least the 2002-2003 academic year, the first year in which environmental science degrees



were tracked separately. The disparity has increased. The concern is not necessarily with the title of the degree, but with the courses that are taken to earn the degree. Increasingly we are seeing applicants for CPG who have not taken what most geologists would consider to be core geology courses like structural geology, mineralogy or petrology. This has resulted in an apparent increase in the number of special case applications. The issue for discussion is whether individual core courses should be specified in the requirements to be a CPG in order to clarify those requirements for prospective applicants as well as the Screening Committee and Executive Committee, thereby minimizing the number of special case applications.

We look forward to your input and opinions on these issues as we look forward to another exciting and productive year.

Invitation from AIPG to Submit Article

You are invited to submit an article, paper, or guest column based upon your geological experiences or activities to the American Institute of Professional Geologists to be included in "The Professional Geologist" (TPG) bi-monthly journal. The article can address a professional subject, be technical in nature, or comment on a state or national issue affecting the profession of geology.

Article submissions for TPG should be 800 to 3200 words in length (Word format). Photos, figures, tables, etc. are always welcome! Author instructions are available on the AIPG website at www.aipg.org.

Please contact AIPG headquarters if you have any questions.

AIPG email is aipg@aipg.org or phone (303) 412-6502.



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The Member Volunteer

William J. Siok, CPG-04773

Each of us is regularly exasperated about how time passes all too quickly. Here's yet another year through which we will travel, hopefully with good fortune, while doing the best to balance personal and professional lives and obligations.

If success can be measured as productive accomplishments and a modest budget surplus following the economic meltdown of early 2009, last year was a success. The 2009 AIPG Executive Committee, under the leadership of John Bognar, continued to address crucial policy issues which affect the profession overall as well as AIPG membership in particular. Issues spanned the spectrum from continued AIPG solvency, the dissolution of the California Board for Geologists and Geophysicists, and supporting the continued funding of the USGS.

AIPG is no different than similar associations in that most of its accomplishments are a result of the efforts of its volunteers. Some AIPG members intentionally place themselves "in the know" about AIPG activities. They do this by volunteering time, energy, and resources on behalf of the membership

and the profession. AIPG is a volunteer organization.

The AIPG headquarters staff is small. There are five full-time and one part-time employees. The staff is productively busy managing the business side of AIPG and addressing the routine, as well as the unique, concerns and problems which confront members. But the work of headquarters is but part of the overall effort which makes AIPG successful.

Decisions to-do or not-to-do something are made by the Section and National Executive Committees according to the AIPG Bylaws. Those who serve in any leadership capacity, section or national level, are elected from among those who volunteer. The AIPG Bylaws confer upon them the authority and the responsibility to make decisions affecting AIPG. Not surprisingly, those who offer to serve are able to have direct influence on the directions taken by AIPG.

The AIPG organizational leadership always strives to make decisions which would be in the best interest of the greatest number of members. Every now and then, an unhappy member contacts headquarters with a complaint or an admonition. Most times, the subject is a

worthy one. When responding to these members, and after discussing the specific issue, it is often recommended that the individual take an active role in the Section or the National level. It probably won't surprise anyone that in most cases, the complainant fades into the background, not to be heard from again. There also are legitimate conflicting opinions among members in which one member says "AIPG must do...", another member says "Under no circumstances should AIPG do..."

All can appreciate both the sense of frustration and of satisfaction which accrue to members of the Executive Committees. But these volunteers are the AIPG leaders and deserve the support and gratitude of all members.

The other major group of volunteers, but less recognized, are those who staff the Standing and *Ad Hoc* Committees. These individuals contribute a great deal of personal time and energy to complete routine, yet critical, AIPG work. AIPG has a great deal to accomplish going into the future and it will continue to depend heavily upon its member volunteers. *Thank you to all AIPG volunteers for getting the job done!*

AIPG Raffle Winners

The following names were drawn as raffle winners at the AIPG booth, during the GSA Convention in Portland, Oregon, in October. Patrick Collins (t-shirt), Crystal Pletka (briefcase), Karin Van Wagner (briefcase), Allan Shareghi (denim shirt), Amanda Baker (briefcase), Zach Mergentahl (t-shirt), Dr. Thomas A Stemmann (briefcase), Sarabier (sweatshirt), T.M. Peryt (t-shirt), Miles Lendeson (coffee mug), D. Goswami (coffee mug), and the Grand Prize went to Brandt Kayser (crystal tourmaline). The drawing was held at noon on the last day of the convention. All winners had to be present to win.

A big **Thank You** goes out to all of the booth volunteers: Alan Benimoff, Daniel Chandonais, Bill Edmund, Rochelle Petrucci, Mike Johnson, Skip Nelson, Derek McGregor, Steve Barnett, Tim Wawrzyniec, Mike Moran, Andrea

McHugh, Russ Slayback, Heather Bays, Terry Sprecher, and Jonathan Sprecher. With your help, AIPG signed up 145 new student members.

The AIPG booth was a Great Success due to the help from all of the volunteers.

Thank You!



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Student Career Advice

Reflections on a Geological Career provides undergraduate and graduate students in the geosciences with advice and guidance about their chosen profession based on the experiences of the contributing Certified Professional Geologists. The participating professional geologists were drawn from the mining, petroleum, engineering, hydrogeologic, and environmental portions of the geological profession. The academic portion of the profession was omitted, not because it isn't important—it clearly is—but because this is the one part of the profession that students interact with on a daily basis. The participating professionals collectively are or have been employed by the full range of geological employers: local, state, and federal government agencies; academia; large, New York Stock Exchange-listed firms; smaller public companies; large independents; large consulting firms; and as independent consulting geologists.

The important observations and suggestions made by the various authors apply to all aspects of the geosciences and all types of employment. Even though a specific paper draws on experiences in a field which is not one's particular focus, the observations generally apply to all fields. The same themes and suggestions—flexibility, networking, keeping up, adapting, etc.—occur again and again throughout the papers for very good reasons. Plan and execute your careers accordingly. There is also a chapter listing the books you have to have, that is the books that professionals

in various fields regularly pull off the shelf for reference.

It's time to think about employment and long-term goals. We hope that you will find yourself in a profession and not just a job. *Reflections on a Geological Career* will provide you with some ideas about marketing yourself (and hence getting the job) and then formulating your goals (and becoming a professional in your chosen career). *Reflections on a Geological Career* is available for free on the AIPG website in the Publications section in PDF format.

Do the Conflict of Interest Provisions of Canon 3 Apply to Published Material?

Canon 3 of the AIPG Code of Ethics enumerates our professional "Obligations to Employers and Clients." Canon 3 contains the conflict of interest provisions of the Code of Ethics and conflicts of interest are generally regarded as the most commonly encountered professional ethics issue. "Employers and clients" generally refer to those who pay us for our professional work. But do "employers and clients" also include those who read and rely on our professional publications? By "professional publication" I mean written material in which the author is identified as a geoscientist and in which a professional opinion about one or more topics is expressed.¹ I believe the answer is "yes."

The conflicts of interest that arise in a publication generally involve disclosure

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

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

of who the work leading to the publication was done for, or who paid for the work, or identification of employers, etc. so that the reader can decide if such information is relevant in evaluating the information presented. There have been numerous news articles in recent years dealing with the failure of drug researchers to disclose their ties to drug companies that would be affected by the outcome of the research. Clearly the public expects that such conflicts be disclosed in publications.

While similar concerns have not come up regularly in the geosciences, the acknowledgements section of many geoscience publications regularly include such things as identification of the research grants, the support of a particular company, etc. When trade names are used to identify particular products used in a study, a statement is usually included regarding the selection of that product and that the naming of the product is not an endorsement of the product but rather that those wishing to duplicate the results should use the same product because of the product's unique characteristics.

These disclosures constitute implicit recognition that such information is relevant to evaluation of the publication and that for publications "employers and clients" does include the readers of the publications, both professional and general public, even those these readers are not directly paying the author a salary or consulting fee. The readers are the "consumer," the user of the professional opinion(s) expressed, just like

1. I believe that "professional statements," that is oral presentations in which a professional opinion is expressed and the author is identified as a geoscientist generally should be treated the same way that written presentations (publications) are. In this discussion, I'm focusing on publications for the sake of simplicity. If someone would like to expand the discussion to oral statements, please send me your thoughts.

professional reports are used by employers or clients. Therefore, the conflict of interest provisions of Canon 3 should apply to any professional opinion given to anyone, employer, client, professional colleagues, or the public.

Use Your CPG on Business Cards and Professional Correspondence

2009 AIPG President **John Bogнар**, CPG-08341, writes, "Many of we Certified Professional Geologists understand the AIPG's certification is in all cases a higher set of standards than those required for licensure or registration of geologists by the 28 states and territory of the United States that have such laws. Some have never thought of the CPG as superior to licensure simply because they are not attuned. Generally speaking, licensure states require the use of a seal or that state's credential when preparing documents that have geologic interpretation that may affect health safety and welfare of that state's citizens. While most CPGs are proud of their achievement to be certified by AIPG, I have noticed that very often, if not in a majority of cases, CPGs will allow their certification by AIPG to take a back seat to the states' moniker. I often see business cards that say for example 'Rock N. Stone, Geologist, LP, RG, CPG.' I believe the card should read 'Rock N. Stone, Geologist, CPG.'

"Professional geologists, especially we CPGs, must be made aware that state licensure boards are there to set the *minimum standard for practice*, enforce the state's statutes and even control the behavior of the licensed community in that particular state. In my home state believe it or not, the registrant does not need a degree in geology, is not required to have certain core geology courses, and has to have only 3 years of so-called experience. Being on the geologist's board in Missouri I have seen what passes for experience. In my opinion much of that accepted should never be acknowledged as geologic practice experience but it is because of the way the law and statutes read. Even though I have just raked my state and licensure in general over the coals, the point is that we CPGs should practice what AIPG preaches. Because the CPG is a superior credential to

licensing, I believe only the CPG should be used on business cards and when signing letters and reports omitting the LG, RG, LPG, etc. unless the licensure acronym is explicitly required by law in that state. Doing this shows the priority and value of CPG over the other monikers. When by law, you must use LG, RG, LPG etc; I suggest that it is placed after the CPG. This will not only elevate the CPG credential to up-front where it belongs, it is my experience that those unaware of what the CPG credential is, will ask, giving you an opportunity to expound."

Philosophical Versus Psychological Views of Moral Behavior

Ethics Committee member **Bill Dixon**, CPG-03659, sent me an interesting article that highlights the difference between the ways psychologists see behavior in real people and the philosophical view that the ideal person behaves the same way at all times and in all situations. The article, "Where the Wild Things Are" by David Brooks appeared in the October 20, 2009 *New York Times*². Brooks notes that in classic literature, the hero has a consistently displayed character trait. "Achilles is angry. Odysseus is cunning." This character trait results in the hero's trials, tribulations, and triumphs in the story. In contrast, psychological studies have consistently demonstrated that individuals behave differently in different situations. The mafia don may weep during an opera or delight in his family but has no feelings in ordering a hit on a rival or in conducting a criminal enterprise.

We see this situationally contrasting behavior in our own lives. What is your reaction to the panhandler on the street? Do you readily give to the United Way or other organizations that work to assist the homeless and hungry? In New York City, one quickly learns that looking strangers in the eye can provoke an angry response while in a small town failure to do so may provoke the same response. Married men have learned to cringe and duck the question sometimes asked by wives, "Does this outfit make me look fat?" Brooks' point in his review of the movie, *Where the Wild Things Are*, is that the hero, Max, displays a range

of situational behaviors throughout the movie.

Recognition of the fact that we behave differently in different situations is perhaps one reason why situational ethical approaches are advocated. The problem is that the situational approach leads to conflicting results. The philosophical moral approach, the approach I've advocated in these columns, judges all similar actions the same way and provides more consistency. The approach starts with simple moral precepts or rules that are to be consistently applied. There is also a recognized method for determining when exceptions to the general rule are allowed. And it recognizes that not all moral questions have a unique answer (see *Common Morality—Deciding What to Do*, column 99, September 2005). While acting differently in different situations is part of what makes us human, recognition that this happens and attempting to act more consistently in all situations is a moral challenge each of us faces in striving to become a better person.

AIPG's CPD Program

David Palmer, CPG-09960 and 2008-9 National Secretary, reviewed the current status of AIPG's Continuing Professional Development (CPD) program in the November/December 2009 issue of the *TPG*. It is clear from Palmer's article that few of us are taking advantage of an excellent method of keeping a CPD log, including those who are required to do so (see "Mandatory CPD program—are you keeping your CPD log?", column 124, November/December 2009). I know that AIPG's system sounds complicated but also know that in practice, it's easy to use and provides a good record of your CPD activity. More and more of us are going to be required to report such activity to somebody and having a good record of your activities is the prerequisite for such reporting. AIPG's CPD reporting system provides that. I urge all AIPG members, regardless of membership category, to make use of AIPG's CPD reporting system.

I also urge those of you who would like to see changes in the reporting system to contribute their thoughts to the ad hoc CPD Committee being chaired by Palmer at David.P.Palmer@ElPaso.com.

2. http://www.nytimes.com/2009/10/20/opinion/20brooks.html?_r=1&emc=eta1 (accessed 10/23/09)

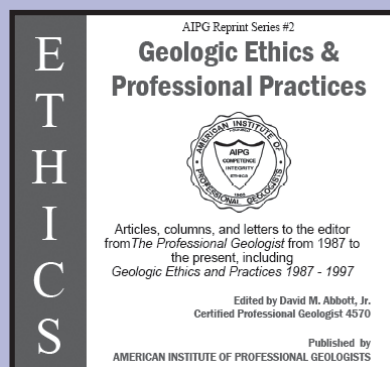
Assuring the Reliability of Sampling Results

The paper, "Groundwater sampling to achieve aquifer representativeness," by **Nick Swiger**, CPG-11237, and **Jan Boll** in the November/December *TPG* provides a detailed description of the problems involved in aquifer sampling. The paper addresses the same fundamental sampling issues I addressed in my paper, "Assuring the reliability of your sample results," in November/December 2007 issue of the *TPG* and in follow-up discussions in columns 114 (March/April 2008) and 121 ("Assuring the reliability of your sampling results: the LA abrasion test," May/June 2009). Are you sampling what you think you're sampling? Is the sample representative? And is it repeatable (by using field duplicate samples in the case of changing systems like aquifers)? I'm not a hydrologist and I thank Swiger and Boll for contributing their paper to this discussion on the reliability of the sampling that underlies our professional efforts.

Geologic Ethics & Professional Practices is now available on CD

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

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




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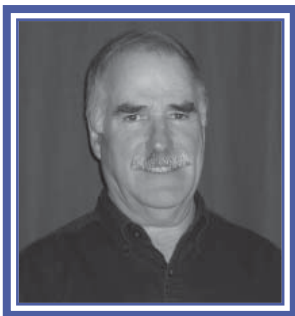
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Apparently Not Everyone

William J. Stone

Everyone knows that the water table is the top of the regional (or a perched) saturated zone. Well, almost everyone. There were people where I once worked that wrote things in their reports like, *The contamination has not yet reached the top of the water table*. How's that again? The water table is a top, so it doesn't have one! *Contamination has not yet reached the water table*, is just fine.

