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Rocky Mountain National Park. Photo courtesy of the Colorado Convention and Visitors Bureau. Come join us in beautiful Colorado for the AIPG 50th annual meeting.
The mission of the American Institute of Professional Geologists (AIPG) is to be an organization that advocates high standards of ethical conduct and ethical conduct of geological scientists in all branches of the science. It adheres to the principles of professional responsibility and public service, and is the ombudsman for the geological profession. It was founded in 1963 to promote the profession of geology and to provide certification for geologists to establish a standard of excellence for the profession. Since then, more than 10,000 individuals have demonstrated their commitment to the highest levels of competence and ethical conduct and been certified by AIPG.

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

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MINING: IT’S ABOUT THE PEOPLE

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The last few years the Georgia Section has tried to have a family-oriented, summer fieldtrip at a state park to enjoy the sunny outdoors. Attendance has been low over the past few years so I decided to have my own fun fieldtrip, a five-day trip to explore The Queensland Energy Province as part of the 34th International Geological Congress. We truly had a diverse group of geologists from all over the world: two from Japan, two from Finland, two from Hungry, and one from each of the following countries: China, Australia, New Zealand, and United States. We visited outcrops of Permian-Triassic in the Bowen Basin and Triassic-Cretaceous in the Surat Basin.

We visited the Dawson Coal Mine on the second day of our trip, which has been in operation since the 1960s. Another enjoyable stop was the Staircase Sandstone Member of the Cattle Creek Formation (Early Permian). These outcrops provided great examples of cross-stratification, soft sediment deformation, slump folds, and dewatering structures.

Carnarvon Gorge National Park was the highlight of the trip. The Precipice Sandstone is the main stratigraphic unit along the walls of the cliffs and was deposited in a braided stream environment during the early Jurassic. We also had the opportunity to observe a large landslide feature that occurred in 2008, and it was here we decided to take our group picture. Our next stop included an excellent display of Aboriginal art, and we soon found ourselves at Aljon Falls & Ward’s Canyon, where ferns and mosses flourish in the cool, moist environment. We also visited the Amphitheatre, where we saw great examples of cross-stratification in the Precipice Sandstone. Our final stop was Moss Garden, a great location to relax next to a waterfall and take pictures of moss-covered rocks.

Five members of the group wanted to climb Boolimba Bluff as we made our way out of the gorge. I was the oldest of the group, and I must say that I lagged way behind. Unfortunately, the last 300 meters was almost straight up the side of the bluff, but I sure am glad that I made the trek. What an incredible view of the gorge! I even saw a strange bird, a Jayhawk, which is not native to Australia. I would like to acknowledge Michael McKillop and Bryan Johnston for being gracious enough to lead our trip. They both did great jobs and we are very thankful for their time and knowledge of the area.
RAPID CITY, S.D. (Dec. 6, 2012) – The South Dakota section of the American Institute of Professional Geologists (AIPG) has named School of Mines alumnus Dr. Mark Fahrenbach as 2012 J.P. Gries Geologist of the Year.

Dr. Fahrenbach, who earned a Ph.D. in geology from the South Dakota School of Mines & Technology in 1995, has served as a geological consultant for SDSM&T. He is an environmental scientist III with the Geological Survey Program, South Dakota Department of Environment and Natural Resources (DENR).

The award is named in honor of Dr. John Paul Gries for his exceptional work in the field of geology and is given each year in memory of Dr. Gries, a longtime geology professor at the School of Mines. Dr. Fahrenbach was nominated by Derric Iles, South Dakota State Geologist, and received the honor for his many contributions in furthering the understanding of the state’s geology. The 2012 award was presented in September at the 49th AIPG national meeting held in Rapid City.

Dr. Fahrenbach graduated from Lansing Community College, Lansing, Mich., in 1980 with an A.S. in geology. In 1984, he graduated from Michigan State University with a B.S. in geology before eventually earning his doctorate from the School of Mines.

Dr. Fahrenbach has nearly 18 years of service as a geologist with the DENR’s Geological Survey Program. During that time, he has been the primary author, or co-author, on several geologic maps ranging from the 1:500,000-scale Geologic Map of South Dakota published in 2004 to 1:24,000-scale maps of surface geology in the Black Hills.

Throughout his career, Dr. Fahrenbach has quietly gone about the business of producing geologic information and maps that are the foundation for understanding South Dakota’s geologic resources. He has become a respected authority on the geology of the Black Hills and has routinely hiked several hundred miles through rugged terrain during a single field season. In his own words, he is a perfectionist to a fault. That particular character trait provides the assurance that geologic maps produced by him are accurate, scientifically defendable, and of value to the State.

In addition to consulting for SDSM&T, Dr. Fahrenbach has served as a consultant for Badlands National Park, and Jewel Cave National Monument. He has more than 31 years of geological and paleontological field experience in the Black Hills.

AGI’s National Geoscience Student Exit Survey, Spring 2012

Student Theses Research Methods

AGI’s National Geoscience Student Exit Survey measures the relevant experiences in school and the immediate career plans upon graduation of recent geoscience degree recipients. In April 2012, AGI conducted the second pilot test of this survey, receiving responses from 46 different departments. This Currents examines the results from two of the questions which inquire about the decision points for successful graduates pursuing a degree in the geosciences.

The survey participants were asked about their research experiences while in school. Out of the 294 survey participants, 229 said they have research experience, and 199 of them worked on individual research projects—145 undergraduates, 35 master’s students, and 19 doctoral students. These 199 participants indicated the methodologies used to conduct their research (literature-based research, field-based research, lab-based research, and computer-based research). Respondents could select multiple methodologies.

The majority of the undergraduate students worked in the field and in the lab (171 students), whereas the highest number of graduate students did computer-based research (36 students), although that number is only slightly higher than field-based (34 students) and lab-based research (34 students). Looking specifically at students studying solid earth/geology, there is a slightly higher number of undergraduate students participating in lab-based research (73 students) than in field-based research (64 students). Among the graduate students studying solid earth/geology, 19 students participated in lab-based research and 18 students participated in computer-based research, compared to the 15 students participating in field-based research and literature-based research.

- Carolyn E. Wilson
REQUEST FOR NOMINATIONS

The AIPG Awards Committee is seeking nominations for future recipients of the Ben H. Parker Memorial Medal, the Martin Van Couvering Memorial Award, the John T. Galey, Sr. Memorial Public Service Award, Honorary Membership, and Outstanding Achievement Award. The qualifications for these awards can be found below. Nominations for these awards, accompanied by supporting statement, should be sent to AIPG Headquarters, c/o Honors and Awards Chr., 12000 Washington St., Suite 285, Thornton, CO 80241.

BEN H. PARKER MEMORIAL MEDAL

The Ben H. Parker Memorial Medal is the Institute’s most distinguished award. It was established by the Executive Committee in 1969 in posthumous honor of a truly great leader, who devoted much of his life to improve the quality of geology and geologists and the services they provide. The medal is awarded to individuals who have long records of distinguished and outstanding service to the profession.

The most important criterion for this medal is a continual record of contribution to the profession of geology. A wide variety of contributions can be considered, such as (a) the education and training of geologists, (b) professional development of geologists, (c) service to the Institute, (d) leadership in the surveillance of laws, rules, and regulations affecting geology, geologists, and the public, and (e) activity in local and regional affairs of geologists.

MARTIN VAN COUVERING MEMORIAL AWARD

The Martin Van Couvering Memorial Award was established by the Executive Committee in 1979 in posthumous honor of the first president of the Institute. Martin Van Couvering made the presidency a full-time occupation for the first two years of the Institute’s history. His dynamic leadership, diplomacy, and organizational abilities established the solid foundation from which the Institute has grown. Few, if any, have given so much to the Institute.

The most important criterion for the Martin Van Couvering Memorial Award is service to the Institute. As in other awards, a wide variety of contributions to the Institute may be considered. By far the most important contribution a geologist can make to the Institute is that of time. It is the contributions by individuals to the Sections, the committees, and special projects that enable the Institute to enhance the practice of geology.

JOHN T. GALEY, SR., MEMORIAL PUBLIC SERVICE AWARD

The American Institute of Professional Geologists’ Public Service Award was established by the Executive Committee in 1982 in recognition of one of its primary purposes: service to the public. In 1992, it was renamed the John T. Galey, Sr., Memorial Public Service Award, in posthumous honor of our fourth President, whose long professional career was a continuum of service to both the geological and the general public.

Recognition of public service is important because so many Members have distinguished themselves and the Institute by giving expert testimony to governmental commissions and committees, and by providing geological expertise where it was needed by the public at large.

The application of geology to the needs of the general public may be in many different forms. Recipients of this award have outstanding records of public service on the national, state, or local level well beyond their normal professional responsibilities.

AWARD OF HONORARY MEMBERSHIP

Since 1984, AIPG has conferred Honorary Membership to those who have an exemplary record of distinguished service to the profession and to the Institute.

OUTSTANDING ACHIEVEMENT AWARD

The Outstanding Achievement Award was established by the 1989 Executive Committee to honor a non-member of AIPG who is widely recognized as a major contributor to the profession of geology. The award is not necessarily given annually, but only when the Awards Committee recommends an outstanding candidate to the Executive Committee for their consideration.

American Institute of Professional Geologists
Nomination form for 2013 AIPG Awards

(Please check one)

☐ Ben H. Parker Memorial Medal ☐ John T. Galey, Memorial Public Service Award
☐ Martin Van Couvering Memorial Award ☐ Award of Honorary Membership ☐ Outstanding Achievement Award

NAME OF CANDIDATE: __________________________ Telephone: __________________________
Address: __________________________
Fax: __________________________
Address: __________________________
E-Mail: __________________________
NAME OF PERSON MAKING
THE NOMINATION: __________________________ Telephone: __________________________
Address: __________________________
Fax: __________________________
Address: __________________________
E-Mail: __________________________
Signature: __________________________ Date: __________________________
Supporting Statement (In brief here, please submit detailed letter of support): __________________________

DEADLINE: Completed nominations must be received by January 15, 2012.
Like many of my colleagues, I have found myself in awe of the drastically changing energy landscape around me. Both technologically and economically, the world of energy is not what it used to be. Precious resources that allow the modern world to exist are becoming harder to find and much more difficult to extract, but advances in drilling technology, such as directional drilling, are a tribute to humanity’s ability to innovate when needed. Nowhere on Earth is this more prevalent than in the Bakken Shale of North Dakota, where I have spent the last year working, learning, living and observing as the energy world changes.