Similarly, everyone knows the familiar definition of *aquifer* as a geologic material that yields useful quantities of water to wells. Again, almost everyone. This is a bit vague for some people. For example, does it mean the entire Ogallala Formation is an aquifer or is it just the part that is wet at the moment that is the aquifer? The first is the generally accepted interpretation, since the saturated thickness in an aquifer can vary. That is to say, the entire stratigraphic unit is considered to be the aquifer. There have even been

efforts to formalize hydrogeologic units, utilizing the established stratigraphic nomenclature, where possible.

However, at that same place where I once worked there were people (probably the same ones that were looking for the top of the water table) that considered the second interpretation to be correct. In other words, they believed the water table is the top of the aquifer. When the precedents to the contrary weren't convincing, I offered this simple analogy. An aquifer is a reservoir like a water tank, right? Is the water level in a tank, the top of the tank? Obviously not.

The problem is, definitions should be precise. In view of the confusion over aquifer, I suggest refining its definition to be a geologic unit whose saturated portion yields useful quantities of water to wells. *Geologic unit* is more specific than *geologic material* and specifying the *saturated portion* allows the top of the aquifer to be the top of the unit, not the

water table. The fact that the water table rises and falls within an aquifer should be irrelevant for its definition.

Finally, everyone knows that an aquifer is the sponge, not the water itself. But apparently not everyone, since silly things appear in print like, *the aquifer [water table] runs up and down the canyon with the seasons, the aquifer [water table] is falling, the aquifer [ground water] is going away*, etc. (Danger, moving aquifers!) Tip: Learn the correct definitions of terms and practice using them correctly.

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 by e-mail: wstone04@gmail.com.

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Answers:

1. The answer is “c” or $[\sigma = \pi^2 * E * I / L^2]$.

Under simple conditions of elastic buckling, the critical stress “ σ ” needed to cause folding is a function of the layer’s elasticity (defined by the Young’s modulus “ E ”), the layer’s moment of inertia “ I ” and the layer’s length “ L ”. Since $I = t^3 * w / 12$

(where “ t ” and “ w ” are the layer’s thickness and width, respectively), we can rewrite “Euler’s Equation” as:

$$\sigma = \pi^2 * E * t^3 * w / 12 L^2$$

An important point to be made here is that the critical stress “ σ ” is directly proportional to the layer’s elasticity and to the third power of its thickness and inversely proportional to the square of its length. It is obvious that thickness and length are quite critical to the relationship and, as may be surmised intuitively, it is much easier to produce “buckling” in long, thin layers than in those that are short and thick.

Choice “b” depicts the “Rayleigh Number” (R) involving a convective layer heated from below. Lord Rayleigh demonstrated that, in such case, thermal convection would take place when the value of the dimensionless “Rayleigh Number” (R) reached a value of about 1,500. In the equation:

$$R = g * \alpha * \beta * t^4 / h * \gamma$$

“ g ” is the acceleration of gravity, “ α ” is the coefficient of thermal expansion, “ β ” is the temperature gradient in excess of adiabatic, “ t ” is the layer’s thickness, “ h ” is the thermal diffusivity and “ γ ” the kinematic viscosity. We can see that the thickness of a convective layer affects “ R ” greatly, since “ R ” is directly proportional to the fourth power of “ t ”. This has important implications regarding thermal convection in the Earth’s upper mantle, as one may conclude that such mode of heat transfer is highly probable in layers as thin as 400 kilometers where kinematic viscosity values of around 10^{-21} apply.

Choice “c” is the basic relationship between electrical resistivity “ ρ ”, resistance “ R ” and the length and cross sectional area of the conductor (“ L ” and “ A ”, respectively). Equation:

$$\rho = R * L/A$$

is essential in establishing our understanding of the basic principles of electric logs. From Ohm’s Law:

$$V = IR$$

$$R = V/I$$

$$\rho = (V/I) * (L/A)$$

where “ V ” defines the potential difference and “ I ” the current input. From the above equation, we can derive the critical relationship:

$$\rho = 4\pi (V/I) * (r_1 r_2 / r_2 - r_1)$$

which expresses electrical resistivity as a function of not only “ V ” and “ I ”, but also as that of the “electrode spacing.”

2. The answer is choice “b” or the “Giant’s Causeway” of Northern Ireland. This impressive system of basaltic columns was originally part of the Thulean Platform which developed during Paleogene time.

“Enchanted Rock” is a classic exfoliation dome consisting of Texas pink granite and covering about 640 acres of surface area. “Enchanted Rock” is located near the city of Fredericksburg in central Texas.

“Lange Anna” is a tall (47 meter-high) sea stack of red sandstone found in Heligoland, a German Islet in the North Sea.

3. The answer is “b” or “Lyropecten.” All three choices represent “dysodont pelecypods”, clams with shells characterized by absence or near-absence of hinge teeth and narrow external ligament. However, “Lyropecten” is a Cenozoic specimen which ranges from Oligocene to Recent.

In contrast, both “Exogyra” and “Gryphaea” are part of the suborder “Ostracea”; the former specimen ranging from Jurassic to Cretaceous and the latter ranging from Jurassic to Eocene. Specifically, both “Exogyra” and “Gryphaea” are well-known, representative Cretaceous pelecypods.

4. The answer is “c” or $\text{Na}_2(\text{Al}_2\text{Si}_3\text{O}_{10}) * 2 \text{H}_2\text{O}$, or “natrolite.” Zeolites are hydrous silicates.

Choice “a” is the mineral “Leucite” or $\text{K}(\text{AlSi}_2\text{O}_6)$, a feldspathoid.

Choice “b” is the mineral “epsomite” or $\text{MgSO}_4 * 7 \text{H}_2\text{O}$, a hydrous sulfate of magnesium.

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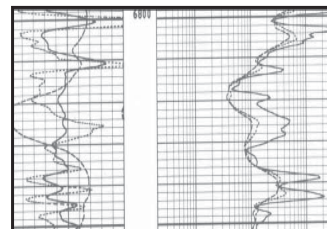
Author: Robert Font, PhD, CPG, PG

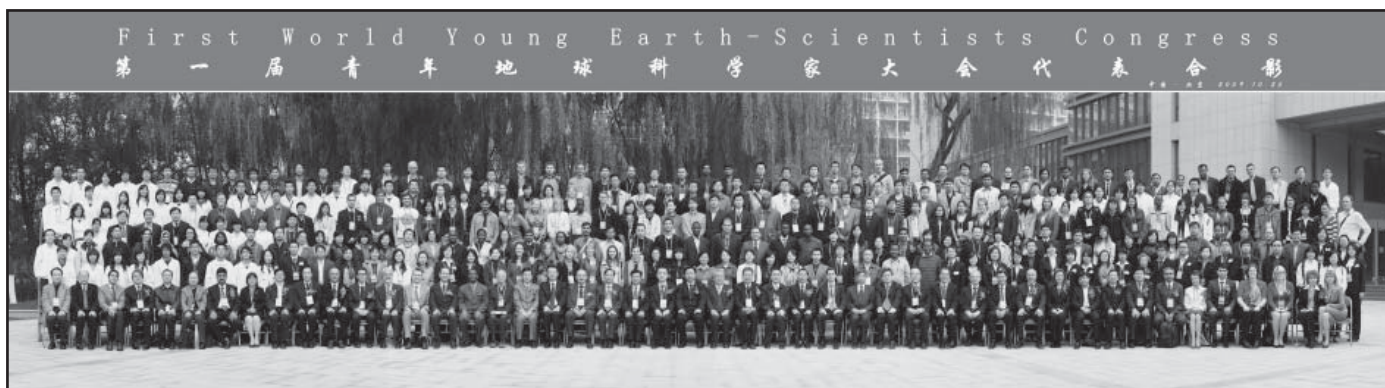
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AGI Hosts Expanded Access To The 2009 YES Congress

Alexandria, VA – The American Geological Institute (AGI) successfully hosted the virtual component of the first Young Earth-Scientist (YES) Congress held in Beijing, China October 25-28 in an effort to expand the opportunity for participation to young scientists from around the world. Over 200 individuals from 31 countries took advantage of this unique opportunity to participate, even without attending in person in Beijing.

AGI, one of the U.S. supporters of the YES Congress, hosted and coordinated webinars that allowed attendees to watch roundtable presentations live both in Beijing and presented by speakers over the Internet on subjects such as natural resources and earth science education, ask questions of the speakers, and give feedback on the subjects being discussed. As a service to the geosciences community, AGI recorded all presentations and will be hosting them via the 2009 YES Congress website <http://www.yescongress2009.org/>.



Dean Feller, MEM-1613, represented AIPG at the October 2009 Young Earth Scientist Congress, held in Beijing.

AGI Announces New 2010 Executive Committee Officers

Alexandria, VA—The American Geological Institute (AGI) welcomes three new executive Committee officers: G. W. (Skip) Hobbs, President-elect; James M. Robertson, CPG-09491, Treasurer; and Jessica Ali-Adeeb, Member-at-large.

Skip Hobbs is founder and president of the private sector geoscience consulting and energy exploration company Ammonite Resources. He has served AAPG and is a former AGI Executive Committee Member-at-Large (2004-2007).

James Robertson has served as the Wisconsin state geologist since 1993. He has also held several AASG offices and is former chair of AGI's Government Affairs Program Advisory Committee.

Jessica Ali-Adeeb is a petroleum geologist with Chevron Energy Technology Company. She is a Past President of the Association for Women Geoscientists and currently a representative to AGI's Member Society Council.

The new members of the AGI Executive Committee will be installed during the 2009 Geological Society of America Annual Meeting in Portland, Oregon.

The American Geological Institute is a nonprofit federation of 46 geoscientific and professional associations that represents more than 120,000 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.

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Energy Use Then and Now

Bob Stewart, CPG-08332

In the summer of 2007, my heating oil dealer offered a buy-ahead contract at \$2.99/gallon. I swallowed hard, and signed up for 700 gallons, my typical annual consumption. At the time I thought the price couldn't get much higher than that. Hah! In June 2008 I topped off the tank for a whopping \$4.79/gallon, and started eyeing several dead oak trees in the back acreage to feed the wood stove. Either that, or declare my Subaru a farm vehicle, drive across the state line to Massachusetts where the price is 20¢/gallon less, and buy off-road diesel in jerry cans to fill the heating oil tank. This winter (2008-2009) heating oil is running at about \$2.49/gallon, happily, below 2007 levels. The reasons for the spike in energy costs through 2008 was complex and debatable, but as a basis for the change, it is instructive to consider the global changes in gross energy production since the cold war ended in 1989. At that time, the top 10 electricity-producing countries were as follows, with production in kilowatt-hours (KWH).

1	United States	2,469,072,000,000
2	USSR	1,545,000,000,000
3	Japan	667,000,000,000
4	Canada	446,412,000,000
5	West Germany	408,713,000,000
6	China	407,300,000,000
7	France	323,575,000,000
8	United Kingdom	297,050,000,000
9	Italy	195,213,000,000
10	Brazil	175,710,000,000
	World Total	9,675,000,000,000

Source: Ash, Russell. 1989. *The Top Ten of Everything*. Macdonald & Company, Queen Anne Press, 216 pp.

Now flash forward nearly 20 years to 2008, and consider the changes, with results also in KWH. The source for these data is *The World Factbook*, published annually by the United States Central Intelligence Agency. The CIA compilation below is current for the period 2005-2007, depending on the country. Note that these data predate the 2007-2008 crash, and thus reflect economies running at full throttle, and unparalleled growth for China and India.

1	United States	4,062,000,000,000
2	China	3,256,000,000,000
3	European Union	3,020,000,000,000
4	Japan	1,025,000,000,000
5	Russia	1,000,000,000,000
6	India	661,600,000,000
7	Canada	609,600,000,000

8	Germany	579,400,000,000t9
9	France	543,600,000,000
10	South Korea	403,200,000,000
	World Total	18,580,000,000,000

Source: <https://www.cia.gov/library/publications/the-world-fact-book/rankorder/2038rank.html>; accessed July 15, 2008.

The differences are fascinating. Global output has doubled. The United States is the only country in the same position, and our gross electricity output also nearly doubled. China occupies the #2 position, but more significantly, the production has increased eight-fold following the Tiananmen Square repression and the unprecedented economic expansion that followed.

The European Union, consisting of 27 member states, came into existence from its predecessor the European Economic Community following the collapse of the Soviet Union, and now ranks third in the world. The reunified Germany (#8) and France (#9) are the only single European nations still on the list. Interestingly, the former East Germany added comparatively little to the overall electricity output of the reunified country.

Japan's production exceeds that of Russia. Summing the 2008 output of Russia plus the 13 states that formerly comprised the Soviet Union yields 1,452,048,000,000 KWH, slightly less than what the entire USSR produced in 1989.

India, with a population of roughly 1.15 billion, didn't make the top ten in 1989, and the latest production is only slightly more than that of Canada (population about 33 million). Contrast the per capita production of 18,354 KWH/person for Canada against 576 KWH/person for India. Along with India, South Korea (#10) joined the Southeast Asian economic expansion since 1989.

Our global population is energy-hungry, and over the past several years the United States in particular has seen the impact in rapidly escalating petroleum costs to levels nearly comparable to those prevailing in Europe. China and India have developed expanding middle class populations with discretionary income, and with that comes the not unreasonable desire for more creature comforts such as living quarters with indoor plumbing, air conditioning, and heating.

Have we learned something from all this? The pre-cold war and post-cold war comparison may not be in the minds of many, but \$5.00/gallon heating oil in 2007 sure was. Significantly, according to the Federal Highway Administration, vehicle miles traveled by Americans declined for six months in a row through April of 2008, an unprecedented change. The population as a whole may be unconvinced of climate change, anthropogenic or otherwise, especially as a reason to reduce energy consumption, but such a reduction finally happened,

only due to the free market forces and a recessionary economy. Although the Bush administration took no action to curb greenhouse gas emissions, high energy costs, and now the recession have accomplished the first steps toward mitigating exactly that problem.

Now, petroleum prices have moderated. Have we absorbed the recent lesson, and contemplated the positive impact upon our country's profligate emissions? Are we driving less and keeping the thermostat down? What's in store for the United States? Read the article by Perry Rahn, (CPG-03724), in this issue – ***U. S. Energy Production Needs More Nuclear Energy.***

I recently read ***Searching for Yellowstone*** (1997), by Paul Schullery. Schullery has been variously employed as a ranger, naturalist, historian, chief of cultural resources, and senior editor in the Yellowstone Center for Resources, and his book is referenced in the late Michael Crichton's ***State of Fear***. Schullery acknowledges the potential impacts of climate change on the Greater Yellowstone Ecosystem (GYE), but takes no particular side in the larger discussion of anthropogenic causes, which is perhaps the reason for Crichton's interest. Schullery writes well, and with a sense of humor. His book is a fascinating story of the origin, development, and management of Yellowstone into the end of the 20th century, and I recommend it. Schullery (p. 307) makes the following comment with respect to one of his own sources:

“As the scientific disciplines related to park management have become more sophisticated and technical, and as books produced by these disciplines have become ever more expensive, the public has ceased to be an audience

for the real research finding, depending more and more on media and on the occasional scientist who bothers to “translate” findings for public consumption.”

The same can be said for the issue of climate change – even professional geologists, who by training and employment should be more knowledgeable about the subject than most, will have to work hard to educate themselves about the scientific basis without relying on popular media. Our academic colleagues rarely engage in meaningful outreach to the public about climate change and other geological issues that affect national or global populations.

National Public Radio recently made a similar point (11/24/09) in a story to commemorate the 150th anniversary of the publication of Charles Darwin's ***Origin of Species***. The NPR story noted that Darwin's observations, interpretations and conclusions were readily comprehensible to those persons with enough money to buy his book when it was first published. In contrast, the basis for scientific research nowadays is complicated beyond comprehension for most of the general public, and it is only the end result that we come to know and appreciate, such as the fact that DNA samples can be matched, or that earthquakes and volcanoes reflect plate tectonic activity, but the details of how we can do this and know that remains a mystery to most.

When not involved with his duties as AIPG editor and with the National Screening Committee, Bob Stewart is employed as a Senior Associate Geologist with Arcadis in its Manchester, CT office.

Attention Sections:

Please take note of the new students members in your section. Welcome them to AIPG and your section.

Remind them of the AIPG scholarship that they can apply for. (Deadline February 15th) Information can be found on page 3 of this issue of *TPG*, or on the AIPG website at www.aipg.org.

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Editor's Corner continued from page 16

According to CCPG, "All geoscientists share common core knowledge around which the profession of geoscience is practiced. These subject areas define the common knowledge base in geoscience required to practice in all three streams of geoscience." Additionally, for the geology and environmental geoscience streams, the following courses are considered to be foundational, with a minimum of five courses to be selected, and at least one from each group:

Geology Stream	Environmental Geoscience Stream
Group 1: Geochemistry Geophysics	Group 1: Geochemistry Geophysics
Group 2: Igneous Petrology Metamorphic Petrology Sedimentary Petrology	Group 2: Hydrogeology/Hydrology Engineering Geology
Group 3: Sedimentology Glacial Geology or Geomorphology Remote Sensing	Group 3: Geomorphology or Soil Science Glacial Geology Remote Sensing

The CCPG recommendations for compulsory and foundation courses are approaching the minimum, aspirational requirements AIPG seeks from applicants for certification. CCPG (2008) recognizes the differences in knowledge necessary for the contrasting practice areas, but also acknowledges the similarities in knowledge expected for a student to become a competent practitioner in each respective area.² Presently, the path to licensure as a geologist in the United States requires a passing score on the ASBOG exam, which is based on a task analysis survey of practitioners. Consequently, the ASBOG exam is weighted according to the prevailing nature of work indicated by the responding practitioners.

My academic training in geology mostly predates Superfund and RCRA, the two original driving forces that spawned the environmental consulting industry as we know it today. I have always felt that basic geology courses which exclude "hydro" and "environmental" in their titles nonetheless provide a wealth of information applicable to most geological specialties. Compulsory and foundation courses, as recommended by the CCPG model, go far to ensure that students get this background. Perhaps AIPG should consider a similar course of action. Opportunities for formal study that are lost while a student are often difficult to recover once you're in the working world. Comments?

2. I have not mentioned the geophysics stream, which CCPG addresses in the same fashion.



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Dear Editor:

You will be pleased to know that we have compiled a complete list of outstanding earth science teachers receiving awards through the NAGT OEST program for 2009. Photographs and narratives will appear in the January issue of the *Journal of Geoscience Education*, along with the mention of your organization's involvement in the program. A complete list of the OEST winners with addresses is included with this mailing for your convenience. On behalf of NAGT, I want to sincerely thank you and your organization for bringing additional visibility and stature to geoscience education through your support of NAGT's award program.

John R. Wagner
Professor of Geology,
Clemson University &
OEST Committee Chair, NAGT

The American Institute of Professional Geologists has agreed to provide a one-year subscription to *The Professional Geologist* to the following winners:

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Dennis Dougherty
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Shelly Anne Witham
 FarWest Section
Laura Hollister
 Midcontinent Section
Richard Snyder
 New England Section
Elisa D'Amore
 Pacific Northwest Section
Roger Groom
 Southeast Section
Cliff Hudson
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Deborah Morgan
 OEST Alaska
Victor Trautman
 OEST Arizona
Wendy Barnett
 OEST Illinois
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Nina VanKleeck
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Dennis Dougherty
 OEST New Jersey
Shelly Anne Witham
 OEST New York
Renee Aubry
 OEST North Carolina
Cliff Hudson
 OEST Oregon
Roger Groom
 OEST Pennsylvania
Verle Emanuelson

OEST South Carolina
Derenda Marshall
 OEST Tennessee
Frances Hamilton
 OEST Utah
Deborah Morgan
 OEST Virginia
James L. Ruffa, II
 OEST Washington
Herb Bergamini
 OEST West Virginia
Pamela Casto
 OEST Wisconsin
Mike Steiner

Dear Editor:

Thank you very much for the Presidential Certificate of Merit and the very nice plaque that I received last week for being part of the AIPG Energy Committee. I really don't deserve it, but am happy to receive it on behalf of all the members of my subcommittee, who did a lot of the work.

I hope that the final statement and supporting materials are well-received by policy makers and the public, and help to enhance AIPG's reputation

John Berry, CPG-04032
Austin, Texas

Dear Editor:

Thanks to your staff for the extraordinary AIPG meeting and field trips. Your fine effort and leader's contributions are greatly appreciated. I also speak for my wife who attended nearly all other trips possible (Arches N.P., Eocene Fossil Collecting, Colorado N.M., and Rabbitt Valley) that I could not attend in the time allowed.

I wish to personally say "thanks" to the organizers and guides of the 1-day West Elk and 2-day coal mining and reclamation to Trapper and ColoWyo mines organized and led by Wendell Koontz, Bobby Munz, Forrest Luke, Juan Garcia, Graham Roberts and organizer Jim Burnell of Colorado Geological Survey. These were our (If I may also speak for Scott Stebbins, Robert Shields, and the several other attendees) best ever peeks into modern coal mining. Everyone who uses coal-fired electrical power and all of Colorado should see or appreciate the great personal sacrifice and contributions these people perform. I am unable by myself to get permission or schedule such outstanding trips, so making these events available is that much more important to professional geologists and mining people. I have visited over 40 coal mines and facilities in my career, but we saw new technology and talked to people

during these three days which topped those experiences by far.

David Boleneus, MEM-1722
Spokane, Washington

Dear Bill,

It was great to see you a couple of weeks ago at the CVD and Leadership Conference. As I said, wish we had more time to catch up.

My time in Washington thus far has been truly amazing. The opportunities I am offered on a daily basis are incredible, and this is truly shaping up to be the experience of a lifetime. I have to thank you twofold: One, for giving me such a great recommendation during applications, and two for facilitating my position here as an AIPG intern this fall rather than in the summer. Actually, I have to thank you a third time, for pulling me in to all of this stuff when I met you at the NCSL event in Boston! I'd need a whole note card just for that. Anyhow, just want to thank you, and let you know in whatever small way how much I appreciate the things you've done for me. Take care, I'll speak to you soon regarding the rest of the recruitment campaign.

Joey Fiore, SA-01164

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SPONSORS:

1 required from a CPG or Member

SIGN-UP FEE (prorated):

Dec-Mar = \$100; Apr-Jun = \$75

Jul-Sep = \$50 Oct-Nov = \$25

ANNUAL DUES: \$100 plus Section dues

APPLICATION: Available on website www.aipg.org*

As defined by the American Geological Institute, a geological science is any of the interdisciplinary specialties that are part of the science of geology, e.g., geophysics, geochemistry, paleontology, petrology, etc.

Applicants for certification must meet AIPG's standards as set forth in its Bylaws on education, experience, competence, and personal integrity. If any Member or board has any factual information as to any applicant's qualifications in regard to these standards, whether that information might be positive or negative, please mail that information to Headquarters within thirty (30) days. This information will be circulated only so far as necessary to process and make decisions on the applications. Negative information regarding an applicant's qualifications must be specific and supportable; persons who provide information that leads to an application's rejection may be called as a witness in any resulting appeal action.

*Due to the availability of AIPG's online directory, new member address information will no longer be printed in TPG. If you need assistance locating this information please contact Headquarters.

Applicants for Certified Professional Geologist

AK-Neil Kinnebrew
CT-Kenneth D. Taylor
NM-John M. Gillentine
NY-Andrew D. Lent

Applicants Upgrading to CPG

GA-Mark E. Hall MEM-1783
ME-John R. Breedlove MEM-1786
MI-Christian Seidel MEM-1769
MT-Michael J. Knight MEM-1714
MT-Michael S. Koski MEM-1740

New Certified Professional Geologists

AK-David B. Harvey CPG-11301
AK-James E. Fueg CPG-11302
MA-Robert Peter Danckert CPG-11304
NV-Amer Smailbegovic CPG-11303
NY-David R. Gill CPG-11305
RI-Barrett L. Smith CPG-11307

New Members

AK-Lauren C. Dubuisson MEM-1766
AZ-Kim S. Wilson MEM-1788
CA-Christian Landau MEM-1775
CO-Ann V. Givan MEM-1771
CO-Charles E. Stanzione MEM-1780
FL-David J. Settles MEM-1784
FL-Joseph T. Alex MEM-1778
GA-James Lee Beaver MEM-1777
GA-Kevin O. DeGrosky MEM-1787
GA-Mark E. Hall MEM-1783
GA-Ralph O. Howard MEM-1779
GA-Susan L. Boyd MEM-1776
IN-Sammy Sirhan MEM-1774
KY-Carroll G. Haley MEM-1770
ME-John R. Breedlove MEM-1786
MI-Christian Seidel MEM-1769
NM-Bogdan M. Strzelczyk MEM-1768
NM-William Turner MEM-1782
OH-Gregory L. Mason MEM-1790

OR-Clifford J. Pearson MEM-1773
SC-Irene B. Boland MEM-1772
TN-Ann E. Epperson MEM-1767
TN-Hugh H. Mills MEM-1789
TX-John M. Hawthorne MEM-1765
UT-Robert W. Schafer MEM-1781

New Students Adjuncts

AK-Rachel A. Puchrik SA-1727
AR-John C. Dennis SA-1638
BC-Betsy A. Friedlander SA-1603
CA-Thomas E. White SA-1598
CA-Kiersti R. Ford SA-1612
CA-Deborah J. Shulman SA-1634
CA-Alfredo L. Sanchez SA-1635
CA-Sylvana N. DeSantis SA-1648
CA-Kari M. Hochstatter SA-1679
CA-Emily J. Kleber SA-1686
CA-Laury M. Fassett SA-1699
CA-Kelly G. Boyle SA-1700
CO-Jessica A. Matthews SA-1619
CO-Patricia G. MacQueen SA-1682
CO-Amanda E. Takacs SA-1695
CT-Emma S. Mendelsohn SA-1604
CT-Amelinda E. Webb SA-1717
FL-Jennifer N. Gifford SA-1284
FL-Brittany L. Newstead SA-1608
FL-Crystal R. Pletka SA-1624
FL-Dylan Miner SA-1636
FL-Tina Kuhn SA-1649
FL-Vimal R. Pradhan SA-1658
GA-Arminda B. Hawil SA-1614
GA-Lindsey E. Hunt SA-1655
GA-Katie H. Ayash SA-1661
GA-Tina M. Skinner SA-1662
IA-Nicholas P. Vreeland SA-1693
ID-Hazel Reynolds SA-1618
ID-Renee Breedlovestrout SA-1660
ID-Eric M. Johnson SA-1691
ID-Timothy R. Brown SA-1703
ID-Brandy L. Caryo SA-1725
IL-Margaret E. McKee SA-0421
IL-Craig J. Gripp SA-1592
IL-Sean M. Slattery SA-1593
IL-Jarek Trela SA-1627
IL-Bradley D. King SA-1628
IL-Simone E. Runyon SA-1629
IL-Stefanie Pipis SA-1630
IL-Caroline M. Amelse SA-1647
IL-Jodi A. Lau SA-1672
IL-Alex T. Fitzjarrald SA-1726
IN-Ronald D. Taylor, Jr. SA-1613
IN-Martha L. Growdon SA-1621
IN-Tiffany R. Schoenbachler SA-1675
KS-Andrew W. Neal SA-1611
KY-Matthew R. Downen SA-1625
KY-Kelsey L. Kidd SA-1626
MA-Karen J. VanWagner SA-1652
MA-Kathleen E. Vander Kaaden SA-1674
MA-Ann M. Surette SA-1692
MA-Theresa L. Smith SA-1720
MI-Shannon M. Molaroni SA-1296
MI-Mary E. Russo SA-1609
MI-Elizabeth G. Wilson SA-1666
MI-Jaclyn D. Clark SA-1701
MI-Joseph F. Sadowski SA-1704
MI-LeAnn M. Germer SA-1723
MI-Kristina L. Revels SA-1724
MN-Ashley J. Tooley SA-1606
MN-Karanina E. Scheel SA-1683
MN-Daniel T. Gustafson SA-1696
MO-James E. Papin SA-1653