After finishing my undergraduate work at the University of Wyoming in 2010, I found myself wondering what was next. The U.S. economy was in shambles and the job market was dismal. I was 26 with no job, wife or kids. All I had was a head full of raw knowledge and a diploma declaring that I knew a thing or two about how the Earth worked. After years of study, I felt confident in my ability to understand the geologic processes shaping the world around me, but I didn’t have the first clue about how to turn this knowledge into a career.

As fate would have it, I was offered a job in my native central Florida investigating sinkholes for insurance companies. But after less than a year back home, I began to catch wind of how much my life was about to change was anyone’s guess.

**Tough Work for Tough People**

Finding work was easier than expected. A simple inquiry on Facebook revealed half a dozen college friends working in the oilfields, all of whom indicated that their companies were seeking young geologists. A week after submitting my résumé, I was interviewing in Billings, Mont., for a well-site geologist position. After an hour-long interview and a couple of beers over lunch, I was told to report to Williston, N.D., in early December for training.

A few short months later, I found myself sitting in a trailer in the shadow of a multimillion-dollar oil rig, staring at a cluster of computer screens that couldn’t have been more confusing had they been in Greek. From the highway, the rig appeared as a beacon of hope for the future of domestic energy and American oil independence. But inside the work trailer it was a bit of a different story.

Diesel-soaked clothing, the constant groaning of the rig, heavy equipment to evade and 90-hour work weeks were the immediate hurdles that had to be negotiated while working and living not a hundred meters from the rig for up to two months at a time. This was certainly a far cry from the comfortable 9 to 5 work day I had become accustomed to in Florida, but the promise of quick fortune extinguished any lingering doubts associated with the work conditions. In addition, before long, I found a strong sense of pride in the hard work and long hours I was putting in with my colleagues in the oilfields. The last hurdle I had to pass in becoming comfortable as a well-site geologist was safety. This job can be dangerous. The equipment is enormous. The 10-hour OSHA training required to become a well-site geologist quickly became the cornerstone of self preservation. Thankfully, safety has become the primary goal these days, even above production, and after a short while the scene grew less intimidating.

Once I got over the initial adjustments and challenges of the first few months, I found that the life of an oilfield geologist suits me well. I enjoy being responsible for a multimillion-dollar operation and appreciate the trust bestowed upon my fellow geologists and me by our superiors.

Our work is exciting too. My colleagues and I are responsible for a number of critical observations while “on tower,” which is oilfield slang for being on a shift. We geologists have the help of an engineer known as a MWD (measurement well-drilling person) and a directional driller, the person responsible for adjusting the angle of inclination at which the bit is drilling. From the comfort of a trailer, we monitor gas from the mud being circulated through the well, use gamma radiation markers to indicate where we are in the rock formations and, of course, examine rock samples from the various strata through which we drill. Using the information gathered, we can accurately navigate through the various strata until we reach the Middle Bakken — approximately three to four kilometers below the surface — at an angle near 90 degrees relative to the surface. After “landing the curve,” lateral or horizontal drilling proceeds for an additional 3,000 meters until TD, or total depth, is reached. Once we reach TD, the well is ready for hydraulic fracturing and potentially decades of oil and gas production.

Due to the inconsistent nature of the Bakken caused by varying depositional environments and the extreme conditions the equipment is expected to
endure, the drilling work can be tedious and highly frustrating. Often an indicator rock layer is used as a guide to help navigate our way to the Bakken, but these layers can simply disappear or pinch out, leaving geologists flying blind until another indicator can be determined. Even more exasperating are equipment failures. Any failure within the system, whether it is with the gamma monitoring tool or the drill bit itself, necessitates a “trip,” meaning all the pipe must be pulled out of the ground. The tripping process is lengthy, often taking several days, and can add weeks to the drilling project.

Despite these struggles and frustrations, I find the work to be a constant challenge and rewarding challenge. There are few better feelings in this world than a job well done, especially after that job has kept us secluded for more than a month and we’re released back into civilization with cash lining our pockets.

Challenging Living Conditions

Civilization is something that you begin to truly appreciate when you have been living in a “man camp” for several weeks at a time. That said, Williston, N.D., unfortunately does not resemble what this city boy, raised in Tampa and Orlando, considers civilization. Williston is a remote place. Even a small city such as Laramie, Wyo., where I lived for four years during college, seems like a metropolis compared to Williston. I must admit, however, that although the infrastructure was designed for the roughly 14,000 people living there in 2011 (according to the U.S. Census Bureau), the town manages to adequately support the estimated 100,000 people now living and working in the region.

Housing in town is next to impossible to find, so most of us oilmen live in man camps. These camps are nothing more than rows of trailers — usually 50 to 100 meters from the rig — provided by the oil companies for roughnecks, geologists and other company workers. Sometimes we are only a few minutes’ drive from town, whereas at other times we might be an hour from any significant population.

The conditions and living circumstances vary drastically from company to company. Admittedly, the geologists have it better than the roughnecks who are typically crammed into trailers like sardines. Rarely do we geologists have to share a bedroom in the two-person trailers, although sometimes we do share a modest kitchen and bathroom. Everyone is expected to cook for themselves so diets vary drastically. The trailers are typically in good condition, and are certainly comfortable enough considering they are free, but they can get cold during a brutally frigid North Dakota winter.

When we do leave the trailers and go into town, there are modest, albeit limited, options for entertainment. Because of the huge influx of people, however, the average wait at any restaurant will be on the order of an hour — sometimes longer — every night of the week. Time is easily passed though, because Williston is never in short supply of interesting characters, most of whom are more than willing to entertain you with casual conversation.

In Williston, I have met people who hail from Florida to Alaska and everywhere in between. Their occupations range from oilmen to truck drivers, from bricklayers to traveling salesmen and even exotic dancers, whom I’ve heard (through the grapevine, of course) can make more money in Williston than Las Vegas. The characters that make up the cast in Williston are as diverse as any metropolitan area I have ever witnessed, leading to an array of opportunity and even a certain element of danger.

My only reference frames for past boomtowns are movies about the old Wild West (it certainly does remind me of that), and stories my father, also a geologist, told. He worked in the same region during the mining boom in the 1970s and spent time in Colorado, Montana, North Dakota and Wyoming. Over the years, he has treated me to stories that paint a vivid picture of how the world of exploration geology used to be. The most infamous place he visited during the ’70s was Rock Springs, Wyo. From what he has said, and from what I learned of the history of Wyoming, the lawlessness of Rock Springs — which included prostitution, gambling and the murder of several police officers — harkened back to similar conditions experienced in the boom towns of the 1800s. Although such mayhem may not be witnessed in modern America again, there are certainly parallels that can be drawn between that period and the current boom in North Dakota.

With such an influx of people, it’s no surprise that the police have had a hard time dealing with the increase in crime. Every month, public radio announces that someone has gone missing or that there is a new fugitive on the loose. However, it appears for the most part that as long as you don’t go looking for trouble, it is unlikely to find you.

As with the interesting characters, there is no shortage of seedy types in Williston, but a polite nod of the head in passing generally keeps conflict at bay. There seems to be an unspoken rule among the many varied sects in Williston that honors the idea that, although the environment is less than ideal, we are all here to work so we may as well get along.

I have quite enjoyed Williston’s populace: People are quick to buy you a drink and share a laugh if you’re the type of person who can enjoy the company of a diverse crowd. On break from the rig, I often find myself being treated to “big fish” stories from interesting individuals from around the country. Once the food and drink has been consumed, everyone parts ways with no intention of meeting again; but the single serving camaraderie of unfamiliar people can be a breath of fresh air after long stints in the field.

The People and the Prospects

Understandably, locals’ opinions of the sudden development are mixed; many are positive, others are resistant to the changes. The boom has brought a tremendous amount of money into Williston. The infrastructure has grown to accommodate the massive influx of people and overall the town has thrived. Those who lament the changes often focus on the crime and the unending buzz of traffic and people in the town. Many claim that their small town has been transformed — for the better according to some, who hope for the growth to continue. Others wish for the town to return to the way it was. But even they realize
that things will never be the same. This boom will likely persist for several years or decades.

The Bakken is a very large formation and there are new wells opening daily, encouraging more and more people to make their way to far northwestern North Dakota. In 2008, the U.S. Geological Survey estimated that the Bakken Formation contains anywhere from 3 billion to 4.3 billion barrels of oil that is technically recoverable within the boundaries of Montana and North Dakota. At current market prices, these reserves are worth somewhere between a quarter and a half trillion dollars. The survey is currently reassessing the formation (due out in fall 2013); industry estimates put the reserves at somewhere closer to 10 billion to 20 billion barrels of oil.

It seems pretty clear that as long as the price of oil is high, the work will continue. Based on the billboards around town advertising openings for roughnecks, the oil companies appear to be optimistic for the continuation of drilling. Most wells produce oil for decades, making profit a virtual guarantee. The initial investment is great but the return is far greater and based on that model, the current boom will continue to gain strength.

In such uncertain times, much of our country’s youth has found it incredibly difficult to locate employment even with a college education. So the Bakken Boom has truly been a godsend for my generation of geologists. We have not only discovered that our education was worth every penny but that we have been fortunate enough to graduate at a time when our services are at a premium. This opportunity will certainly not last forever, but the majority of my colleagues agree that this boom will be an excellent stepping-stone for our geologic careers. Earth provides us with an amazing array of gifts but at some point we will reach the end of these resources. It will be the responsibility and challenge of my generation of geologists and all scientists to envision and construct a world that conservatively and efficiently uses these resources to their fullest potential.

*With permission from AGI, this article was reprinted from EARTH, October 2012, pages 32-39.*

Powers is a graduate of the University of Wyoming and a one-year veteran of the North Dakota oilfields. The views expressed are his own.
Greetings from your AIPG National Secretary! As I write this I am still basking in the glow of the AIPG annual conference which was held in the Black Hills in late September. What an amazing experience! The weather was beautiful and the field trips and technical sessions were outstanding; however, the greatest highlight of the event for me, as always, was the opportunity to share in the fellowship of AIPG friends and colleagues. I sincerely hope that everyone who attended the meeting came away with renewed vigor and excitement about the future of both AIPG and the field of geoscience.

I cannot write another word without thanking all of the people who made the conference a great success including the local organizing committee, the South Dakota AIPG Section, the incomparable staff at AIPG national headquarters, the student volunteers, and faculty members at the South Dakota School of Mines & Technology (SDSM&T) who led field trips, moderated technical sessions, and co-chaired the meeting.