MO-Catherine C. Reed SA-1698
MO-Xiouyu Guo SA-1710
MS-Zack W. Munger SA-1644
MT-Amy E. Singer SA-1318
MT-James E. Swierc SA-1681
MT-Megan R. Rosenblatt SA-1718
MT-Chelsea M. Feeney SA-1719
NC-Jeff D. Bowman SA-1689
ND-John D.W. Fielding SA-1702
NJ-Kelli L. Moran SA-1643
NV-Carla M. Eichler SA-1277
NV-Racheal L. Johnsen SA-1663
NV-Audrey H. Roger SA-1665
NV-Mengesha A. Beyene SA-1722
NV-Jennifer L. Manion SA-1728
NY-Justin M. Allen SA-1615
NY-Brian R. Terbush SA-1639
NY-Deirdre A. LaClair SA-1642
NY-Timothy Sime SA-1664
NY-Rebecca Hammer-Lester SA-1677
NY-Brandt R. Kayser SA-1687
NY-Patrick J. Collins SA-1706
NY-Jeremy M. Weremeichik SA-1707
NY-Amanda M. Baker SA-1721
OH-Terra A. Dalton SA-1607
OH-Laura C. Walkup SA-1622
OH-Heather M. Stoller SA-1645
OH-Kevin R. Liebe SA-1656
OH-Kelsey R. Blongewicz SA-1657
OH-Justin M. Von Bargaen SA-1659
OH-Melisa R. Bishop SA-1671
OH-Alexa R. Sedlacek SA-1716
OK-Vanessa N. Harvey SA-1602
OK-Xiou Xu SA-1709
OR-Alyssa R. Pratt SA-1600
OR-Kevin J. Friscia SA-1601
OR-Luke C. Marth SA-1616
OR-Kelsii J. Dana SA-1617
OR-Erica A. Medley SA-1620
OR-Ali V. Furmall SA-1623
OR-Tracy J. Lund SA-1646
OR-Eleanor Ra Wershow SA-1654
OR-Josh Heard SA-1673
OR-Hollie A. Heesacker SA-1680
OR-Jenifer M. Shempert SA-1685
OR-Julia F. Cohen SA-1705
OR-Jennifer L. Oberst SA-1708
PA-Matthew S. Ritz SA-1610
PA-Reed A. Myers SA-1633
RI-Rachel N. Grandpre SA-1690
SK-Christine L. Austman SA-1688
TN-Ernest M. Wylie, II SA-1594
TN-Jennifer L. Pickering SA-1595
TN-Phillip M. Derryberry SA-1599
TN-James W. Atwood SA-1667
TN-Megan E. Ennis SA-1668
TN-Rene A. Shroat-Lewis SA-1669
TN-Miles A. Henderson SA-1670
TN-Eric G. Hogan SA-1714
TN-Aubrey L. Modi SA-1715
TX-Craig M. Bremer SA-1640
TX-Sarah B. Dunn SA-1641
TX-Justin N. Brundin SA-1676
TX-Nolwenn Coint SA-1678
TX-Erika K. Jordan SA-1684
VA-David C. Greenawald SA-1605
VA-Katherine Telfeyan SA-1697
WA-Vita M. Taube SA-1596
WA-Alex P. Jones SA-1597
WA-Julia E. Labadie SA-1650

New Members continued on page 54

AIPG CLIMATE CHANGE AND DOMESTIC ENERGY STATEMENT

Updated Position Statement on Climate Change

The National Executive Committee asked Past-President Dan St. Germain (CPG-07858) and me (Chairman of the 2008 Ad Hoc Committee on Climate Change) to simplify the AIPG position statement on Climate Change. The previous position statement, which was presented by Dan St. Germain in his Presidents message "A Year in Review" (TPG: November/December 2008), was the product of six months of often heated debate by the ten members of the Ad Hoc Committee on climate change. This debate was followed by further discussions, modifications and approval of the position statement by the National Executive Committee in Flagstaff, in October 2008.

The development of the original climate change statement by the Ad Hoc Committee was a rigorous exercise reflective of the widely divergent views of the committee members. One of the highlights of the process was the circulation of a climate change questionnaire to the general membership. The questionnaire results were published in the September/October 2008 issue of the TPG. The questionnaire results showed that the widely divergent views of our committee were a reasonable reflection of our membership as a whole. The questionnaire was used as a guide to establish an overall philosophy behind the position statement. This approach lead to some of the ambiguity in the final product. The following revised position statement is a concise statement that allows the AIPG to take a professional and scientific position without getting involved with the political debate:

The geological professionals in AIPG recognize that climate change is occurring regardless of cause. AIPG supports continued research into all forces driving climate change.

**Samuel W. Gowan, CPG-07284,
Chairman of the Ad Hoc Climate
Change Committee.**

Energy Committee Report

At the national meeting in 2008 in Flagstaff, Arizona President-Elect John Bognar asked me to chair an energy committee, which I accepted. The initial call for volunteers was by email to all members in October 2008. There was also an announcement in the TPG Jan/Feb 2009 issue. Since then, we added and subtracted members and had approximately 50 volunteers on the roster. We initially had a few teleconferences and a web site where members could both make comments and post articles and technical papers.

We divided the work into six teams: Oil/Gas, Coal, Nuclear, Other Resources, Environmental, and Carbon Dioxide. The number of members on each team ranged from four on Nuclear to 13 on Other Resources. I contacted Rick Fritz, Executive Director with AAPG, for assistance and he was very helpful. I also spoke to Jim Blankenship, Geoscience Director and David Curtis, Director of their DC office who provided some references and AAPG publications for our use. We also added three AAPG members who volunteered to join our teams.

Our plan was that each team would produce a paper with references to support their position. Next, we would reduce the six papers down to a few pages for a comprehensive final statement. We completed a three-page document that the National Executive Committee members reviewed in June 2009. Additional edits and teleconferences took place from July 2009 through September 2009. The completed document was presented to the National Executive Committee members in October 2009, in Grand Junction, Colorado. With a few minor

edits, the National Executive Committee approved the final document.

Our completed work included AIPG Domestic Energy Statement along with six individual papers corresponding to each of the six original teams. Dr. James F. Howard, CPG-02536 and Keith Long, MEM-0795, included two additional papers on Ocean Energy Alternatives and Biofuels respectively.

Serving as committee chair has really opened my eyes concerning the great diversity we have in AIPG membership and the different areas of expertise. It has been a great learning experience for me personally, and I must acknowledge the six team leaders for all their hard work for getting this project completed: John Berry, CPG-04032; Don Harris, CPG-10819; Doug Ganey, CPG-10868; Dennis James, CPG-04970; David Ryckman, CPG-11246; and Lee Smith, CPG-03385.

Now that the statement is complete and posted on AIPG's web site, it is up to the membership to use it and submit it to your congressman and senators. If any members make presentations to local civic organizations use it as talking points to discuss the issues of energy. We as geologists should be taking more of a leadership role concerning this important issue and I encourage you to use it.

**Ronald Wallace, CPG-08153,
Chairman of the
Energy Committee**

American Institute of Professional Geologists Domestic Energy Statement

The American Institute of Professional Geologists recognizes that there is a need to reduce the United States' dependence on imported petroleum, natural gas, and uranium, as well as the strategic minerals needed to process them. Increased domestic production of fossil and min-

eral energy resources, as well as the mining of certain minerals needed for the development of alternative energy sources, will pose environmental concerns. Regulations and limitations on access have discouraged much domestic development of energy resources, but the U.S. energy industry has proven that mitigation of environmental concerns is both physically and economically possible. Therefore regulations should promote the responsible development of energy resources and not be allowed, as a matter of policy, to hinder the development of domestic energy resources.

Recognizing the dependence of our civilization on energy, the AIPG encourages the use and development of all forms of traditional and alternative energy including oil, natural gas, coal, methane, nuclear, geothermal, solar, hydro, and wind. To increase the domestic supply of petroleum, industry must be allowed to explore and produce domestic sources of oil and natural gas. The U.S. populace must realize there cannot be enough domestic petroleum production to make us independent of our enormous volume of imports. Conservation of energy is therefore also important.

We appreciate public apprehension regarding nuclear power, yet we also recognize that nuclear power is currently the only energy source that can produce enough power to replace a significant amount of the fossil fuels consumed without releasing greenhouse gases to the atmosphere. We suggest, therefore, that Government policy should encourage the use of nuclear power and the exploration and production of uranium resources in the United States under realistic rules governing security and safety. Safe production of nuclear power requires the development and use of geologically suitable sites for the long-term interment of high-level radioactive waste; approximately 3% of all waste which is produced, when fuel is reprocessed.

The AIPG strongly supports the education of the public as to the current realities of energy availability (as of October 2009) to wit:

- Oil – Our nation's economy is based on petroleum, which accounts for 39% of our total energy supply, with oil imports of 12 million barrels per day, while our domestic production is only 5 million barrels per day and declining.
- Natural Gas – Supplies 24% of our total energy but we currently import 16% of our natural gas needs. Domestic natu-

ral gas production can be increased over the near term from conventional and unconventional sources, including tight gas sands, coalbed methane, and gas shales.

- Nuclear – 8% of U.S. total energy is produced in 104 domestic nuclear power plants. We currently import 90% of the uranium used to fuel those plants. The U.S. has "reasonably assured resources" of uranium of 343,000 tU, more than enough to alleviate dependence on foreign sources of uranium.
- Coal – Is currently used to produce 22% of our domestic energy supply needs. The U.S. also has significant reserves, which at current use rates will last for over two hundred years.
- Alternative energy sources – While there is a lot of excitement about the potential for alternative energy sources to alleviate dependence on oil, natural gas, coal, and nuclear power, the reality is that these nontraditional energy sources produce 7% of the U.S. energy needs. Development of alternative sources, with the possible exception of hydroelectric and wind energy, is in its infancy. Additionally, each has environmental issues of its own and the cost of these forms of energy is currently much greater in most situations than that of conventional energy sources. The AIPG supports development and research of all alternative energy, but recognizes that it will take many years and a dedicated effort to reach significant delivery of these forms of energy to society.
- Wind – Is the fastest growing source of renewable energy, but infrastructure and future limits on the supply of some critical rare earth minerals required for the turbines may slow growth.
- Hydroelectric power – Currently is the largest renewable energy source in the U.S., with a significant amount of power produced by hydroelectric dams in the northwest. This area has great potential for growth but also legacy environmental issues to overcome.
- Solar Electric – Currently produces the smallest percentage of renewable energy because of its high capital costs, long construction time, intermittent availability of sunlight, and need for some strategic minerals. Intensive research is leading to rapidly decreasing costs.

- Geothermal – Currently is capital intensive but has almost an unlimited amount of resource. At present only six western states utilize geothermal power.

- Other – Tidal, wave, and ocean thermal conversion will all be important sources of energy and all have great potential but will be many years before they will have a large impact on the overall energy resource.

Government can encourage domestic energy development by opening leasing of public lands and streamlining environmental permitting of public and private lands for energy development and utilization of the mineral resources needed for alternative energy. Environmental regulations should be scientifically sound and sufficiently objective to promote exploration and development of all energy resources including oil, natural gas, coal, uranium and strategic minerals.

If society chooses to reduce the rate of CO₂ emissions into the atmosphere produced during the production of energy from traditional, fossil fuel resources, geologists should proceed to quantify the geologic sequestration capacity for carbon dioxide.

The AIPG strongly supports conservation of energy as a way to limit the environmental effects of energy production and use. The AIPG further supports vigorous efforts to limit the environmental impacts of those traditional and alternative energy developments that are required to sustain our society.

The detailed individual Energy Statements will be published in their entirety in the March/April 2010 issue of *TPG*.

START AN AIPG STUDENT CHAPTER TODAY!

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

U.S. Electricity Production Needs More Nuclear Energy

Dr. Perry H. Rahn, CPG-03724

Sources of U.S. Electrical Energy

The following table (from "Statistical Abstract of the U.S.", 2008; modified to include percent) shows U.S. electricity generation according to fuel type for year 2005.

Source	Billion kWh	%
Fossil fuels, total	2,903.3	71.90
Coal	2,014.2	49.88
Petroleum	121.9	3.02
Natural gas	751.5	18.61
Other gases	15.6	0.39
Nuclear	780.5	19.33
Renewable energy, total	357.2	8.84
Coventional Hydroelectric power	265.1	6.57
Biomass, total	61.8	1.53
Wood	37.8	0.94
Waste	24.0	0.59
Geothermal	15.1	0.37
Solar	0.5	0.01
Wind	14.6	0.36
Other	3.7	0.09
Total Generation	4,038.0	

The table shows that coal provides half of the nation's electrical power. This is followed by nuclear power (19.3%) and natural gas (18.6%). This paper briefly examines the major sources of electricity and their potential for future supply.

Nationwide demand for electricity is expected to rise 19% over the next decade. The world's population is growing from its present 7 billion, and worldwide energy demand is predicted to rise 50% by 2030. An important question facing this nation is: where will this additional power come from?

Fossil Fuels

Most of the nation's electricity (71.90%) originates from the burning of fossil fuel. This includes petroleum, natural gas, and coal.

Petroleum is used to supply 3.02 % of the nation's electricity. In 2007 the U.S. daily production of crude oil was 8.5 million barrels. This number has been decreasing over the past few decades. Domestic oil consumption was 20.7 million barrels per day in 2007. Domestic oil reserves are decreasing and the

U.S. is becoming increasingly dependent upon foreign sources. The U.S. has only 3% of the world's proven oil reserves, yet consumes 27% of the world's oil. Petroleum is used mainly to make gasoline for transportation. The dwindling supply of petroleum and instability of foreign sources has increased the design and sales of hybrid and all-electric cars. President Obama recommends one million plug-in hybrid cars by 2015. Electric cars may seem like a panacea for the nation's increasing dependence on foreign oil, but the electricity has to be generated somewhere. And driving more fuel efficient vehicles does nothing to discourage long commutes and urban sprawl. All things considered, it does not appear that petroleum will be a major fuel source for increased U.S. electrical production.

Synthetic oil can be produced economically from oil shale and Canadian tar sands. Oil shale (synfuels) development in the U.S., initiated in the 1970s, has mostly ceased. Oil shale typically is mined and cooked to release the oil, hence CO₂ is released and the landscape degraded. Billions of barrels of recoverable oil are present in the Green River Formation, but the price of recovery is unacceptably high because of the amount of energy needed to convert the rock into oil. Athabasca tar sands in Alberta may yield 1.7 trillion barrels of crude oil, possibly more oil than found in Saudi Arabia. In 2009 two TransCanada pipelines are being designed to carry oil from Athabasca tar sands into the U.S.

Natural gas seems to have a bright future because new gas fields are being discovered in the Gulf of Mexico and other places. However, the U.S. has less natural gas reserves than the quantity already consumed. Imports now account for 20% of consumption. Further, this commodity is much sought after for residential supply and other uses. Natural gas supplies, like petroleum, are finite.

Coal supplies 50% of U.S. electricity. Nationwide there are 500 coal-fired power plants. The U.S. has vast coal deposits, and domestic reserves of coal are estimated to be equivalent to four times the oil in Saudi Arabia. There are many environmental impacts resulting from the use of coal. "Mountain-top" coal mining in West Virginia is an example of the environmental destruction accompanying coal strip mining. Streams in the Appalachian Mountains in eastern Pennsylvania offer a dramatic comparison of the effects of coal mining: the Bush Kill, Loyalsock, and Aquashicola are beautiful trout streams, whereas the Shamokin, Mahanoy, and Schuylkill are polluted from coal mining. Acid rain is another environmental problem.

The main handicap to development of electricity from coal is that carbon dioxide is emitted when coal is burned. Carbon dioxide is believed to be increasing the temperature of the Earth, and many countries are limiting the emission of greenhouse gases. Although the U.S. is not part of the "Kyoto Protocol" to limit greenhouse gases, this attitude might change

in the future. Coal-fired power plants are the largest source of anthropogenic carbon dioxide. President Barack Obama wants to reduce U.S. greenhouse emissions by 14% below 2005 levels by 2050, but the cost may be prohibitive. A DOE study of a near-zero emission coal plant in Illinois showed a nearly doubling of the cost.

Simple mathematics shows the magnitude of the CO₂ problem: the atomic weight of carbon is 12, and the molecular weight of CO₂ is 44. Therefore the ratio of carbon dioxide to carbon is $44/12 = 3.7$. In other words, there is almost 4 times the weight of carbon dioxide produced as coal burned.

The use of “clean coal” implies the safe capture and disposal of CO₂. But this term does not necessarily have anything to do with reducing CO₂ emissions. The construction of a coal-fired plant to capture CO₂ can be prohibitively expensive. In fact, the capture of CO₂ directly from air is as feasible as capturing it from a smoke stack. In any event, research is ongoing to determine ways to store the recovered CO₂. Sequestration might include pumping it into underground oil or gas reservoirs, but the expense might be prohibitive. For example, a proposed coal-fired electric plant in the outskirts of New York City, involving the capture of CO₂ emissions and pumping of the gas 70 miles offshore into sandstone, would cost \$5 billion.

Despite research into “clean” coal burning techniques, the future of coal is limited by global environmental factors. As a harbinger of things to come, in 2009 the National Society of Professional Engineers reported that a large coal-powered electric plant near Las Vegas was being planned, but opposition pointed out that the plant would throw out large quantities of carbon dioxide. Hence Dynegy, Inc., is dissolving participation in the development of the coal-fired electric plant.

Renewable Energy

Except for hydropower, renewable energy represents a very small percent of the U.S. electricity production. Renewable energy could increase somewhat because President Obama’s “stimulus package” legislation being prepared by U.S. Congress includes \$20 billion for tax incentives for wind, solar, and other renewable power sources.

Hydropower contributes 6.57% of the nation’s electricity. Boulder Dam, AZ, the Grand Coulee Dam, WA, and Oahe Dam, SD, function very well in that electricity production can be turned on easily during the day when demands are high. But future increase is not very likely because the good dam locations in the U.S. have been utilized. Dams create many kinds of adverse environmental impacts, and it appears that, in the future, hydropower will not supply any additional U.S. electricity. Dams in foreign countries, such as the Three Gorges Dam on the Yangtze River, China, are still being built.

Solar, wind, geothermal, and sea (waves/tides) contribute less than 1% of the nation’s electrical power. Studies show that a new electrical grid to aid in the use of renewable energy would be costly. *The Wall Street Journal* (February 9, 2009) reported that a new electric grid “...would require building a transmission system that would carry a price tag of up to \$100 billion”. In order “to get 20% of its electricity from renewable energy by 2024, the study says,” the U.S. needs “to build a new electricity circulatory system, including 15,000 circuit miles of extremely high voltage lines. The system, which would be laid alongside the existing electric grid infrastructure, would start in the Great Plains and Midwest -- where the bulk of

the nation’s wind resources are located -- and terminate in big cities along the East Coast.”

A major obstacle to wind power is that the wind does not blow all the time, and there is no easy way to store the energy for times of high electric demand. Because of environmental concerns, legislation is being proposed that would put off-limits any solar and wind energy projects in southern California deserts. A proposed Nevada Wind Farm near Reno is meeting opposition by people opposed to 44 giant wind turbines overlooking their homes; the project will produce 85 megawatts when the wind blows, providing power for up to 36,000 households.

Two geothermal electric plants near Fallon, NV, were dedicated in 2009. Enel North America reports the two plants will generate 65 megawatts of power, enough to supply 40,000 households. Except for places in California and Nevada, however, geothermal energy plays very little part of electrical power production in the U.S. Other countries have abundant geothermal resources and plan additional use. For example, Japan will utilize its volcanic terrain to provide geothermal energy; they plan to tap hot water and steam at 2,000 meters depth to generate 60 Megawatts of electricity by year 2016.

President Obama’s economic stimulus package includes \$16.8 billion for renewable energy and efficiency programs. However, renewable energy constitutes only a very small percentage of U.S. electricity, and most likely will not play a big part of the future U.S. electrical production.

Nuclear Power

Presently 104 nuclear reactors supply 19.33% of the nation’s electricity. Other countries depend even more on nuclear energy. For example, 59 nuclear power plants generate 79% of France’s electricity, and 55 nuclear power plants generate 29% of Japan’s electricity.

Following the Three Mile Island accident in Pennsylvania (1979) and the Chernobyl nuclear meltdown in Russia (1986), nuclear power production was not held in high esteem. But in the 21st century, additional nuclear power plants are being sought after by many countries.

Nuclear energy is handicapped by problems associated with uranium mining and the handling radioactive waste, e.g. the spent fuel rods. Two decades after Yucca Mountain in Nevada was selected to be the nation’s nuclear waste repository, the Obama administration in 2009 cut almost all funds. The nearby Nevada Test Site, already contaminated by atomic bomb tests, has been proposed as an alternative high-level radioactive waste disposal site.

Many countries support deep burial in geologic repositories for disposal of high-level radioactive waste. These include Belgium, Canada, Czechoslovakia, Finland, France, Germany, Japan, Russia, Spain, Sweden, Switzerland and the U.K. For example, radioactive waste disposal began in the Czech Republic in 1959; the repositories include abandoned underground limestone and uranium mines within 150 km of Prague. Radioactive waste in Germany is buried in 300 ft deep former potash and the Asse salt mines. Finland buries radioactive waste from 4 nuclear power plants in gneiss. Nuclear power supplies 50% of the energy in Sweden from 10 reactors; the Swedish repository is in granite below sea level. The French radioactive waste research facility, a precursor for their deep repository, is in limestone near Bure.

Although the U.S. does not have a permanent repository for commercial radioactive waste, the U.S. has been accepting transuranic radioactive waste (i.e., contaminated industrial waste) in the Permian Rustle Formation, a bedded evaporite, at the 2,250 ft deep Waste Isolation Pilot Plant (WIPP) near Carlsbad, NM. Intermediate-level waste, such as waste from reprocessing or nuclear weapons production, has been stored there since 1999.

The high cost of constructing new nuclear reactors is an impediment to nuclear energy. It has been three decades since a new nuclear power plant has been built in the U.S., yet 35 new reactors are now in the planning stage. For example, Florida Power and Light has plans for a new plant off the Florida Keys, but it came in as costing \$12 billion to \$18 billion. Other countries are increasing nuclear energy production. According to Bloomberg News (January 8, 2009), Kyushu Electric Power Co., the monopoly power supplier to Japan's southwestern island of Kyushu, will spend \$5.9 billion to build a third nuclear reactor at its Sendai station; construction of the 1,590-megawatt reactor is slated to begin in 2013 and operations will start by March 2020. Bloomberg noted, "Kyushu Electric wants nuclear power to account for about half of its output, compared with 41 percent in the year ended March 2008. Japan, the world's third-biggest oil consumer, is boosting nuclear power generation to strengthen security of energy supplies and reduce emissions of greenhouse gases."

Security issues, including terrorism, are a "wild card" and a detriment to the peaceful use of nuclear energy. No direct sabotage of a nuclear reactor has occurred, although in 1981 Israel destroyed Iraq's Osirak nuclear reactor near Baghdad and in 2007 destroyed a suspect Syria plutonium production reactor. The technology to produce nuclear electrical energy increases the feasibility of acquiring nuclear weapons. There are approximately 20,000 nuclear weapons in the world; the United States and Russia have 96% of them. The International Atomic Energy Agency (IAEA) must diligently prevent rogue nations from the enrichment and reprocessing of uranium and plutonium.

Hellman (2008) shows the risk of nuclear terrorism compared to other risks. For instance, the chance of a large asteroid colliding with Earth has a probability of 10^{-8} per year. Current nuclear reactor designs require a failure rate for a significant release of radioactivity to be less than 10^{-6} per reactor per year. These probabilities are quite low when compared to former Secretary of Defense William Perry's estimate that the chance of a nuclear terrorist incident in the next decade to be 50%.

Recent World-Wide Developments Indicate a Nuclear Revival

Following a story of the Russia-Ukraine natural gas dispute, the *Christian Science Monitor* (January 16, 2009) reported: "With the squabble between Russia and Ukraine leaving much of [Europe] with uncertain gas supplies, some governments seem to be getting over their 'Chernobyl complexes' and are returning to nuclear energy, hoping it will provide a form of reliable, domestically produced energy. Slovakia and Bulgaria announced this week that they may reopen Soviet-era reactors..." and the Italian government "...recently declar[ed] its intention to return to atomic energy, despite two decades of officially shunning the power source." The Monitor adds, "Environmentalists continue to debate the issue, but a desire

to reduce the carbon footprint of energy suppliers is renewing interest in nuclear energy."

Noting expected growing demand for energy and the present lack of financing in oil industry, the *Financial Times* (January 22, 2009) editorialized, "A big increase in nuclear power has to be part of the solution." The Times pointed out that "oil companies are cutting back on the capital investment needed to replace their aging infrastructure (and) lower prices mean less incentive...to build new refineries and pipelines, to develop harder-to-reach oil fields and to invest in exploration." The Times argued that "It would be a bad mistake if the (current) financial crisis led us to postpone the decisions and investment needed to provide the world with a viable source of safe, secure and environmentally friendly energy." The Times also argued that "the new generation of nuclear reactors is cheaper than its predecessors and produces energy at a considerably lower cost than other low-carbon energy sources," and "no renewable source yet has the capacity to generate the amounts of power needed to replace large fossil fuel plants."

In an op-ed in the *Washington Times* (January 29, 2009), Stuart Butler, vice president for domestic-policy issues for the Heritage Foundation, wrote that, "if we're serious about security and the environment, we should be embracing" nuclear energy. But, Butler notes, "excessive legal and permitting delays are pushing up the capital cost of new nuclear-power plants and thwarting most new projects. Only one nuclear plant is currently being built in the United States - and that began in 1973." In the meantime, "44 are under construction in other countries. France now generates 80 percent of its electricity from nuclear. We produce just 20 percent." Also, "from an environmental perspective," Butler said, "nuclear energy can't be beaten. No belching smokestacks or polluting gases. It releases nothing into the atmosphere - no carbon dioxide, no sulfur, no mercury." And, nuclear power "takes up hardly any land. One double-reactor plant takes up a few hundred acres and can power 2 million homes. The same production from wind or solar can take tens of thousands of acres, often blighting scenic views."

The *Financial Times* (February 6, 2009) reported, "The Swedish government will allow the construction of nuclear power stations, ending a ban imposed after a 1980 referendum." The move "demonstrates how even environmentally conscious countries are changing their attitude to nuclear power, and now regard it as a potential solution to concerns over carbon dioxide emissions, high fossil fuel prices and dependence on imported energy sources." The *AP* (February 5, 2009) added, "Leaders for the center-right coalition government said new reactors were needed to help fight climate change and secure the nation's energy supply amid growing support for nuclear energy in the Scandinavian country." The "plan, which needs approval from Parliament, calls for new reactors to be built at existing plants to replace the 10 operational reactors when they are taken out of service." Sweden's move is seen as evidence of a European nuclear revival. *Bloomberg News* (February 6, 2009) reported that Fortum Oyj, Finland's biggest utility, plans "...to build a reactor at home, the latest evidence of a nuclear renewal sweeping Europe." Additionally, France "...unveiled a project last week to build its 60th reactor and possibly one more after that, while the U.K. is preparing to sell land for new atomic plants, attracting interest from some of the region's biggest utilities." Another *AP* (February 5, 2009) article pointed out that Fortum's "1,000-1,600 megawatt unit would be situated next to two existing reactors at Loviisa, 55

miles (90 kilometers) east of the capital. Construction would begin during the next decade and the plant could be operational in 2020...A similar application for a new nuclear reactor has been made by Fennovoima, a consortium of companies, including Germany's E.ON AG, stainless steel maker Outokumpu Oyj, regional utilities and Swedish mining and smelting group Boliden. Finnish utility TVO, which is building Europe's first European Pressurized Reactor, or EPR, on Finland's west coast has also applied to build a new nuclear plant." But, according to *Bloomberg News* (February 5, 2009), "The Finnish government has yet to decide on how many projects to approve as it seeks to provide more electricity from nuclear power for the population of about 5.3 million."

Reporting on nuclear development, the *UK's Times* (February 6, 2009) highlights that "Europe has 196 nuclear plants (with) about 35% (of) its electricity coming from nuclear energy... France gets an estimated 77% of its electricity from nuclear power, the highest proportion in Europe. Lithuania is second on 65%." According to the *Wall Street Journal's* (February 5, 2009) environmental Capital blog, Sweden's move is "...a big change, because Sweden was an early and ardent opponent of nuclear power." Most importantly, according to the Journal, "...the government reversed its 2006 campaign pledge not to build any new reactors and ended a ban on nuclear-power research." In addition to concerns about climate change, "...energy security (is also) forcing a rethink of nuclear power in many European countries. Sweden's new nuclear program seeks to address both problems." In 2009 Spain, Germany and U.K. seek to expand their nuclear power plants.

Conclusions

The continued production of U.S. electricity is necessary to sustain modern living standards. The use of fossil fuels for

future electrical production is bleak. Petroleum is running out. Natural gas is expensive and supplies are finite. Coal mining damages the environment and burning coal is believed to contribute to global warming. Hydropower won't supply any additional power. Renewable energy might be environmentally desirable, but, realistically, these sources don't contribute much. Electric power production by nuclear energy is gaining world-wide acceptance. There are 428 nuclear power plants world-wide and 44 new plants are being constructed. Nuclear energy is gaining ground as an alternative to burning fossil fuels because they do not emit greenhouse gases. The optimism in the nuclear industry is reflected in U.S. university enrollments: the number of students in nuclear engineering programs rose from 500 in 1999 to nearly 2,000 in 2007.

The handwriting is on the wall. Nuclear energy is poised for a renaissance, and will be the major contributor for the nation's future electrical energy. The crux of the problem with nuclear energy is not uranium mining, nor is it reactor safety, nor is it the disposal of high-level radioactive waste. The most important liability of nuclear fission is the deliberate misuse of nuclear facilities and materials by terrorists.

References:

Hellman, M.E., 2008, Risk analysis of nuclear deterrence: The Bent of Tau Beta Pi, Vol. 99, No. 2, p. 14-22.

Dr. Rahn has more than 45 years experience as a geological engineer. He is the author of the 1996 textbook "Engineering geology, an environmental approach". He welcomes comments to this article at perry.rahn@sdsmt.edu.

AVIS

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Have you received an email from AIPG Headquarters recently? If the answer to this question is **NO**, then you need to contact AIPG Headquarters and update your email. You may contact us at **aipg@aipg.org**. You may also login to the website (www.aipg.org) and update your information. You may also contact your section officers with your email update.

AIPG sends out notices on seminars, conferences, scholarship information, and section newsletters. Headquarters receives several hundred return emails due to incorrect information in our database.

If you do not have **aipg@aipg.org** on your approved senders list, then you need to. Please add this email to your approved list of senders. So please update your email. You might be missing out on some very important information.

Earth Science Week

On September 28, 2009 Florida Governor Charlie Crist signed a proclamation acknowledging October 11-17, 2009 as Earth Science Week. The proclamation defines earth sciences as geology, meteorology, physical oceanography, and hydrology and that these sciences provide the foundation for sound environmental management and stewardship of Florida's mineral, energy, and water resources. Earth sciences are central to understanding climate change and the potential effects on Florida's landscape and environment. The full proclamation is provided.