One aspect of the annual conference that infused the overall atmosphere with positive energy was the outstanding student participation that we experienced in this meeting. We had approximately thirty student volunteers from SDSM&T, in addition to students from many other institutions who participated in the meeting. One group of students from the University of South Dakota (who traveled approximately four hundred miles to attend the meeting) has initiated measures to formulate an AIPG student chapter since their participation in the annual conference. Another strong feature of the conference was the student poster contest with fourteen entries from four colleges and universities, including the winning entry for the undergraduate category submitted by a student from Oglala Lakota College, a Tribal college located on the Pine Ridge Indian Reservation in western South Dakota. What a tremendous opportunity for these students to participate and network in a national conference! I heard several students already making plans to attend the next AIPG annual conference in Colorado.

I believe that this type of student and faculty involvement in AIPG activities is critical for the future of AIPG and that it’s also critical for the future of the students pursuing careers in the geosciences. The American Geosciences Institute (AGI) and other sources have recently estimated large discrepancies between the projected number of graduating geoscientists and the number of geoscientists who will be needed in the coming years to fill the growing number of positions in geoscience fields. Clearly, we need more students to enroll in geoscience programs, and some geoscience departments already are experiencing growth. As more students enter these fields, there will be a greater need for professional interaction, networking for jobs, participation in conferences, and other activities in which AIPG can reach out and provide assistance and venues for these activities and thereby help these students achieve their goals to become professional geoscientists. Through these activities we also can strengthen the future of AIPG, and we can grow along with the growing number of geoscientists who will enter the work force in the future.

How much growth could AIPG experience in the coming decades if we are successful in attracting a portion of these new geoscientists to our organization? How should we best reach them with our message of who we are and what we do for the profession of geology and related fields? Where will AIPG be in twenty years after much of this growth has occurred? These are challenging and exciting questions that we will need to consider carefully as we move forward in this new era of growth in the geosciences. One strong message that I received from our recent conference is that engaging academic geoscience departments as cooperators in our conferences and meetings can be a great way to reach these future geoscientists.
AIPG was founded in 1963, the same year I took my first course in geology. Much has changed in the geosciences and AIPG during those fifty years. As we celebrate our anniversary, members continue to raise concerns regarding the education of geologists and a need to return to the basics. However, one must ask what constitutes the science of geology in 2013, and what are AIPG’s objectives to maintain the competence and uphold the scientific ethics of those practicing the science in the future.

Early Beginnings

Like all natural sciences, geology found its true beginnings as a direct result of the Renaissance. In the 16th century DaVinci recognized the marine origin of fossils and Agricola published a treatise on mining and mineralogy. In the 17th century Steno produced the stratigraphic law of “superposition” and principles of “original horizontalty” and “lateral continuity.” A strong focus on descriptive geology had begun.

During the 18th century the economic demand for mining further drove the need for geologic knowledge. This culminated toward the end of the century in the development of geologic mapping by William Smith. James Hutton (often called the father of modern geology) was one of the first to consider geologic origins. His theory of Earth’s evolution, printed in 1788, was referred to as Plutonism. Hutton believed that Earth’s processes were gradual and involved volcanic activity, erosion, deposition and solidification by heat. His ideas were in direct contrast with the Neptunists, who believed that the rocks were precipitated by the ocean or “catastrophes.” The publication of Lyell’s three-volume work, Principles of Geology, further developed Hutton’s ideas into the concept of “Uniformitarianism,” a theory that heavily influenced Darwin’s research, and was in direct conflict with “Catastrophism.” Uniformitarianism is as important to the geologic sciences today as evolution by natural selection is to the biologic sciences.

Along with great advances in physics, chemistry and biology, the second half of the 19th century saw the science of geology diversify into sub-disciplines such as stratigraphy, paleontology, mineralogy, geomorphology, volcanology, glacial geology and, by the end of the century, petroleum geology. Many of the early academicians of geology had their beginnings in other disciplines such as medicine, botany, geography and chemistry. University geology departments emerged and grew. Geology, for a while, became a general part of high school science curricula.

A Mechanism Dilemma

Drawing on discoveries in physics and chemistry, the first half of the 20th century saw great strides in geology. Breakthroughs in radiometric age dating extended the age of the Earth to 3.0 billion years. Seismology gave new understanding to the makeup of the Earth. Deep sea coring, sonar, and paleomagnetism shed new light on the 70% of the Earth that had never before been explored. New theories would abound for sources of petroleum, geosynclines, mountain building, continental drift, earthquakes, origin of the oceans and atmosphere, as well as the origin of the Earth and Universe. However, when AIPG was founded, there was no known mechanism that would unify the myriad geologic subdisciplines, and the core studies leading to a college major often seemed disconnected from each other, as did many of the geology faculty in a given department.

In the 1960s geology departments in the U.S. were commonly referred to as “soft rock” and “hard rock” schools. Both types of schools generally offered similar core curricula for a baccalaureate degree — introductory geology (historical and/or physical geology); mineralogy; stratigraphy; paleontology; sedimentary, igneous and metamorphic petrology; and structural geology. As a major you probably had most, if not all, of these. You were also required to take sufficient hours in inorganic chemistry and introductory physics along with the required mathematics, liberal arts courses and electives. Schools in the north usually had a more extensive selection of advanced courses focusing on such topics as geomorphology, glaciology, and metamorphic petrology, while schools in the midwest and south focused on soft rock geology and paleontology. If you were lucky you might have had sufficient room and opportunity for an advanced course in economic geology, petroleum geology, hydrogeology, or aqueous geochemistry. There was much more distinction between courses if you pursued an advanced degree. Field camp was generally a requirement for a BS rather than a BA in geology. Camp
A Revolution in Geology

With a few exceptions, undergraduate geology courses in the 1960s involved a lot of rote memorization, field description and intense laboratory time. In addition to mineralogic and petrologic identification and classifications, you learned a few general laws and processes such as superposition, isostasy, geosynclinal theory, sedimentary processes, reaction and weathering series, seismology, and structures. This constituted the fundamentals of geology at the time. Uniformitarianism was still the guiding principle, but it did not tie everything together and left many questions unanswered. Even in paleontology, little was said about extinctions or interdependence of Earth systems. The focus was on evolution, diversification and adaption — catastrophism (even of a non-Biblical form) was still a nasty word.

Then a revolution happened. The grand theory of continental drift proposed by a German meteorologist (Alfred Wegener) in 1915, and totally rejected by the geologic community for 50 years, now had a mechanism that geologists could live with. Plate tectonics would revolutionize our understanding of geologic systems and dynamic processes. Geology faculty from separate sub-disciplines began to communicate and even collaborate. In December 1968, a more subtle but powerful event took place. The Apollo 8 crew sent back to Earth the first photo of the “Earthrise.” It is probably the most influential earth science photo ever taken.

Beginning in the 1970s textbooks were rewritten, continents rearranged, and almost everything geologic now seemed to have a unified explanation. By the mid 1970s interest in geology and interdisciplinary programs began to enlarge. Not wishing to be pre-empted by other scientific organizations, AIG went into the act. When I joined in 1976, it had just changed its name to The Association of Professional Geological Scientists (APGS), and I became a CPGS. This attempt to unify practicing geologists resulted in an immediate 20 percent increase in membership. Three years later APGS, under pressure from a majority of the membership, reverted back to AIGP. However, the field of geology and college curricula would continue to evolve. AGI even changed its name from the American Geological Institute to the American Geosciences Institute, albeit in 2011.

Catastrophe Strikes Geology

In 1980, a Nobel physicist and his geologist son found a clay layer containing high amounts of iridium that could not be explained by terrestrial sources. They suggested the source of the iridium was an asteroid that had struck the Earth 65 million years ago, ending the Cretaceous Period and annihilating the dinosaurs. A possible event of such magnitude caused an uproar in the geologic community. Where was the hard evidence? Where was the crater? Over the years that followed, many discoveries were made that supported the impact. Evidence for the Chicxulub crater in the Yucatan had actually been discovered during petroleum exploration much earlier. It appeared as though the old-school battle between Uniformitarianism and Catastrophism had been resurrected. But, good questions were raised and more answers provided. What would an impact do to the oceans and atmosphere? Did we need to look closer at catastrophic Earth events? The geosciences began to consider in much more detail the interrelationships between the Earth and its oceans, atmosphere and biosphere throughout geologic history. Earth Systems Science was born, and geology departments saw more opportunity. Regulation of the environment also evolved during the 1980s, producing a major expansion in employment for geologists outside of the mining and petroleum industry. It also provided a need for Professional Licensing and resulted in AIGP’s public involvement in statewide efforts, as well as significant membership gains.

In 1994 Comet Shoemaker-Levy slammed into Jupiter, and we got to see how an impact can affect a planetary atmosphere. The game was afoot. Extinctions again became a popular topic along with myriad related subjects including paleoclimate change. In 1992 Joseph Kirschvink, a geobiologist, proposed a Precambrian “snowball earth”, during which there was global glaciation. Melting of the ice, as a result of accumulation of volcanically derived greenhouse gases then turned the Earth into a hothouse. Soon after, as zoologist Andrew Parker suggested, primitive animals developed eyes, and the Cambrian explosion and a zoological arms race ensued. Then there were more extinctions to look at. It seems that geologic history was now better explained by a combination of gradual (uniformitarian) events along with major catastrophes, similar to Niles Eldridge and Stephen J. Gould’s modification to natural selection called “punctuated equilibrium.”

The Past is the Key to the Present

The Great Permian Extinction became a renewed focus of interest by numerous disciplines in the 1990s and 2000s, with the probability that the eruption of the massive Siberian Traps and greenhouse warming had played a major role. Recent research has also focused on the Eocene thermal optimum, when mammalian evolution as well as global climate went through major changes. Understanding the mechanisms driving the Earth’s climate systems during the Eocene and at other times will help us to predict the climate in the near future. In 2000 Nobel laureate Paul Crutzen and ecologist Eugene Stoermer proposed a new geologic epoch, the Anthropocene, to address human impact on the geosphere.