The Florida Geological Survey was instrumental in working with the Governor's office to write this proclamation.

The American Geological Institute (AGI) has prepared a workforce report that shows an aging geosciences workforce, and that there are not enough young geoscientists coming into our profession to make up for those of us who will retire in the next 10-15 years. Part of the lack of young geoscientists is that there are fewer geoscience students coming into the universities that want to be trained in the sciences. Many are not aware of the earth sciences because there is no requirement to take earth science in high school. Those that are aware of earth sciences want some form of interdisciplinary education and do not want to take the core geology courses.

Proclamations such as this, if properly promoted, will go a long way to help educate students at the high school and university level about the benefits of a geoscience education. The Florida Association of Professional Geologists, a section of the American Institute of Professional Geologists, has sent a letter to Governor Crist and to Florida Department of Environmental Protection Secretary Michael Sole thanking them for the proclamation and acknowledgement of Earth Science week.

If you have the opportunity to distribute the proclamation to high school or university students, please do so. We as professional geologists need to promote our profession as best we can.



CHARLIE CRIST
GOVERNOR

EARTH SCIENCE WEEK

WHEREAS, earth science is an all-encompassing term for sciences related to the earth, including geology, meteorology, physical oceanography and hydrology; and

WHEREAS, the earth sciences are central to the understanding of climate change and its potential effects on Florida's landscape and environment; and

WHEREAS, earth scientists monitor changes in our natural systems to predict, prepare and mitigate for the effects of natural hazards environmental change, including flooding, coastal erosion, landslides, droughts, expansive soils and sinkholes; and

WHEREAS, the earth sciences provide the foundation for sound environmental management, conservation and land use through better understanding of earth systems; and

WHEREAS, the earth sciences use observations and measurements from earth and space to safeguard public health, increase environmental protection and encourage wise stewardship of Florida's mineral, energy and water resources; and

WHEREAS, knowledge of earth sciences is important for protecting Florida's residents and environment from the natural hazards that pose a threat to our economy and quality of life; and

WHEREAS, the earth sciences are critical to understanding Florida's aquifers and groundwater, supporting restoration of America's Everglades and protecting Florida's freshwater springs considered some of the most unique in the world; and

WHEREAS, the earth sciences are essential in understanding the impact of hurricanes on Florida's coast, repairing our famed beaches and safeguarding Floridians from the effects of storms; and

WHEREAS, the earth sciences provide better understanding, protection and management of Florida's cultural, historical and pre-historical resources;

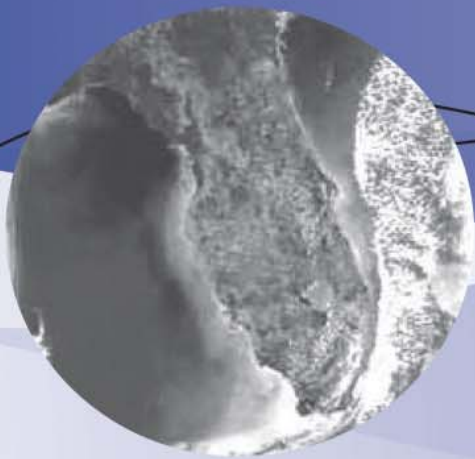
NOW, THEREFORE, I, Charlie Crist, Governor of the State of Florida, do hereby extend greetings and well wishes to all observing October 11-17, 2009 as **Earth Science Week**.



IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Florida to be affixed at Tallahassee, the Capitol, this 28th day of September in the year two thousand nine.

Charlie Crist
Governor

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Kurtis W. Stokes, CPG-07934,
February 13, 1959 - November 2, 2009

The Northeast Section AIPG Executive Committee is sad to report the passing of Section President Kurt Stokes (CPG-07934) after his brief, fierce struggle with cancer. Kurt leaves behind his loving wife Irene and two pre-teen daughters, Valerie and Nicole.

Kurt received his Bachelors of Science in Geology in 1981 from SUNY Cortland where he was one of the star players on that school's championship Lacrosse team. Kurt returned to academia for his Masters of Science degree, also in geology, which was awarded from Adelphi University in 1989. His 25-year professional career included stints as an environmental geologist with the Nassau County Health Department, Law Engineering, and several other Long Island consulting firms.

Kurt started his career with URS in 2000 after 17 years of experience with other firms. During his tenure with URS, Kurt became a cornerstone of our environmental practice in New York City, and played a significant role in expanding our environmental services

with agencies such as the New York City Economic Development Corporation, New York City MTA, and the US Postal Services among many others. However, he will be mostly remembered as a dear colleague, mentor and great friend to so many people he worked with at URS. To those who knew him, Kurt was simply a gentle giant.

Kurt joined the NE/AIPG ExCom in 2004 and, with his usual high energy and contagious enthusiasm, became the Section's Secretary. He helped organize field trips to the American Museum of Natural History and the Geologic Tour of Central Park. Kurt also played a key role in making the 20th Anniversary Dinner for the Angelo Tagliacozzo Memorial Geological Scholarship Fund a success. He was elected Section President and began serving in 2009. During his short tenure, Kurt firmly and efficiently guided, prodded, and pushed for the development of a new Section budget, increased subsidies for bi-annual meetings, and expanded outreach to other geologic and earth science organizations. One example of Kurt's strong commitment to AIPG and geology was his leadership in organizing a very successful joint meeting with the Long Island Association of Professional Geologists. Only a few weeks before his death, Kurt was on the phone making sure that the Section's upcoming trip to the Peabody Museum at Yale (dedicated to another deceased ExCom member, Jonathan Bass) was on track.

An avid fisherman, Kurt thought nothing of getting up at 3 AM on a chilly October morning and spending a few hours surf casting into the waters of the Atlantic Ocean off Long Island. "I would stop shivering by the time I got off the train at Penn Station," he once said, with a smile and a shake of his head, knowing how silly that sounded. His love/hate relationship with the New York Jets quickly became apparent in any discussion of sports. Kurt made an annual pilgrimage, bringing along his two daughters, to JetFest at Hofstra University, to get a look at the team and to assess their chances for a winning season.

A warm and caring individual, Kurt had an

irrepressible sense of humor and genuinely liked people. He could be tough, aggressive, and demanding when the situation called for it, but he never held a grudge and always wanted the best for his colleagues, friends, and co-workers. Intensely independent, Kurt approached the end of his life as he did everything else, with determination, grit, and an unbending competitive desire to fight to the end on his own terms.

Our thoughts and prayers go out to Kurt's family. Condolences may be sent to: Mrs. Irene Stokes, Valerie, and Nicole, 2697 Windsor Avenue, Oceanside, NY 11572

A college education Trust Fund has been established for the benefit of Kurt's daughters, Valerie and Nicole. Donations in Kurt's memory may be sent to: Kurtis W. Stokes Memorial Trust, 2697 Windsor Avenue, Oceanside, NY 11572.

Donald G Bryant, CPG-02225 (1971-1998), of Denver, Colorado died Saturday, October 17, 2009 at his home after a brief struggle with brain cancer.

Born in Hollywood, California on June 21, 1927 to Donald and Lucille Bryant. Don is survived by Sally, his wife of fifty-seven years. He and Sally had four children, Ellen, Stephen, Elizabeth (deceased), Edward and two grandchildren.

Don graduated from Inglewood High School in Inglewood, California in 1945 with a special award in science.

He served in the U.S. Navy from 1945 to 1949 when he was honorably discharged.

Don earned, with distinction, a B.Sc. in Geological Engineering from the University of Arizona in 1954, an M.S. in Geology from Caltech in 1955 and a Ph.D. in Geology from Stanford in 1964. At the University of Arizona he was awarded two certificates of scholastic honor, membership in Tau Alpha Pi and a National Science Foundation grant to attend Caltech. While at Caltech, he was inducted into Sigma Xi. A second national Science Foundation grant enabled Don to attend Stanford. In 1967, Don was honored with a Degree of Merit in Geological Engineering from the University of Arizona.

During his career Don worked for Cerro de Pasco in Morococha, Peru and for Phelps Dodge at Bisbee, Arizona. After receiving his Ph.D. he worked for Bear Creek Mining in Salt Lake City, Utah after which he became Chief



Geologist for MolyCorp at Questa, New Mexico and Mountain Pass, California. Subsequently, Don Became Chief Exploration Geologist for all of MolyCorp and managed national and international exploration from their headquarters in Louviers, Colorado. In 1970, he began his own consultancy, Bryant Geologic Consulting. His consulting work took him throughout North and South America, Europe, Africa and Asia. He continued geological work until his death.

During his many years of work in the mining industry, Don authored and co-authored many published papers, including several on the Warren (Bisbee) Mining district, and the Questa molybdenum deposit. He was passionate about mining and exploration geology, especially ore-forming breccias.

Don was a Registered Geologist in Arizona and California as well as an AIPG Certified Professional Geologist. He served on the board of the Society of Economic Geologists Foundation and was a longtime member of the Society of Economic Geologists, Denver Regional Economic Geologists and the Arizona Geological Society.

IN MEMORY

Donald G. Bryant
CPG-02225

Member Since
1971-1998
October 17, 2009
Denver, Colorado

James R. Muhm
CPG-02598
Member Since 1974
November 31, 2009
Englewood, Colorado

Kurtis W. Stokes
CPG-07934
Member Since 1990
November 2, 2009
New York, New York

AIPG Section Websites

AIPG Section Website links are on the AIPG National Website at www.aipg.org. Click on the top right drop down menu and click on Section Websites. If your section does not have a website contact AIPG Headquarters to get one setup (wjd@aipg.org). AIPG Headquarters will maintain a website for your section. Several sections (AZ, CA, CO, FL, GA, HI, IL Chapter, MI, MO, NM, OK, PA, and TN) are examples of websites hosted by AIPG National.

GeoTHERM – Expo & Congress February 25-26, 2010 Offenburg, Germany

The fourth GeoTHERM – expo & congress will be taking place in Offenburg (in the south of Germany/Europe) on and February 25-26, 2010. Within just three years GeoTHERM has established as international event simply not to be missed by anyone involved in the geothermal market. In 2009, 112 exhibitors, as well as over 2,600 congress participants from 18 countries, benefited from this opportunity to make valuable contacts. Accompanied by a high-quality congress program covering the areas of shallow and deep geothermal energy, the event offers well-founded knowledge for research and practice as well as a perfect platform for exchange of experience.

Both congresses of shallow and deep geothermal energy will be translated simultaneously in three languages (English, German, French). Every participant can choose his own program throughout the whole conference offers.

The specialised event participants are:

- Geothermal industry
- Geologists
- Engineers and planners
- Local authorities and administrations
- Energy authorities and public utility companies
- Operators and investors
- Science and Research

You can request the congress program of GeoTHERM in the net using www.geotherm-offenburg.de (also available in English). If you have any further question concerning the congress or exhibition please do not hesitate to contact Sandra Kircher via mail Kircher@messeoffenburg.de or by phone +49 781/ 9226 32.

Applications for the Forms Challenged

Lawrence M. (Larry) Austin, CPG-05181

We have educational requirements and we're sticking to them. However, what should be a relatively simple process often is not and often is made more difficult as more people get involved. So, my objective here is to help both our applicants and our membership in the promotion of and assistance with the application process. I'm going to concentrate on the CPG application process although, to a great degree, the comments also apply to our other categories of membership.

First of all, let me introduce myself. I'm one of the gate keepers. My official position is that of chairperson of the National Screening Committee (NSC), a position I've enjoyed for several years now. I work with a team of your colleagues who are endowed with phenomenal patience and unswerving dedication. They contribute untold hours to the process. Herein I hope to lessen that load a bit.

Let's start with Article 2.3.1 of the AIPG Bylaws:

2.3.1 Requirements to be a Certified Professional Geologist

Any person whose application for certification as a Certified Professional Geologist was received prior to May 14, 2005 and who has met the requirements for such certification as they existed on the day that such person's application was received shall be categorized as a Certified Professional Geologist upon approval pursuant to the procedures in effect on the day prior to the date the application was received.

Beginning on May 14, 2005, the requirements for certification as a Certified Professional Geologist shall be:

1. a baccalaureate or higher degree in a geological science, and a minimum of thirty-six semester hours or fifty-four quarter hours in geological sciences as recognized and approved by the Executive Committee; and at the dis-

cretion of the Executive Committee; acceptable continuing education to demonstrate a currency with technical, regulatory, and economic factors affecting the profession, and

2. eight years or ninety-six months of experience in the practice of geology acceptable to the Executive Committee. A master's degree in a geological science shall credit the applicant with one year or 12 months of professional experience, or a doctorate in a geological science shall credit the applicant with three years or thirty-six months of such experience. In lieu of 1 and 2 above, evidence satisfactory to the Executive Committee of the applicant's sound knowledge and proficiency in a field of geological science may be substituted.

Applicants for Certified Professional Geologist shall affirm their adherence to applicable professional and ethical standards and shall provide acceptable references from either (1) at least three professional geologists who have personal knowledge of the applicant's qualifications, integrity, and conduct, at least two of whom are Certified Professional Geologists, or (2) a professional society that is specifically recognized for this purpose by the Executive Committee. In extraordinary circumstances, as an alternative to all or part of the foregoing, the Executive Committee may require acceptable references from no fewer than six professional geologists who have personal knowledge of the applicant's qualifications, integrity and conduct.

These are the requirements for CPG certification. There are somewhat different requirements for other categories of membership and the reader is referred to Articles 2.3.2 through 2.3.4 for those other requirements.

Now let's look at the process of assembling the information, filling out the forms and actually submitting an application for CPG with the expectation that it will be acceptable. The forms are

available on-line in a package intended to provide the applicant with everything he/she needs to submit a complete package. They're under "Member Forms" and available in both .PDF and MS Word formats. I'd recommend the Word format if you intend to fill it out on the computer unless you have a .PDF editor available. There's also a flow chart if you wish to see how the process unfolds. Note to members: If you're assisting someone in the application process, be sure to have them send you, preferably via email, whatever they have at the time the question(s) arise. Now, if you're like me, print all 10 pages so you have something in front of you to review. Just remember, if you're looking over a partially completed application, destroy your copy when done to ensure confidentiality.

We start on the cover page, **Section I:** Most of this is relatively straight forward personal and current employment data. We need it for purposes of contacting the applicant should any questions arise - and they do. Just let us know how and where to best contact you, the applicant. One item that's a little more confusing is the "Major Fields of Geologic Practice." For brevity we use a series of abbreviations given on the second to last page of the packet. Pick the three that best apply to what you're doing.

Now let's go to Page 2, **Section II,** Record of College Training. This is where you list your education so that we can compare it to the requirements of the Bylaws and the college transcripts. The applicant should list each college or university attended in order beginning with the most recent. They should include all studies, even those that did not involve geological sciences as we'll delve into any gaps we perceive in the history. Just note on the form that the major subject was something else. Hours of geology can be provided in either Semester hours or Quarter hours but tell us which units you're using. And do the same for post-graduate continuing education courses

although here we don't need a record of non-career related courses.

Official transcripts must be submitted for all geological sciences education and come directly from the educational institution to AIPG Headquarters as proof of your education. If your list includes non-geological educational work at a different educational institution, simply indicate on the form or submit a statement with the application that your studies at that institution did not include any applicable coursework and that a transcript is therefore not being submitted for those studies.

Section III concerns documenting the record of experience for the individual. On the application form we require a complete record of your work history from college onward. And yes, this includes non-geological work experience although we do not need verification of the non-geological work experience. Please double check this history for continuity in dates and make sure all relevant experience summaries are requested. And yes, we need to know if you took a six month stint as a cashier at the local grocery store one time when you were out of work. Otherwise we'll assume you were in prison for securities fraud or some similar nonsense and you'll end up explaining it seven ways from Monday. Save us all the grief, **BE THOROUGH!**

Experience Verification forms are extremely critical yet poorly understood. There is a portion for the applicant to fill out and a portion for the person verifying the experience to fill out. As an applicant, only fill out the part that pertains to you and the header, name and address, for the person who will verify the information. When you describe your experience, please tell us what you did in terms of geologic analysis, what tools you used (i.e. cross sections, geologic mapping, borehole logs, etc.), what documentation you created (reports, correspondence) and whether you had supervisory authority along with what level (supervised a team of 2 geologists and 3 technicians), etc. We don't need to know specifically what projects, clients or sites were involved and we don't need your thesis or 3 reports attached as examples as we're likely not going to read them anyway unless we have a particular interest in the subject or suspect something is amiss. Be concise. Your verifiers should review the information you provided. Is it accurate? Please note that the verifier does not have to be your

immediate supervisor although we'd prefer they be if appropriate. However it should be someone who is familiar with your work and preferably has the geologic knowledge that is necessary for a qualified review. It does not have to be someone from within your employer, and often is not in the case of self-employed consultants. However, avoid using subordinates or relatives as this seriously detracts from the credibility of the verifier and likely will be rejected.

Please avoid the temptation to list all your career responsibilities on one experience form and then forward it for verification of the appropriate portion from several employers. Unless you've taken the time to clearly indicate who should verify what portion and advised each verifier to clearly state what portion they are verifying, it leads to confusion for both the verifiers and the reviewers. Often it results in denial of verification of at least some portion of each form by each verifier. If a screener is pressed for time at that point it may be easier to just say no and let you go back and re-do it, adding weeks or months to the review process. Again, save us all the grief. Make extra copies of the form and separate each position so that each verification is for all and only the data on that form. It may take a little more time to do it this way but it saves time for the screeners later and thus, processing time for the application.

Section IV requests a listing of sponsors. For CPG, two must be AIPG members and one can be another geologist who meets the criteria for a professional geologist sponsor as indicated on the sponsorship form (Baccalaureate degree or higher with 30 semester hours or equivalent in geological sciences and at least 5 years of post-degree experience in the practice of geology as a vocation.) This is often a major stumbling block for potential applicants. However it's mostly because we haven't yet enacted a requirement to have AIPG branded into our foreheads. There are likely a considerable number of your colleagues that are members but don't consistently advertise it. A quick call or email to Vickie at HQ will get you a list of section members in your area and contact information. If you contact me, I'll try to put you in touch with anyone I know from the Institute in your general area and arrange a meeting. For the most part, we'll do whatever we can to make it easy for you to procure the appropriate sponsors.

Again, some common sense is in order when selecting sponsors. No more than two may be from the same organization at the time of submission. Please refrain from using close relatives or subordinates as these will not be acceptable. It becomes a "do over" that comes back to screeners whose attention is now focused for any little typo on your application. Don't do it!

In **Section V** we ask if you've held any state certification, license or registration and, if so, to list them. Also, to indicate if any have been refused, revoked, suspended or otherwise acted against and, if so, to provide an explanation. How you respond to this question is extremely important. The NSC members will check up on claimed licenses, certifications or registrations. Much of this information is on-line. Proof is required for current ones. Very important, if you've held a temporary work permit, be sure to list it as such as not all states list temporary permits on-line. If we check for a license and the state doesn't have it listed, we'll have to investigate as to why it was claimed or the application may be denied.

We ask for your legal history in **Section VI**. We're not particularly interested in speeding tickets but we are interested in any crime or action related to geology, subject to investigation, injunction, fines or penalties related to consumer, investor or securities fraud or indicted or convicted of a felony. If so, be sure to add an explanation, the final judgement and why the charge(s) and judgement(s) are not pertinent to the application.

Sections V and VI relate to items AIPG considers extremely important relative to ethics. If you have any questions at all regarding these specific questions, contact us, either myself or Mr. David Abbott of the Ethics Committee. We'd rather clear them up ahead of time than have to deal with sensitive questions and bruised feelings later.

Section VII asks for a list of geologic societies and organizations of which you are an active member and **Section VIII** asks for a list of publications you have authored or co-authored. A complete list is not necessary here but manuscripts accepted for publication should be listed as such. There are no right or wrong answers here.

In **Section IX** you have an opportunity to present other pertinent information. Please refrain from overburdening the application with copies of publications,

theses, reports and the like as they may not receive the attention anticipated. Our screeners are, after all, volunteers. Please respect their time.

Section X is your affidavit attesting to the accuracy and completeness of the application. Note that the notary's seal and statement is required for a CPG application. If the application is being submitted from an area where a notary is not available, please contact HQ for guidance as we will work with you to gain equivalency.

Accompanying the application package are the Geological Experience Verification forms and the Sponsor's Statement forms. I'd like to emphasize again that separate experience forms and sponsorship forms should be filled out as appropriate and furnished to the individuals who then send the forms directly to AIPG-HQ for inclusion in the application. Note that each of these forms has a section for the applicant to fill out and a section for the verifier/sponsor to complete. Please do not fill the

verifier/sponsor sections out for them! This is readily spotted in the review process and seriously detracts from the credibility of the application! If they've agreed to assist you, they should be willing to write the few sentences necessary to complete these simple forms.

Finally, send the appropriate forms to your verifiers and sponsors, contact your colleges and universities for transcripts and forward the rest of the package to AIPG Headquarters. It will be held there until all the pieces are in (administratively complete) and then forwarded either for Section Review and then NSC review or directly to the NSC for review depending on the status of the Section Screening Committee and any prior membership you've held with AIPG. At a minimum the process is likely to take 60 days and you will be notified of where your application is within the process at key milestones. Please be patient but also don't hesitate to contact us should you have any questions.

AIPG's application process can be an intimidating experience for those seeking the CPG status. However since some states require it for the practice of geology (e.g., Alaska), others use it in their own certifying processes (e.g. Michigan for the title Certified Underground Storage Tank Professional), and we believe it to signify a significant life achievement, it's important that we be accurate, thorough and consistent. After all, we seek to sustain the significance of those three letters appended to your name at the bottom of the page.

Larry Austin has been involved with the practice of geology since 1975. He has been actively involved in AIPG's National Screening Committee (NSC) for many years and is the current Chairperson. He has also served two terms on the Executive Committee. Privately he is President of Aqua-Tech Consultants, Inc., an environmental, hydrogeological and geotechnical consulting firm in Grand Rapids, Michigan.

New Members Continued from page 41

WA-Aaron A. Fitts SA-1651
WA-Andrew M. Hess SA-1694
WA-Emily Baker SA-1712
WA-Elise Otto SA-1713
WI-Jordan Hilderbrandt SA-1637
WI-Ari B. Weil SA-1711
WY-Carly C. York SA-1631
WY-Sharon Bywater-Reyes SA-1632

AIPG Membership Totals

	As of 12/12/08	As of 12/01/09
CPG / Active	3,634	3,551
CPG/Non-Practicing	426	408
Member	945	997
Associate Mem.	21	24
Student Adjunct	400	432
Honorary	21	20
Corporate Member	3	3
TOTALS	5,450	5,429

**Welcome
New Members
to AIPG!**

Coming Soon!! CALL FOR ABSTRACTS

The Marcellus Shale: Energy Development and Enhancement by Hydraulic Fracturing Conference

**Pittsburgh, Pennsylvania
May 5-6, 2010**

Arizona Section

The Arizona Section went international during its Fall 2009 field trip. Dawn Garcia (CPG-08313) organized and led a spectacular trip into the State of Sonora, Mexico. Fifteen participants drove down to the beach community of Puerto Peñasco (aka Rocky Point on the north side of the border), on Friday, November 13, and stayed at the Peñasco del Sol resort overlooking the Sea of Cortez. We enjoyed a golden sunset and a shell-covered beach with tidal pools in an area that has a tidal range of 8 meters (25 feet). The evening was capped by a feast of Mexican food at the local hot spot.

On Saturday, November 14, we carpooled 85 kilometers (52 miles) east to La Herradura Mine, an open pit gold mine operated by Fresnillo PLC, which was the first Mexican company to be listed on the London Stock Exchange. Pat Mallette from Newmont Mining Company, who was co-leader of the field trip, and three geologists from Fresnillo, gave us a detailed presentation of the mine geology and operations, guided us on a tour of the open pit, the heap leach field, and to an overview of a new mine (Soledad-Dipolos) being constructed northwest of La Herradura. Fresnillo also provided lunch at their on-site employee cafeteria. A highlight of the trip was when we were dropped off inside the pit at a recently blasted wall and allowed to collect samples in an area marked as ore material (as opposed to waste rock). With the ore assaying at an average of 3 grams of gold per ton, it was difficult to pick out any nuggets, but we had fun looking at hand specimens and filling the sample bags with colorful rocks. The group traveled back to Rocky Point for another evening at the resort and more fantastic Mexican food and

music tableside (what else would one expect?).

On Sunday, November 15, eight adventurous attendees traveled 180 km (115 miles) southeast to the town of Caborca. We met Jose Jesus Valenzuela Luna (aka Loco), the Historian for the City of Caborca and an expert on petroglyphs and the prehistory of the area, who also acts as a local guide. Loco took us for a hike on San Jose Hill, which is surrounded by a lush green valley irrigated by groundwater. The region (known as “El Proveeder”) is covered with thousands of petroglyphs dated from 600 BC to 1450 AD from the Hohokam culture. The petroglyphs were chipped out of the black desert varnish patina covering light-colored intrusive rock outcrops. The hill also has a series of man-made terraces (trincheras), cut out of the rock debris, that were constructed by the native peoples for use as living platforms, trading sites, and ceremonial activities. These terraces also afforded historic occupants (and us) an expansive view of the entire valley. Loco then took us into Caborca to explore the old Spanish mission – La Purisima Concepcion de Nuestra Señora de Caborca. Restoration of this beautiful white-washed structure was recently completed following a damaging series of floods, the most recent in 1993. Arizona residents were surprised to learn that the mission church is the twin of San Xavier del Bac in Tucson. Both churches were constructed by architect brothers following the same design. After yet another wonderful meal of Mexican food in Caborca, the party split up, with some returning to Rocky Point and some heading back to the USA. Our thanks to Dawn and Pat for treating us to an experience with another culture we will long remember.



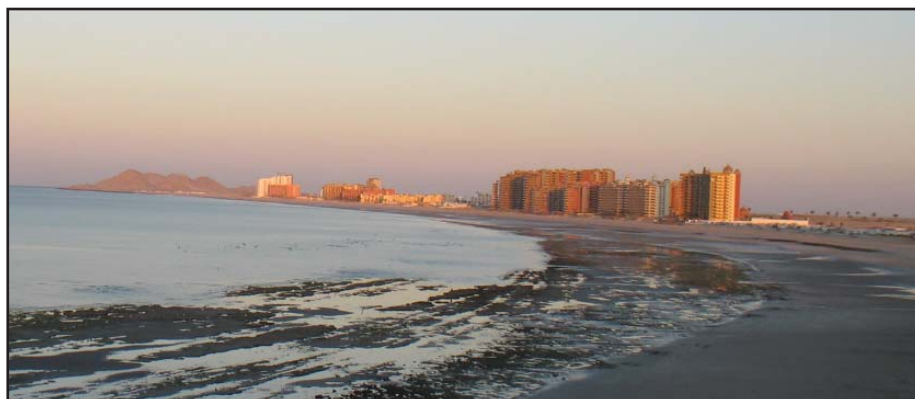
Rocky Point Sunset.



Dawn Garcia and Karen Wenrich examining a trinchera.



Caborca Mission.



Rocky Point Low Tide.

Colorado Section

Photos from the Ouray Summer Field Trip.





Colorado Section rock stars at the Colorado National Monument at National Meeting. Graham Closs, Jim Russell and Larry Cerillo. Photo by Jim Burnell.



Field trippers' view from inside the dragline on the Northwest Colorado Surface Mining and Reclamation field trip. Photo by Jim Burnell.



"Field Hospital" in the Commodore #5, Creede.

Georgia Section

Visits Georgia Southwestern State University—Last spring a few members of the Georgia Section visited Georgia Southwestern State University in Americus, Georgia to present Justin Griffin his AIPG student certificate and

plaque. While there Dr. Sam Peavy, chairman of the Geology and Physics Department, invited our section to teach his Environmental Geology class one day in the fall semester. He wanted us to show his students what a geologist does in the field. This past October members Ron Wallace and Rick Ricci along with Jim Fineis, president of Atlas Geo-Sampling Company demonstrated installing a monitoring well on campus, proper soil screening and soil description. The students watched as the well reached total depth and the screen and riser, sand filter pack, bentonite, well cover, and concrete were completed. Each student got an opportunity to either hand auger or operate the drill rig. We demonstrated proper groundwater sampling and showed some of the different bottles used in collecting water samples. Some simple surveying was also shown to the students. Back in the class room the soil samples were brought in and the students had a hand in describing the samples. Each student received a notebook with a section on proper soil logging and the classification system. The notebook also had many typical field forms used by consultants. A homework problem was given to the students on a UST site in Americus where they were to produce a potentiometric surface map and benzene concentration map. We encouraged the students to join AIPG and spoke of the advantages they would receive. We hope to have a chance to do this demonstration again at another university.



Dr. Sam Peavy (with baseball cap) along with students watching drilling.



Jim Fineis, President of Atlas Geo-Sampling Company, demonstrates hollow stem auger drilling

Michigan Section

National Advisory Board Representative Executive Committee Meeting Summary. I am approaching the end of my term as a 2009 National Advisory Board representative. As most of you have no doubt heard, I have been elected as National Secretary for the 2010-11 term. I would like to thank each of you for your support which allowed me to achieve this position. I'll continue to provide information to the Section in the newsletters about the activities of National, and where AIPG is heading. If anyone has any comments or concerns that they would like presented to the National Executive Committee, please feel free to send them to me, and I'll take them to the meetings.

The final National Executive Committee meeting for 2009 was held during the Annual Meeting in Grand Junction, Colorado in early October. The primary items to come out of the meeting included the approval of the revised strategic plan, the approval of the energy statement, and approval of the position statement on climate change. AIPG Foundation representative Ray Talkington provided information about the plans of the Foundation, and what has or will be done to increase visibility and knowledge to members about the purpose of the Foundation.