The Earth is now estimated to be 4.54 billion years old. There is also evidence that life may have started as early as 3.8 billion years ago. The more we study the Earth in “deep time” the more we learn of the interdependence between the Earth and the oceans, atmosphere and biosphere including man. Many of these advances have come from biology and other disciplines. They not only contribute to the understanding of life’s evolution on Earth, but also the search for life sustaining and creating conditions on extraterrestrial worlds. To best understand the importance of life’s impact on the evolution of the Earth and its surface, including the oceans and atmosphere, as well as the integration of earth sciences, Robert Hazen’s new book, The Story of Earth (2012), is an essential read. Hazen not only presents a cohesive history of the Earth, but also convincingly gives new insights, including the probable co-evolution of most minerals along with life. Fifty years ago you wouldn’t have found a geobiologist collaborating with a mineralogist. Actually, you would have had hard put to find a geobiologist.
Earth Systems Science

Geology has always been interdisciplinary. It draws from the basic sciences (Physics, Chemistry and Biology). Earth’s natural systems, rock formation, the oceans, the atmosphere, and the evolution of life are inextricably linked. Many geoscience endeavors therefore require a collaborative interdisciplinary effort utilizing any number of geologists, structural geologists, sedimentologists, geophysicists, geochemists, geobiologists, biogeochemists, paleontologists, volcanologists, astrobiologists, paleobotanists, paleoclimatologists, palynologists, marine biologists, oceanographers, atmospheric physicists, glaciologists, etc. It’s never been just about rocks.

Many departments have struggled to find ways to attract students. Geology departments need a critical mass of professors from various subdisciplines to maintain both viable undergraduate and graduate programs. Those programs are mutually beneficial in attracting sufficient numbers of undergraduate students to help sustain the critical mass. Departments have had to become creative. Some have even shared faculty and facilities such as geology and engineering to sustain geohydrology, engineering geology, environmental geology and other programs. Other departments have looked for specialty niches and have formed “centers of excellence” to build upon their strengths to maintain curricula that focuses heavily on physical, chemical and biologic processes of the geosphere. Some universities have recently combined faculty from the geosciences, geography and anthropology departments to form centers of excellence to address the Anthropocene.

Core Curricula and Skill Sets

All of this diversification does not necessarily mean that core geology curricula have disappeared at most schools. A review of current undergraduate core curricula at major colleges and universities reveals a close similarity to those from the past. However, many geoscience departments at major universities do offer various tracks for undergraduates pursuing professions in specific geoscience areas, such as environmental geology. Most universities will note that these tracks are also in preparation for graduate studies and are not terminal points for employment. What can be the cause for complaints from within the profession that “the kids just aren’t learning enough fundamental geology?” A close look at many purported “earth science” programs at some smaller universities and community colleges does suggest that some core curricula have been diluted, but these schools generally are not offering BS degrees in geology. Some are offering degrees in “environmental studies” that are often too general and may be missing core geoscience courses. This should be a case of “buyers beware” on the part of the student as well as the employer.

There is an adage regarding college science degrees that probably predates the 1960’s —

A.B.S. shows that you have learned how to learn. An M.S. shows that you have learned how to use. A Ph.D. shows that you have learned how to contribute to the advance of science.

As an undergraduate major, it was instilled upon me that, if I wanted a career other than as a geological technician, I had to get an advanced degree. Petroleum companies at the time would not consider you unless you had at least a Master’s Degree. They were not necessarily interested in the topic of the thesis, rather a demonstration that you could use the fundamentals that you had learned. A Master’s Degree was the standard of the industry in those days, and for many of us who have had to hire geology staff in the environmental consulting business, it has remained the standard. If you could not learn enough geology as an undergraduate in the old days, how could one expect to do so now, particularly with the degree to which geoscience curricula have expanded. A review of internet job sites for geology openings reveals that approximately one half require advanced degrees, and many require a professional license or the ability to obtain one. If employers are having problems with their employee’s lack of core knowledge or their inability to pass geologist registration exams, then perhaps the problem rests more with the employer’s vetting of the candidate.

Much has also changed in the tools that geologists use. Gone are the days of the plane table and alidade, and pace and compass surveying — enter the new days of GPS, Total Stations, LIDAR and 3D Laser mapping. Down-hole tomography, Geoprobe® and Membrane Interface Probes, and other devices provide real-time results. Everything seems to be digital and instantly recordable; something that was unheard of fifty years ago. Not all of this massive data gathering capability necessarily produces better products. Canned software is used to crunch numbers and plot data, sometimes with unrealistic results. Often, nothing can replace the geologist’s mind, training and experience to integrate and interpret the data. It should also be the fun part. Then there’s the reporting of geologic interpretations. One should not attempt to expound upon one’s geologic findings, if one cannot present those findings visually or graphically. With the modern graphics and analysis tools available, this is much easier today. Students need to have these skills available from the start.

Geoscience Students are AIPG’s Future

AIPG has done an excellent job in the past in promoting professional registration and developing guidelines for professionals. As an active member, however, I used to have great difficulty in getting junior staff interested in joining AIPG. This is a dilemma I think most of us have had. A common response is, “it’s only a lobbying organization, so what will I get out of it?” Or, “if it will help me get a license, then I’ll think about it.” With many of the states now having geologist registration, the challenge to recruit members seems even greater. I always believed that AIPG could provide a role and stature similar to NSPE or ASCE, but that just hasn’t happened. AIPG’s primary ability to maintain its membership over the last several years has been due to a successful program of initiating student chapters. As of July 2012 students make up nearly 23% of AIPGs membership. AIPG faces a lot of competition from other science organizations that engineering organizations do not face. AIPG as an organization needs to develop a master plan to convert these students to fulltime membership.

Building Competency

AIPG needs to play a stronger role in strengthening the competency of the profession from the bottom up. This can
be done effectively by sponsoring and/or working with student chapters, as has been done in the past. Individual members should also get to know the faculty in their area and avail themselves as a local resource. Members should make it clear to students and faculty what skills will be expected of them in the work force and encourage attainment of advanced degrees. Members also need to be heavily involved with their Human Resources Departments in the advertising, screening, interviewing, selection and reviewing of candidates. A solid review of candidate letters and transcripts, phone calls to references, and detailed interviews will, in most cases, reveal a potential candidate’s shortcomings. Members also need to become effective mentors to their junior employees and to be sure that those employees receive the additional training and education to keep them competent.

Maintaining Ethics

Geologists have a tendency to be independent thinkers. That’s good, as long as the thinking remains scientifically based and unbiased. Most geologic organizations share members from a broad spectrum of subdisciplines, and AIPG is not that much different. However, those other technical organizations have a greater degree of focus on transferring of geologic knowledge, whereas AIPG has a focus on strengthening and promoting the practice of geology. Members of AIPG work in a broad arena of applied geology. The interests of their employers, as well as member’s personal interests, are often in conflict with others in the profession. To maintain a constructive atmosphere in which AIPG will grow with the times and attract more members will require strict adherence to the AIPG Code of Ethics (COE). COE Standard 2.4 states “members should promote public awareness of the effects of geology and geological processes on the quality of life.” Members need to understand that exercising this Standard also implies adherence to all of the Rules under COE Standard 2.2 which states “members should be accurate, truthful and candid with all communications with the public.” Publicly straying out of one’s area of technical competency could violate one of these standards, and damage the credibility of AIPG. The future of geology will continue to get more complex and provide more opportunities for professional geologists. To be successful AIPG must be open to that complexity.

Geology in 2013 and beyond won’t be just about rocks. It will be as diverse as a science can get.

References:


Drew Diefendorf is a retired Consulting Hydrogeologist now pursuing a pro bono second career as a research assistant in paleoclimate and biomarker research. He is a past president of the Wisconsin and Tennessee Sections of AIPG and has served on geosciences advisory boards for the University of Missouri and Syracuse University. Mr. Diefendorf has been a guest instructor at Missouri’s Geology Field Camp in Wyoming. He has also served on AGI’s Human Resources Committee, as well as the Executive Committee of numerous statewide and regional environmental planning organizations.

AIPG History

Acting Executive Director

Edward “Bud” Rue, CPG 12

Future President Bud Rue was recording secretary at the organizational meeting in September and at the Founding Convention in November 1963. At the Founding Convention, Bud was asked to be Executive Director of AIPG. He said yes, tentatively. Thus, although also asked, Bud was not available to be a member of the first Executive Committee. However, it soon became apparent to Bud and the Executive Committee that it was too soon to have a salaried Executive Director, and require Bud to move from Illinois to the Denver area. So Bud became acting Executive Director from November 14, 1963, through most of 1964.

At the fourth Executive Committee meeting on November 12, 1964, Bud told the committee that the $750 per month salary was not enough for him to make a major relocation. The committee asked Art Brunton of Denver, who accepted the position.
Kristina Pourtabib, SA-3410

It is a warm mid-afternoon on a Thursday, and I find myself in the same situation that I end up in frequently on this day of the week; wandering through hectic hallways, past rows of lockers and hoards of people shifting between classes. I give the occasional smile or nod to the individual who stops and stares at me in complete wonder as I move along carrying various large and odd-looking objects. I am almost to my destination, and – thankfully - because my arms are starting to grow tired from carrying these heavy boxes. 204…203…202…201, I stand outside the door and politely knock so as not to interrupt the teacher, and I am quickly ushered into the room and directed to an open table where I am able to start setting up. When I am ready, I motion for the kids to come over to me, most of them can barely contain their excitement and are already asking me questions. I have them stand around the demonstration table, and I begin my talk. This week I am giving a demonstration on the many facets of erosion to a local fourth grade elementary school class. Last week it was teaching groundwater and pollution to high school students, and the week before it was fossils and minerals to junior high students. Although giving these demonstrations can be overwhelming for me at times, I think it is important as a geologist to give back and share your knowledge with the community.

I have been participating in our department’s K-12 Geology Outreach Program for the past year now, and at first I found myself wondering “what have I gotten myself into? I am not a teaching major and being in my senior year as a geology major, I have found my work load to be increasingly never ending, so why would I take on this extra responsibility?” I guess I realized that during my personal K-12 experience, geology was occasionally taught as a week-long unit here or there, but never really focused on as an important part of the sciences. It was not until one of my general Earth Science courses during my freshman year of college that my love for Geology began. I believe that exposing pre-college students to the many aspects of geology through an eye-catching, hands-on demonstration really helps to solidify the idea of what being a geologist can entail. It is not a lack of interest in the field of geology that keeps potential new majors away, but it is a lack of knowledge about what geology really is. That fundamental curiosity about the world and how its landscapes came to be is a core part of what makes most geologists strive towards learning more, and that concept is something that is instilled at an early age. After many of my demonstrations, I have had students come up to me wanting their own rock collections identified, sharing geology concepts that they have seen on T.V. and in movies or about fossils that they have found themselves. It is amazing to see how excited they get when they can make connections between the demonstrations and their own personal experiences. If geology were to be a recurring part of a young student’s curriculum up until high school, then more people would be able to see just how important and all encompassing the science of geology really is.

I would encourage all students and professionals to give back to the community and share your knowledge of geology with local schools or organizations. You will not only be passing the torch along to potential geologists in the making, but you will have a fun time interacting with others on a subject that is important to you. If you were to know everything about all aspects of geology and never shared that information with anyone then what good is it? To be a geologist is to be part of a community of people with shared interests, and the best way to expand that community is to get out there and tell new people about geology and why it is an important part of our world.