I would like to remind our Section members that one of the main goals of the National Executive Committee is to find a way to offer additional value to AIPG members. Please take a few minutes and decide what AIPG means to you, what you like, and what could

be done to improve the organization. For those members that have a problem with the way things are done, speak up; this is your chance to provide input directly to the national executive committee. Both compliments and criticisms are welcome.

Remember too that anyone that became a CPG after July 1, 2006 is required to provide documentation on continuing education efforts. You should use the AIPG on-line system for this purpose. The on-line system is very easy to use, and is visible to the CPD review committee that will ensure members are complying with this requirement. Please take a few minutes to upload your information into the system. It may take a few minutes the first time, but once you have set up your basic information, entry of specific items goes quickly.

In addition to participating in the National Executive Committee meetings, I also enjoyed attending the remainder of the annual meeting. This is a great opportunity for networking and accumulating continuing education hours. The field trips were great, and there were numerous excellent technical presentations. If you haven't attended an annual meeting, please consider it. Next year's meeting will be held in Orlando, Florida. I would guess that in addition to the usual opportunities afforded by

the annual meetings, this one would be a good one to bring the family along (for obvious reasons).

I look forward to continuing to serve on the National Executive Committee as a Michigan Section representative for the next two years.

**Adam Heft, CPG
Michigan Section
Newsletter Editor**

Governor Signs Executive Order to Combine DEQ and DNR—On October 8, 2009 Governor Jennifer Granholm signed an Executive Order calling for the creation of the Department of Natural Resources and Environment (DNRE) which will result from combining the current Departments of Natural Resources and Environmental Quality. The order will take effect on January 17, 2010.

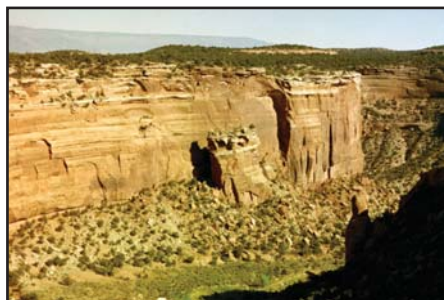
The order is an effort to streamline government. The mission of the new DNRE will be to conserve, manage, protect and promote Michigan's natural resources and environment and related economic interests for current and future generations. Efforts are currently underway to define the structure of the new department which will be ongoing through the end of December 2009.

The changes to the department will also include changes in the Commission of Natural Resources, which will become

the Natural Resources Commission. The members of the commission will still be appointed by the governor with input from the House and Senate. The NRC will also maintain authority over regulating game hunting such as establishing periods of validity for hunting and fishing licenses and the feeding of elk and deer without referring to the DNRE Director. The NRC will also take on the duties currently performed by the Citizens Committee for Michigan State Parks and the Water Resources Conservation Advisory Council. The governor will assume the role of appointing the DNRE Director.

The order also establishes a Trails Advisory Council to assume the duties of the Snowmobile Advisory and the Michigan Trailways Advisory Councils, which are being abolished. The Trails Advisory Council will concentrate on the creation, development, operation and maintenance of snowmobile, equestrian, hiking, off-road vehicle, and skiing trails. A seven-member Environmental Science Review Board will also be appointed by the DNRE Director to advise the DNRE on scientific issues related to the environment and natural resources.

2009 Annual Meeting Photos from Grand Junction, Colorado.



Photos by Ron Wallace

Presenting...

New AIPG Emblem Designs

**Bob Stewart, CPG-08332 and
Joey Fiore, SA-1164**

As I previously discussed in my editor's column from the July-August 2009 issue of TPG, one of our initiatives in advance of AIPG's 50th anniversary in 2013 is to conceive of alternative emblem designs. As a preface to this discussion, let's consider the copyrighted emblems presently used by AIPG; both are available through our website, www.aipg.org. Figure 1 is the original black and white logo of the organization, and Figure 2 is the color logo emblazoned on various AIPG documents and images.

The existing logos have served AIPG well, so why change? Emblems and logos are part of the public face of AIPG, and a golden anniversary is an excellent opportunity to reflect on our past achievements and contemplate our future path. Moreover, following my previous announcement, Armando Ricci, Jr., CPG-01437, called to remind me of a proposed logo re-design in the 1970s, which was inconclusive and resulted in no modifications.

On the following page 59, we present the suggested alternatives (or additions). These emblems are the result of probably three times the number of preliminary graphics that explored many permutations of the symbols and lettering available to represent AIPG, which were developed through the generosity of Joey's graphic artist colleagues. Options A, B and C are similar in their use of AIPG's name over the top of the geology pick and gavel logo, with the three core values of competency, integrity and ethics around the lower perimeter. The prominence of the geology pick and gavel has been enhanced, along with the "AIPG" letters along a diagonal across a latitude and longitude grid. Individual modifications include the different globe supports around the perimeter of options A and B, and the substitution of bullet points for punctuation between the three core values.

Options D-H exclude the three core values, and substitute in their place the opposing, stylized wheat sheaves, traditional symbols of a close relationship to the Earth and its resources, and also appropriate symbols for AIPG. The latter are also consistent with the color logo presently used by AIPG. Options E and F include the latitude and longitude grid; options D, G and H do not. The font style and color of the diagonal "AIPG" varies among the options. We have retained the geology pick and gavel on all options.

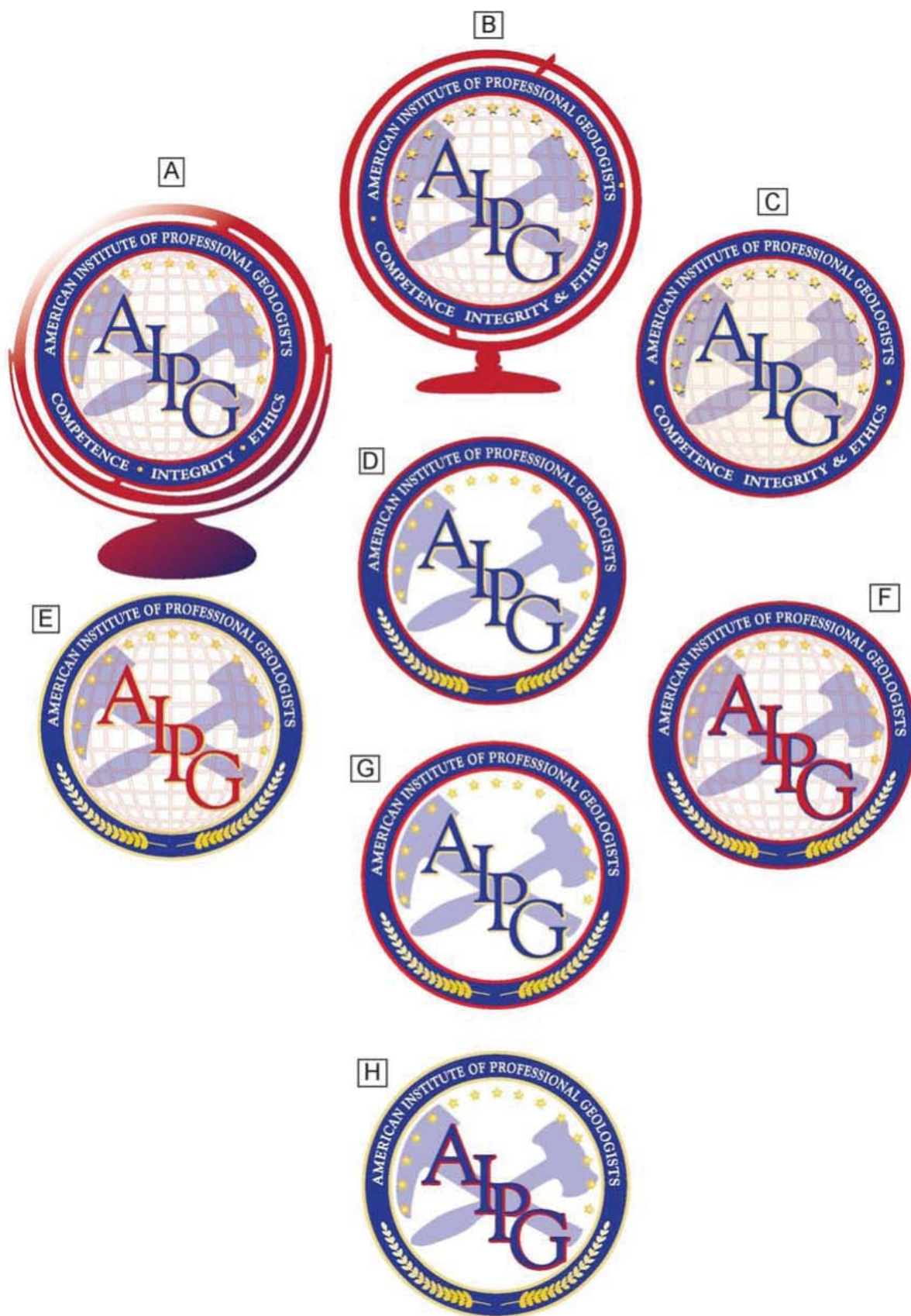
We are asking the membership to consider the principal question of whether a re-design is a good idea, and if so, the secondary question of what the new logo should look like. Is one choice sufficient? Two? How do you like the symbolism? Font style? Graphical layout? We look forward to your comments. robert.stewart@lfr.com, fiore.joey@gmail.com, and aipg@aipg.org.



Figure 1



Figure 2



BUILD THE FUTURE OF GEOLOGY TODAY!

SUPPORT THE AIPG FOUNDATION

The American Institute of Professional Geologists Foundation is revitalizing itself and building a strong platform of programs to promote the future of geological studies among students, the public, and professionals.

The Foundation is soliciting your support to fulfill its mission. Your contributions, through either generous cash contributions or through a deferred gifts program, are vital for the continuation and expansion of the Foundation's initiatives.

The goal of the AIPG Foundation is to establish a \$2 million endowment which will be used to fund geologically-oriented programs.

The Foundation will continue to support the dissemination of information concerning geologic issues affecting the public and its long-standing support of the AGI internship program in Washington D.C., geological field trips in grades K-12, AIPG section outreach activities, and professional development programs.

Help the public interest, the geological profession, AIPG and yourself in the following ways:

- Contribute to the Foundation
- Help raise funds for the Foundation
- Volunteer assistance in developing the Foundation's programs

For further information or if you have questions about donating to the Foundation, contact Ray Talkington, Chairman, AIPG Foundation at (603) 773-0075, ext. 11 or rtalkington@geospherenh.com.



AIPG STORE LOOK FOR SALE ITEMS

NEW ITEM! Beanie Cap is made of 100% acrylic. Comes in a variety of solid colors or with a contrasting trim. Available colors: Athletic Oxford, Athletic Oxford/Black, Black, Black/Natural, Camel, Light Pink/White, Natural, Natural/Navy, Navy, Navy/Natural. One Size Fits Most. **Price: \$15.00**

New Promotional Items
Vest and Beanie
Price: \$35.50 SAVE \$5.00!



New Item: This canvas briefcase with leather handles and shoulder strap has multiple pockets inside and out. Also features the AIPG screen print logo. Only available in blue.
Price: \$14.95



SALE SALE SALE SWEATSHIRT - Hanes Ultimate Cotton Crewneck Pullover, 90/10 cotton/polyester fleece. AIPG embroidered lettering. Colors: Red, Navy, Light blue, and Gold. Sizes: **-Price: \$14.50 (L-XL) / 16.00(XXL)**



AIPG Expandable Briefcase has the embroidered AIPG pick and gavel logo, durable 600 denier polyester fabric and a large main zippered compartment. Created with several pockets and pouches for optimum organization. Available Colors: Black, Hunter, Navy, Red, Royal. **Price: \$31.00**



NEW! POLO SHIRT



Silk Touch POLO SHIRT. Fabric/Style: 5-ounce, 65/35 poly/cotton pique; flat knit collar and cuffs, double-needle armholes and bottom hem, side vents; metal buttons with dyed-to-match rims. Available Colors: Banana, Bark, Black, Burgundy, CoolGrey, CourtGreen, DarkGreen, Hibiscus, LightBlue, Navy, Red, Royal, Stone, White. Sizes: S-3XL. Prices: **\$30.00 (S-XL) / \$31.50 (2XL) / \$33.00 (3XL)** **Also available in Ladies Sizes**



POLAR FLEECE 1/4 ZIP PULLOVER Elastic waist and cuffs, contrast collar, embroidered AIPG lettering with pick and gavel. Colors: Black, Navy, Royal, Charcoal, Burgundy, Forest, Khaki. Sizes XS - L. **Price: \$27.00**

DENIM OR KHAKI LONG-SLEEVE SHIRTS 100% cotton, garment washed, tuck-in tail, button-down collar, horn tone buttons, patch pocket. and adjustable cuffs. Embroidered AIPG spelled out with pick and gavel. Sizes: XS-4XL. Prices: **\$22.50 (XS-XL) / \$24.00 (2XL) / \$25.50 (3XL) / \$27.00 (4XL)**



TRAVEL MUGS Translucent Blue 16 oz. **Price: \$7.50**, Stainless Steel 16 oz. **Price: \$9.50**



CAP - Velcro closure. Embroidered AIPG spelled out with pick and gavel. Colors: black, tan, royal blue, and white with blue bill. **Price: \$12.75**



CHECK OUT OTHER GREAT ITEMS
AVAILABLE AT WWW.AIPG.ORG

Not Just Software...

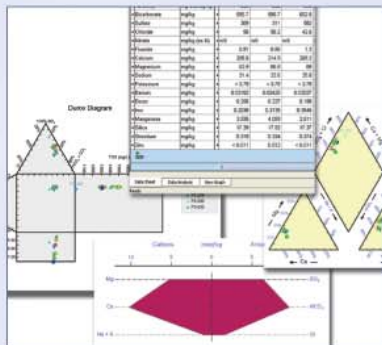
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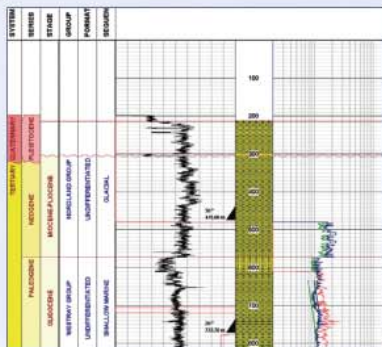
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GWB Standard

GWB Professional

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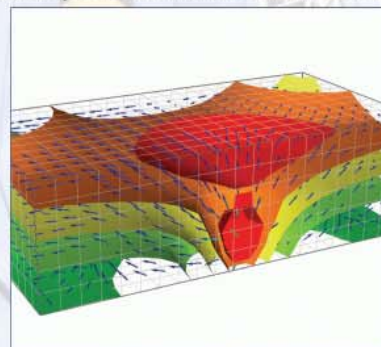
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