Kristina Pourtabib, SA-3410, is a 2012 AIPG Scholarship Winner. She is a senior at Eastern Illinois University in Charleston, IL majoring in geology and double minorin in chemistry and GIS. Kristina is interested in many different aspects of geology, including: igneous petrology, basin analysis, and optical mineralogy. She is hoping to attend graduate school in the fall of 2013 and then enter into the workforce. In her free time she participates in her department’s geology outreach programs, works as the departmental tutor, and is the vice president to her school’s SGE Gamma Chi chapter and Geoscience club. She also enjoys activities such as hiking, traveling, and playing with her puppy.

Should I become a CPG?

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

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

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

www.aipg.org
As AIPG prepares to celebrate the 50th anniversary of our organization, we have asked the AIPG sections to prepare a history of their section. Below is the submission for the Georgia section history.

**AIPG Georgia Section History, 1981-2012**

The Georgia Section was formed and the by-laws approved on October 14, 1981. The four original members included: Earl Hoover, Robert Dickerson, Serge Gonzales, and Charles Spiers. Their first meeting was held on January 29, 1982, which included the selection of officers for 1982. Earl Hoover was the Interim President and elected as the first Georgia Section President. By April of 1982 the membership had grown to 14 members. During the first year they had joint meetings with Southeastern Section of AEG and AIME. For the next two decades the section president would generally serve from two to three years and included: Charles Spiers, Serge Gonzales, Kenneth Nelson, Charles Thomas, Anthony Roberts, Sam Pickering, Harold Gill, and L.T. Gregg. Dr. Serge Gonzales was the first section member to be appointed to an AIPG National committee as chairman of the Education Affairs Committee. At the 1986 national meeting he received AIPG Presidential Certificate of Merit. He was also the first Georgia Section member to be elected to National Secretary for 1988-1989. The section’s second national officer was Dr. Thomas Jones, who was elected as National Editor from 1991-1992.

The section for many years would plan to have two meetings per year generally around a field trip followed by a business meeting at a restaurant. Many of these meetings would be visits to different types of open pit mines or landfills. In 1993 the section was visited by AIPG Executive Director Bill Knight.

In 2002 Ron Wallace was elected as section president. A few years later Eric Lowe became vice-president and the two have held the positions or switched. Glen Faulkner has been section secretary-treasurer since 1994. During most of this time, the section planned four meetings per year, mostly around field trips. In 2003 the section started giving a student membership plaque initially to four of the universities that offered geology degrees. By 2007 the section annually awarded a plaque at all six universities that grant geology degrees. Starting in 2010, each of the six students receive a $250.00 scholarship along with the membership plaque.

In response from a request from student members in 2005, a student chapter was formed at Georgia State University. This was followed by another student chapter at University of West Georgia in 2010. An additional two student chapters were formed in 2011, one at Columbus State University and the other at the University of Georgia.

To support the activities of the section, a day and a half environmental remediation conference was organized in 2008. Since then there have been three additional conferences that have been expanded to two full days. In 2011 Ron Wallace was elected to National President-Elect. The membership has grown over the years from the section beginning with four members to a total membership in 2012 of over 270.
The Benefits of Research in Undergraduate Education: Perspectives From a Teacher and a Student

David A. Gonzales, CPG-11266 and Jacob N. Cammack, Fort Lewis College, Durango, Colorado, 81301

Introduction

Inquiry is an important component of science education, and the merits and methods of inquiry are disseminated in the *National Science Education Standards* (NSES; National Research Council, 1996). Although there are published examples of research experiences at the undergraduate level, it has been reported (MacDonald et al., 2005) that only 1% of a sampling of geoscience faculty in the United States has used research in their curriculum. This is an interesting point given that inquiry is a fundamental practice of scientists in all careers.

The positive impact on student learning via authentic, scientific research and similar experiential activities is documented (e.g., Project Kaleidoscope, 1991; many citations listed in the SERC online portal for Undergraduate Research as a Teaching Practice). In this article we present the perspective of a teacher (Gonzales) and a student (Cammack) on the undergraduate research experience within the context of an igneous and metamorphic petrology class. Our goal is to showcase one example of how undergraduate research can contribute to the academic experiences and career development of faculty and students, and to encourage the use of inquiry as part of the learning process.

A Teacher’s Perspective

As an undergraduate student in 1981 I had the opportunity to work on a research project with one of my instructors. Up to that point in my education a great deal of my academics had involved class activities and exercises with verification of my knowledge and skills via exams. Therefore, I was excited to engage in the process of science on an actual geologic problem. I did not, at this time, however, fully appreciate the significance and potential of this research experience.

In the initial stages of my teaching career I relied mostly on lectures to transfer knowledge, and used exams and class exercises to assess student gains. After several years of instruction a window of opportunity to employ a different format was presented. Igneous and Metamorphic Petrology was a required upper-level undergraduate course that I had taught several times. In 2002, due to changes in the curriculum, this course was eliminated. I was faced with the choice of not teaching a cherished subject or transforming the course into something that would not only allow students to explore topics in petrology, but also give them an opportunity to further develop essential skills as scientists.

In 2003 I created a research-focused petrology course that serves as an upper-division elective for students (Figure 1). The primary pedagogical strategy of this course is to blend field and analytical studies with inquiry to promote authentic, student-driven research. Students use their prior knowledge along with observational and interpretative skills to investigate major regional rock bodies and geologic histories, as opposed to completing a set of class activities with predefined outcomes.

The assessment outcomes of this research course are documented elsewhere (Gonzales and Semken, 2006, 2009) and they illustrate that the students benefited in various ways by designing a research project, collecting and interpreting their own data, and communicating their findings. Students noted that they both enjoyed and were frustrated by the messy process of inquiry involving the testing and retesting of ideas with the potential of not having definitive answers and outcomes. The evidence revealed that this course clearly incited a passion for topics in petrology and geology in students, and gave them a different perspective on their academic experience. Many of the students who took this course have contributed new information to the scientific community through professional presentations. All of the students surveyed in the assessment process noted that they enjoyed research as part of their education and wanted to do more inquiry-based projects.
A Student’s Perspective (Cammack)

I took the research-focused Igneous-Metamorphic Petrology course at Fort Lewis College in 2010 which then evolved into a senior research project on chlorine isotope signatures of rocks in the Navajo volcanic field. The process of conducting original research at the undergraduate level helped make me a more competent geologist and a scientist. The trial-by-fire experience gained through two years of original research helped develop the scientific philosophy and skills that I apply daily in my budding career as a geologist. Learning to do research did not come easily but the process was rewarding in the end.

Doing authentic research (Figure 2) changed my perspectives on scientific inquiry. I realized that it is an ever evolving and complicated process that is not always honestly portrayed in a lecture-centered science class. A linear model for forming ideas, collecting data, and making interpretations is simply not reality. A valuable point that I took away from my experience was that scientific inquiry constantly changes and evolves into new questions and directions. I continually consulted with other students and scientists, and researched others’ work through the entire project. I realized that science is defined by one’s data and analyses, not a collection of facts, and that data always have some degree of error. I came to understand that gathering trustworthy data is a difficult task, with a snake-pit of potential problems. One of the most important lessons I took away from my research experience was that the use of different types of data is important in making valid interpretations.

There were many struggles along my research path. These included: 1) managing my time to deal with the different demands of the project; 2) handling my funding and resources; 3) and overcoming logistical obstacles such as scheduling instrument time to conduct analyses. I learned, with some anguish, that I had to review background information on the subject at all stages of the research. Reading and understanding scholarly articles was necessary to assess previous ideas, and find the relevant inconsistencies or gaps in my research. This was an important step in learning how scientists approach problems, test ideas, and interpret data. This process, however, took a great deal of time and often led to new questions.

The research I conducted as an undergraduate has had a profound impact on my career path as a geologist. Skills that I gained in scientific writing and presentation, data collection, and data management have been applied in several internships and positions. During my first mining internship I was asked to develop and implement a means of using radio-frequency identification (RFID) technology to track ore and waste for an underground mining operation. The project led to implementation of my procedure with recommendations for future steps to complete the project, a presentation to the regional project supervisors, and a job offer. This project required me to: 1) synthesize data and information to design an experiment and test the RFID system capabilities; 2) present the information I gathered to a management team; and 3) use analytical writing skills to generate a summary report. These skills were germinated as a direct result of the original undergraduate research I conducted as a student at Fort Lewis College.

Final Thoughts

From the Teacher

For those teachers who have a passion for a certain topic, but feel briddled by the classroom routine, I encourage you to engage in a research project with students. This activity can open up new ideas and passions in the instructor, and keep us alert to current trends that will help teach the next generations of geoscientists. Doing science in the classroom allows the instructor to engage with students in a venue where both can further develop professional skills and habits.

There are a number of benefits of having students do scientific inquiry. In the academic setting they can apply knowledge and skills they have learned in classes to assess actual problems. For those of us who promote the Liberal Arts education, research is also a useful tool to help students develop a broader perspective about the role of science in our communities. In the past 20 years, numerous studies have provided evidence that inquiry, especially those involving field activities, can enhance curriculum in modern liberal arts programs and prepare students for diverse workplace challenges (Kirchner, 1994; Schwab, 2001; DiConti, 2004; Plymate et al., 2005). For the career path, doing research can develop important skills in how to collect and analyze data to solve problems. In essence, students can further develop the critical thinking skills needed as scientists (Gonzales and Semken, 2006, 2009). Multiple conversations with professional geologists reveal that they prefer junior geologists who have the skills and practical experience to address a variety of problems.

Be forewarned, research in the undergraduate classroom is not without its challenges. The logistical issues that are involved in this type of activity can be complicated and difficult to manage (noted in Gonzales and Semken, 2009). One of the main hurdles that I had to overcome was the preconception of many students that there are black-and-white answers to scientific problems. I used to think that students gained an ample understanding of how scientific inquiry worked simply by listening to my lectures, but I have learned the hard way that is not the case. If we do not engage students in actual research they will not understand the complications, pitfalls, and values of this process.

If you have not tried an inquiry-based project in the classroom, the benefits far exceed the challenges. The research experience does not have to develop within the context of an entire course, but can be introduced with class activities, homework exercises, and individual field trips. The good news today is that there is an increasing body of published works and examples of inquiry in the classroom. In addition there are web-based sources of information such as the Undergraduate Research as a Teaching Practice at SERC.

From the Student

I advocate undergraduate research as an irreplaceable component of any scientist’s education and career. As budding geologists, students should know that learning research skills requires a lot of work and getting your “hands
dirty.” In doing research you will develop the skills you need in careers. After my experiences I have developed the opinion that research is not for every undergraduate student. Without ample interest and commitment a student may become frustrated, and gain very little if anything from the involved process of doing original research.

Here are a few recommendations for undergraduate students to consider when taking on an original research project. Pick a topic that excites you, and make sure you develop a project that is reasonable and doable at the undergraduate level. If you are not passionate for the project then don’t become trapped by it. Start your project early, be persistent, and find a professor or other professional who will be dedicated to mentoring your research. I came to realize that a well-designed project is fundamental in the process. You must develop a “thick skin.” There will be times when your ideas are challenged and you have to deal with criticism and setbacks which can be frustrating. If you select a project that is too broad, and cannot be finished in a reasonable timeframe, it can lead to results that hinder a reasonable assessment of the problem.

For those undergraduate students who are not required to conduct research in their academic experiences, I strongly recommend that you get involved in research project. In my opinion there is no substitute for the pedagogical rewards earned through conducting original research. This activity is an essential component of any science, and lends itself to intrinsic lifelong value. My research experiences as an undergraduate student have motivated me to attend graduate school, and engage in more geologic research. I am enthralled by what is to come in my scientific career, and hope this article will propel other undergraduate students to pursue research as a complement their classroom experiences.

References


David Gonzales is an alum of Fort Lewis College, and has taught in the Department of Geosciences since 1997.

Jake Cammack a recent graduate of Fort Lewis College, and calls Pagosa Springs, Colorado his home. He is an advocate of hands on research experience, and is currently pursuing graduate school. He is interested in stable isotope geochemistry, as well as igneous and metamorphic petrology.
The AIPG Foundation
Thanks Donors

Several generous members have provided very generous donations to the AIPG Foundation and a note of thanks is appropriate. Donations as of 12/17/2012.

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Future Donors May Assist Now

The AIPG Foundation is undergoing change. We are looking to support the needs of the near term and the future, and the Foundation recognizes that funding the Foundation is not the goal. Funding the needs is the goal. The new thinking of the Foundation is that the AIPG Foundation exists to support activities of AIPG. Among other things the Foundation wishes to:

• make educational grants to support individual scholarships to undergraduate and graduate students in the geosciences;
• prepare literature with educational content about the role of geosciences as a critical component of the sciences and of the national economy and public health and safety;
• make grants to classroom geoscience teachers for classroom teaching aids;
• support development of education programs for the science and engineering community;
• support geoscience internships in the nation’s capital;
• support geological field trips for K-12; and

Foundation News continued on page 26.
SCHOLARSHIP PROGRAM

Purpose
To assist students with college education costs and to promote student participation in the American Institute of Professional Geologists (AIPG). Up to four scholarships will be awarded to declared undergraduate geological sciences majors who are at least sophomores.

Scholarship Awards
Scholarship awards in the amount of $1,000.00 each will be made to eligible students attending a college or university in the U.S. Scholarships are to be used to support tuition and/or room and board.

Eligibility Requirements
Any student who is majoring in geology (or earth science), is at least a sophomore, and is attending a four-year accredited college or university in the U.S. can apply. Also, the student must be either a student member of AIPG or must have applied for student membership at the time the application for the scholarship is submitted.

Each student who is awarded a scholarship agrees, by accepting the scholarship, to prepare a 600 to 800 word article for publication in The Professional Geologist. The subject of the article must be related to a timely professional issue.

Application Process
Applicants must submit: a letter of interest with name, mail and e-mail addresses, and telephone number; proof of enrollment in an eligible geological sciences program, transcripts; an original one-page essay on why the applicant wants to become a geologist; and a letter of support from a faculty member familiar with the applicant’s academic work. The application packet should be submitted to:

American Institute of Professional Geologists
Attn: Education Committee Chr.
12000 Washington St., Suite 285
Thornton, CO 80241

For questions regarding the application process call (303) 412-6205 or e-mail: aipg@aipg.org.

Applications must be received by
FEBRUARY 15th
Awarded the month of
SEPTEMBER

Basis of Awards
Awards will be based on the content and creativity of the essays as judged by the Education Committee. The decisions of the Education Committee are final.
This issue of TPG marks the first of AIPG’s golden anniversary year. Throughout this issue, we have included vignettes from A History of AIPG, 1963 - 2003, which will continue in the rest of the TPGs published in 2013. A History of AIPG is also available for downloading from AIPG’s website, or a printed copy is available for purchase. From its inception in 1963, AIPG focused on the same issues that concern the profession today – licensure, employment trends, academic training for geologists, government regulations and professional ethics. A History of AIPG is organized chronologically, and it is fascinating to follow the evolution of the organization in the context of a changing nation and world. AIPG began when mining and petroleum were the chief private sectors employing geologists. This trend continued into the 1970s, when the latter part of the decade saw new laws and regulations governing hazardous waste management (RCRA) and uncontrolled hazardous waste sites (CERCLA, or Superfund). Both laws and the resulting regulations took effect late in 1980, and began the modern era of the environmental consulting industry, a major employer of geologists for over 30 years.

At the time of AIPG’s creation, many basic concepts of waste management and pollution abatement were well-established, although the role that geology played was not. My library includes a copy of Environmental Pollution by Laurent Hodges, completed in 1972 and published in 1973. This book is based on a course entitled The Physics and Chemistry of Pollution, taught in the physics department at Iowa State University. Hodges’ intent was to write a single-volume “scientific discussion of the major types of environmental pollution – air, water, noise, solid waste, thermal and radiation pollution – and their effects on man and the environment.”

The challenge of managing the wastes of human society dates to antiquity. Hodges begins Chapter 11, Agricultural Pollution, with the story of one of the labors of Hercules. Augeas, King of Elis, kept a herd of 3,000 oxen, whose stalls had not been cleaned for 30 years. Now that’s a lot of manure. Hercules diverted the rivers Alpheus and Peneus through the stalls, which were washed clean in one day. The story is from Bulfinch’s Mythology, which doesn’t speculate on the reaction of downstream residents or water quality. Pollution control advanced with human understanding of the links between raw materials, wastes and illness, whether infectious diseases or the result of exposure to chemical emissions. In the 20th and 21st centuries, global ecology has become an equally pressing concern.

Hodges also devotes a chapter to meteorology and climatology, including local and global effects of pollution on climate, and includes a review of arguments for and against anthropogenically-driven climate change such as global warming. This subject was as controversial then as it is presently.

A discussion of geology and hydrogeology, the latter a little-known and underappreciated sub-discipline at the time, is notably absent in Hodges’ book, and typical of that era. This circumstance reflects the nature of geological training and the profession at the time. Although the importance of geological controls on contaminant fate and transport is obvious now, only

Robert A. Stewart, CPG-08332

1. Which of the following minerals classifies as a “carbonate” and represents a source of manganese?
   a. Barite
   b. Goethite
   c. Rhodocrosite

2. A sedimentary rock composed of angular pebbles cemented together defines:
   a. Marble
   b. Conglomerate
   c. Breccia

3. According to the Wentworth scale, a particle (clast) ranging in size from 2 to 64 millimeters defines:
   a. Sand
   b. Pebble
   c. Cobble

4. Remembering the gas laws, recall the following expressions for Boyle’s Law \((P_1V_1 = P_2V_2)\), Charles’ Law \((V_1T_2 = V_2T_1)\), Gay-Lussac’s Law \((P_1T_2 = P_2T_1)\) and the “Ideal Gas Law” \((PV = nRT)\). For the above, “\(P\)” represents pressure, “\(T\)” absolute temperature, “\(V\)” gas volume and “\(Z\)” the “gas deviation factor” or “compressibility factor”. Now, calculate the volume of natural gas reserves \((V_2)\) at surface conditions \((P_2\) and \(T_2\)) if we know the volume of gas \((V_1)\) at reservoir pressure and temperature \((P_1\) and \(T_1\)). To solve the problem you may assume that at surface conditions \(Z_2 = 1\) and that at reservoir conditions \(Z_1 = Z:\)
   a. \(V_2 = V_1 \frac{P_2}{P_1} \frac{T_1}{T_2} \frac{1}{Z}\)
   b. \(V_2 = V_1 \frac{P_1}{P_2} \frac{T_2}{T_1} \frac{1}{Z}\)
   c. \(V_2 = V_1 \frac{P_1}{P_2} \frac{T_2}{T_1} \frac{Z}{1}\)
   d. Ha, ha!
I would first like to thank everyone for the opportunity to serve as National President of the Institute. It is an incredible honor and being able to celebrate the 50th anniversary of the Institute with all of you makes it that more special. I have been on the National Executive Committee the last few years and I’ve seen the president tackle important issues and implement initiatives that strengthen the organization. I have also witnessed the important role of president-elect, someone who works closely with the current president to ensure a smooth transition. As I begin to lead this organization, I want to assure each and every one of you that I truly understand our organization’s challenges, strengths, and opportunities. Past President Barbara Murphy extensively pushed for increased communication between the Executive Committee and the sections, and I believe it played a major role in the organization’s growing success. As such, I will continue and expand upon that initiative. Historically, the vice president has been responsible for contacting the sections, but we now realize that is a huge undertaking for just one individual. Therefore, we want to create an environment that fosters meaningful communication and collaboration between ALL advisory board members and the individual sections. Recently, at the 2012 National Conference, we assigned contacts to each section and we are hopeful that increased communication will make this organization stronger and more successful.

I enjoy reading emails from the National Executive Committee about the activities and events sponsored by each section. While the sections may be diverse in some aspects, each has sound leadership and members who offer support, take on additional duties, or volunteer their time and resources. I encourage all the section officers to read the other section newsletters to gain new ideas, collaborate, and if possible, hold joint meetings. I encourage the stronger sections to reach out to those that are not quite as active to offer assistance and guidance. Barbara Murphy also succeeded in having a calendar placed on our website, and I encourage each section to advertise their activities on this user-friendly interface.

The January/February TPG has been dedicated to the student members for a number of years now. We have all talked about the need for increased student membership, and the proper development of those members, as more and more geologists retire. Essentially, the field of geology and the societies designed to protect and preserve that profession, will soon undergo an expertise “gap” if we do not succeed in attracting more students. Students need to understand that their relationship with AIPG does not end when they receive their degree. Instead, we should show them that AIPG can increase the value of that degree, such as growing a professional network or attending educational seminars, by remaining an active member throughout their career. AIPG has a very good plan where students can join for free, and once they graduate, upgrade to a young professional membership and pay a reduced rate for three years. We recently surveyed our student members about their use of Facebook so we could gain insight on how best to communicate with the students and meet their needs. AIPG has had a booth at the National GSA meetings for many years, and I am encouraged to see more of our sections taking the initiative to have a booth at regional GSA meetings. AIPG also sponsors sessions on geology careers at the GSA National Meeting and the regional meetings. Our efforts have resulted in a steady increase in student membership the last few years. I would like to see more sections lead sessions at GSA in order to engage directly with students as well as faculty members.

AIPG is a professional organization with members in all areas of the geosciences. Therefore, I truly believe we uniquely possess the skills and experience to reach out to show students what professional geologists do and how rewarding the profession can be. We should go to the students at the universities and not expect them to always come to us. As an example, our section recently sponsored a field trip that introduced students to monitoring well installation, collecting groundwater samples, and describing soil samples. We have also visited landfills, quarries, and remediation sites. In short, we must show students real world examples that they will most likely not see in the classroom. Due to our diverse membership, we can expose students to the fields of engineering geology, geophysics, mining, and petroleum exploration and production just to name a few.

Growing AIPG’s membership has always been a major objective and one that the Executive Committee and staff work together on. Our section volunteers are valuable assets, and it is through them that we attract new professional and student members. I challenge each section to communicate with the universities and the chairman of the geology or geosciences department to lend support, give talks, and sponsor professional activities. Universities are always looking for speakers for brown bag lunches or club meetings. Email your newsletter to the chairman and ask them to share it with students. Find out the needs of the department by reaching out to student advisors, program chairmen, or counselors. Talk about the importance of licensing and the need for the students to take the ASBOG fundamental test as soon as their state allows.

AIPG has grown over the last 50 years and we can build on our past and look to the future. There are many opportunities out there. This year please commit some time to the Institute and reach out to the professionals and students. I look forward to a successful year and look forward to meeting many of you.
AIPG in 2013

William J. Siok, CPG-04773

It’s appropriate to use my first column of the new year to publicly congratulate and welcome 2013 AIPG President Ron Wallace as he officially becomes AIPG leader! Please read his excellent column in this issue. There you will get a sense of his outstanding plan for this year and also for his enthusiasm regarding a bright future for AIPG as an organization dedicated to the service of the profession.

This issue of TPG is dedicated to students not in name only, but in content which the Executive Committee hopes will be of value to geoscience students at all levels. As professional association demographics indicate, students are the immediate future of professional associations. Consider, if you will, some AIPG programs aimed at education at various levels of society. Some of these efforts are directly supported by geoscience student members.

I don’t like the word ‘outreach’, which I believe has outlived its utility, but am not astute enough to discover a more succinct way of describing the efforts made by AIPG and many AGI member societies to provide information about our profession to the public, including lawmakers. As a 501(c)6 corporation, the American Institute of Professional Geologists engages, on behalf of both its membership and the profession as a whole, in outreach and advocacy.

AIPG engages in educational efforts on a section level (state). AIPG members meet with legislators and their staff to promote the science, its practitioners, and the benefits of secondary earth science education.

AIPG supports efforts of scientific and regulatory agencies, on the state and federal level, to promote the understanding and application of the geosciences to public policy.

AIPG actively participates in the annual National Conference of State Legislatures (NCSL) to promote geosciences and educate state lawmakers regarding impact of geosciences at state level. This NCSL Geosciences exhibit is a very successful cooperative effort of AIPG, AAGS, AEG, AGI, and GSA.

AIPG is a member of the USGS coalition. The USGS Coalition is an alliance of organizations united by a commitment to the continued vitality of the unique combination of biological, geological, hydrological and mapping programs of the U.S. Geological Survey. The USGS provides independent, high-quality data, information, research support and assessments needed by federal, state, local and tribal policymakers, resource and emergency managers, engineers and planners, researchers and educators and the public. The Coalition supports increased federal investment in USGS programs that underpin responsible natural resource stewardship, improve resilience to natural and human-induced hazards, and contribute to the long-term health, security and prosperity of the nation.

AIPG promotes appropriate academic preparation. This includes encouraging fundamental curricula for geoscience majors through cooperative efforts with departments at the university level.

AIPG provides a forum through its news journal The Professional Geologist, for exchange of ideas and perspectives regarding public policy issues. AIPG offers occasional workshops to membership regarding appropriate public policy activities on a section (state) level for geoscience practitioners.

AIPG, through its Advisory Board and national Executive Committee, promotes the development and organizational endorsement of positions addressing critical national energy, resource, environmental, and hazards policy. AIPG through officers and staff provides testimony to Congressional committees regarding critical geoscience-related issues as requested.

Tying these efforts together in a largely volunteer organization requires active membership to be effective. Since promotion of the profession is also in your self interest, please work within your sections. Students especially are needed and welcome!

Foundation News continued from page 21.

• support educational outreach programs to the public on the state and local level.

The Foundation is in its infancy. While the new thinking Foundation hopes to uncover many sources of funding in the future as its policies and procedures are implemented and the Development Committee begins to operate in earnest, the one obvious source right now is you the individual member of AIPG. That is why the Foundation is hereby asking you, the individual member to donate. The immediate fiscal goal is one million dollars. From that fiscal place the Foundation would then have the ability to not only fund those routine aforementioned items, but new and lofty goals not yet identified.

Won’t you as an individual member consider making a generous minimum commitment of $100.00 to help build the AIPG Foundation? Your donation will provide a strong start for the Foundation, and gifts from other sources in subsequent years will lay the groundwork for funding opportunities for education and other AIPG initiatives today and tomorrow.
Answers:

1. The answer is choice “c” or “rhodocrosite”. “Barite” is barium sulfate and “goethite” constitutes an iron-bearing oxide.

2. The answer is choice “c” or “breccia”. Pebbles are rounded in “conglomerates” indicating a greater transport distance from the source. Marble is not sedimentary, but a non-foliated metamorphic rock which forms upon the metamorphism of carbonate minerals, such as calcite and dolomite.

3. The answer is choice “b” or “pebble”. Please refer to the table below representing the Wentworth scale of particle size:

<table>
<thead>
<tr>
<th>Clast</th>
<th>Size (diameter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulder</td>
<td>&gt; 256 mm</td>
</tr>
<tr>
<td>Cobble</td>
<td>64 – 256 mm</td>
</tr>
<tr>
<td>Pebble</td>
<td>2 – 64 mm</td>
</tr>
<tr>
<td>Sand</td>
<td>1/16 to 2 mm</td>
</tr>
<tr>
<td>Silt</td>
<td>1/256 to 1/16 mm</td>
</tr>
<tr>
<td>Clay</td>
<td>&lt; 1/256 mm</td>
</tr>
</tbody>
</table>

In soil mechanics, clay is typically defined as particle size less than 2 microns in diameter.

4. The answer is choice “b” or \( V_2 = V_1 \left( \frac{P_1}{P_2} \right) \left( \frac{T_2}{T_1} \right) \left( \frac{1}{Z} \right) \)

Through experimentation, Boyle and Charles determined that for any given quantity of gas:

\[
\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad (1)
\]

Equation (1) applies to the common situation where \( P, V \), and \( T \) are changing for a given quantity of gas and constitutes an expression of the “Ideal Gas Law”. Hydrocarbon reserves of “natural gas” are often found to deviate from perfect or ideal gas behavior. The “gas deviation factor” or “compressibility factor” (\( Z \)) must be accounted for in our calculations, or errors as high as 30% may occur in reservoir studies. In general, the dimensionless (\( Z \)) ranges from 0.7 to 1.2, with 1.0 representing “ideal behavior”. Accounting for (\( Z \)), equation (1) may be rewritten as:

\[
\frac{P_1 V_1}{Z_1 T_1} = \frac{P_2 V_2}{Z_2 T_2} \quad (2)
\]

To solve our current problem, we set \( Z_2 \) at surface conditions as \( Z_2 = 1 \) and let \( Z_1 \) at reservoir conditions be \( Z_1 = Z \). Substituting these values into (2) we obtain:

\[
\frac{P_1 V_1}{Z T_1} = \frac{P_2 V_2}{T_2} \quad (3)
\]

Solving (3) for \( V_2 \):

\[
V_2 = \frac{P_1 V_1 T_2}{Z P_2 T_1} \quad (4)
\]

Rearranging (4):

\[
V_2 = \frac{(V_1) P_1}{(P_2)(T_2/T_1)(1/Z)} \quad (5)
\]

Equation (5) is the answer to our question and corresponds to our choice “b”. It is an important equation since the value of \( V_2 \) is the volume of gas at the surface that we may recover from this reservoir under the prescribed conditions. This recoverable gas volume has obvious economic implications and constitutes a much needed energy source in supply and demand considerations.
The March/April TPG is the Student Issue. Individuals and Sections are encouraged to purchase extra copies of the Student issue to provide to Universities and Colleges with Geology Departments. This is a good way to generate interest in a student chapter.

The cost of the Student Issue is being discounted from $4.00 to $3.00 for quantities of 10 or more. Amount due ($3.00 x Quantity) + Shipping and Handling.

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If weight of order exceeds 10 lbs., additional postage will apply.

Please forward your order, with payment, to AIPG Headquarters no later than February 17, 2013.

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Court of Scientific Illiteracy in an Italian Earthquake Predictions and a Triumph

The court was apparently swayed by the emotional testimony of the relatives of the victims that was allowed. The court was apparently swayed by the emotional testimony of the relatives of the victims that was allowed. The court was apparently swayed by the emotional testimony of the relatives of the victims that was allowed. The court was apparently swayed by the emotional testimony of the relatives of the victims that was allowed. The court was apparently swayed by the emotional testimony of the relatives of the victims that was allowed.

Earthquake Predictions and a Triumph of Scientific Illiteracy in an Italian Court

I assume many of you read one of the articles covering the October 22, 2012 conviction of six scientists and a government bureaucrat to six years in jail for manslaughter for their failure to predict the 2009 earthquake that left more than 300 people dead in L'Aquila, Italy. The men stood accused of "inexact, incomplete, and contradictory" information about the risks posed by tremors during the weeks preceding the April 6, 2009 earthquake. All seven men were members of The Great Risks Commission, which the government formed to make such predictions, and the Commission did not predict that earthquakes preceding the April 6, 2009 foreshadowed a major quake.

One can only hope that the Italian appellate process, which apparently can take years, throws these convictions out. Just how the emotional testimony of relatives of the victims is relevant to the question of whether earthquakes can be predicted is a mystery known only to the L'Aquila court. I'm sure no one doubts the emotional and physical losses of the residents of L'Aquila but it isn't expert testimony about earthquake prediction. I hope no such court case would occur in the US but with the apparently increasing scientific illiteracy as demonstrated by the number of people who believe that dinosaurs and humans coexisted, I wonder. Certainly the plaintiff's bar seems to advocate the position that "My client was injured and so someone else (the chosen defendant) should pay" regardless of the client's responsibility for the injury or the plaintiff's contribution thereto.

Weather forecasters correctly predicted that Superstorm Sandy would cause major damage and disruption in the northeast, and particularly on the New Jersey shore, once the storm track became clear. Nevertheless people died and massive destruction occurred. Would things have been worse if the forecasts hadn't been made and disseminated? Probably. If the forecasts had been wrong, would some be calling criminal prosecution of the weather forecasters? Instead, the power companies are being blamed for not getting power restored faster.

I remember attending a session at the 1982 AIPG Annual Meeting in Pasadena, CA that discussed the impacts on Los Angeles and San Francisco of major earthquakes and the ability of relief personnel and supplies to reach the stricken areas. An interesting topic assumed that major earthquakes could be accurately predicted some years in the future and assessed the consequences of such predictive ability. Certainly people and readily moveable valuables could be evacuated. But would building and renovation activity cease? When would earthquake insurance policies be terminated? These are interesting questions to ponder.
North Pole, South Pole: the Epic Quest to Solve the Great Mystery of the Earth’s Magnetism

North Pole, South Pole: the Epic Quest to Solve the Great Mystery of the Earth’s Magnetism, by Gillian Turner, 2010, 2011, The Experiment LLC, New York, 271 p., covers a broad swath of history from the legend of the Greek shepherd, Magnes, for whom magnetism is named, through the 1995 effort to model the Earth’s magnetohydrodynamic dynamo in the Earth’s liquid outer core using a Cray C90 computer and 2,000 hours of computing time. The model was able to generate spontaneous self-reversal of polarity, on a randomly occurring basis for the geomagnetic time scale, and more recent efforts to understand the magnetic fields of other planets and the Sun.

Turner’s book describes the study of magnetism and the various efforts to use declination and magnetic inclination as a possible method of determining longitude and the studies of electricity and magnetism in the 18th and 19th centuries. Early on it was recognized that the geomagnetic pole was not quite coincident with the Earth’s axial pole and repeated measurements of declination at the same places over the years demonstrated that the declination changed continually. Following World War II, the deployment of magnetometer surveys over the ocean basins led to the delineation of the linear magnetic anomalies, which combined with increasing data on magnetic reversals led to convincing proof of the plate tectonics theory. The physicists explored the questions of the causes of the Earth’s magnetic field, why it varies in intensity and pole position over time, and why does the field randomly reverse. These questions are not finally answered but much has been learned.

North Pole, South Pole is a fairly quick, enjoyable read and is one most geoscientists should enjoy. For those of us who lived through the plate tectonics revolution, the names of the principal contributors bring back fond memories of a very exciting time in the history of geoscience. As noted, this book is for the general audience. It contains a glossary for the general reader and a list of selected additional reading including William Glen’s excellent The Road to Jaramillo: critical years of the revolution in Earth Science, Stanford Univ. Press, 1982, a book I’ve enjoyed reading and re-reading.

AGI Statement on the Conviction of Italian Seismologists

Alexandria, VA - On October 22, 2012, in L’Aquila, Italy, six seismologists and one Italian government official were convicted of manslaughter and sentenced to six years in prison. The seismologists and official had been on trial for not adequately warning the public about the danger of a potential earthquake prior to the L’Aquila earthquake in April 2009 that killed 309 people. Central to the question of manslaughter was whether there was a direct link between the reassuring statements of the commission on which the defendants served and the deaths from the earthquake.

Scientists are frequently called on to serve direct public needs, as indeed they should be. The American Geosciences Institute (AGI) believes that this is an appropriate role for earth scientists to undertake when the question is in their area of expertise, just as a medical doctor may be expected to assist in a medical emergency. Likewise, just as that medical doctor can assume protection from liability as long as standard and accepted procedures were followed at the scene of the emergency, AGI believes that scientists should be allowed to present their best recommendations without fear of retribution. This case, while complicated, puts scientists worldwide on alert that they may be attacked if, in hindsight, their best recommendations fell short of serving the public good. AGI feels that this is bad for science, and bad for the public good.

In a blogpost (http://www.earthmagazine.org/article/hazard-ous-living-italian-seismologists-tragically-convicted-manslaughter) on EARTH Magazine’s web site, Dr. Thomas Jordan, the 2012 winner of AGI’s Outstanding Contribution to the Public Understanding of the Geosciences Award and Director of the Southern California Earthquake Center (SCEC), told EARTH Magazine, “This won’t help those of us who are trying to improve how risks from natural hazards are communicated between scientists and the public.”

AGI believes the best approach to mitigating the effects of future earthquakes is to advance education, public awareness, and preparedness initiatives such as SCEC’s ShakeOut earthquake drills. When these initiatives are paired with robust natural hazards research and development efforts and continued use of observational, analytical, and monitoring tools, we can begin to reduce the significant toll natural hazards have on society. Scientists must be allowed to communicate their findings through carefully defined relationships between appropriate scientists and those public officials responsible for civil protection, without fear of retribution when those findings are the result of best practices at the time.

Geologic Ethics & Professional Practices

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.
A Few Words to Live By for Young Geologists

Mickey Cruse, MEM-2105

I originally acquired my degree in geology in 1976, many years before the state officially recognized geologists. At that time there was not a lot of diversification in the field as there is now. But like all of you I had acquired a degree and was looking forward to “curing the world.” My first job was a little less than formidable and afforded all of the challenge of a heart surgeon being hired as a nurse at a pre-school. But I accepted the challenge and pressed myself to experience anything and everything that came my way. It does not hurt to diversify your capabilities; as with learning a second language, you will expand your horizons.

My first mentor was Jack Parker, a geological consultant out of Michigan. As could be expected I tried to impress him with my knowledge. His response was that I had two ears and one mouth and to use them in direct proportion. I took that advice to heart and have been accumulating experience ever since. And this is the basis of my realization that there are two real truths regarding your degree besides its face value.

1. It proves you can set and complete long term goals.
2. It proves you can learn.

Never stop learning. I recognize that most young graduates will know more than me; therefore, to you I will pose the maxim “As you are now so I once was... As I am now so you shall become.” We all need to continue to learn and to push the envelope of knowledge whether it be formal education or applied experience in the field. The education gives you the tools; the experience gives you the raw materials to develop a product.

The most conspicuous aspect of the modern consciousness is our population’s failure to address the concept of time. This I call “fourth dimensional thinking.” Geologists have the mindset to understand the end product of millions of years of earth processes. Geologists by their very nature are a patient lot. It took millions of years to develop a tangible product. Appreciate that facet of geology and incorporate it in your observations. Do your best - let your actions and efforts speak for you.
To Learn a Water-Balance Parameter, Model it as Zero

William J. Stone, MEM-2164

Although models are idealized representations of reality that give non-unique solutions and cannot be validated, they are still important tools in hydrology. They are especially useful for evaluating conceptual models. Consider the water balance at a site: Precipitation = Runoff + Evapotranspiration + Recharge. If all parameters but one are well documented, or at least quantifiable, the unknown can be backed out. Alternatively, why not model the system without it, assigning the unknown parameter a value of zero? When model results exceed known or realistic values for a known parameter, the surplus may be attributed to the unknown parameter.

A liquid-waste treatment plant in a semiarid Southwestern setting was discharging effluent into a local ephemeral watercourse. The stream ceased flowing within a few miles below the discharge point. This loss of runoff water along the watercourse was generally attributed to downward leakage (transmission loss), but that process and ultimately recharge, had not been quantified. Facility operators insisted leakage was negligible because, if it led to recharge, they could be seen as contaminating regional ground water.

On behalf of the state environmental agency where I worked at the time, I constructed a simple, one-dimensional MODFLOW model of the stream system to investigate the water balance along the stream. To be realistic, precipitation and evapotranspiration were scaled to include the area of the adjacent valley walls, despite modeling the valley ground water as if in a rectangular box. More specifically, since recharge was the concern, the model was set up to investigate that parameter by not allowing any downward leakage. It was reasoned that if downward leakage were zero and evapotranspiration was maximized, the only other way for water to leave the model would be by stream flow (runoff). But because the stream normally dried up along its course, the amount the model said was runoff could reasonably be assumed to be recharge. Obviously this was a preliminary model and follow-up field measurements were required. But this got people to finally stop saying there was no leakage. Tip: In modeling water balance, assign the unknown parameter a zero value; excess water showing up for some other parameter may be attributed to the unknown parameter.

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

Invitation from AIPG to Submit Articles

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) 412-6205.
A couple months ago I attended documentary night at my favorite coffee shop/restaurant. That night’s subject was our education system and culture, and the documentary was actually a compilation of clips and short videos that included a couple talks given by Sir Ken Robinson. Robinson is, according to his website, “an internationally recognized leader in the development of education, creativity and innovation.” One of the talks was his 2006 TED talk\(^1\) (he has a 2010 one that is also very worth listening to\(^2\)). TED\(^3\) is an organization that hosts conferences where some of the world’s top “thinkers and doers” give short (18 minutes or less) talks. The other was an RSA Animate, a series of white-board illustrated talks\(^4,5\). If you’ve never really paid attention (as I hadn’t) to either of these lecture series, they are all over the internet and I highly recommend both. TED talks are very thought-provoking and RSA Animates are an awesomely engaging (and mesmerizing) way to experience great ideas.

I am easily pulled into discussions about the shortcomings of our education system, likely a result of an early awareness that things weren’t as good as they could or should be. This awareness can be at least partially attributed to some amazing high school teachers who didn’t always hide their frustrations with the limitations placed on them, and on me, by the system. Initially, I thought these flaws were specific to my county and state. I only saw them in terms of what we didn’t cover (geology), the physical freedom we didn’t have (20 minute lunches confined to the loud cafeteria, uniforms my senior year, etc.), and the narrow mindedness of my surroundings. Now I see that education shortcomings vary across boundaries, scales, and subjects. Robinson’s talks contributed to this evolution in my thoughts by speaking to something that I had been feeling but hadn’t quite identified: the restriction of intellectual freedom.

In the TED talk Robinson talks about intelligence and creativity, making the point that our education system is designed to churn out university professors that “live in their heads...and slightly to one side.” His descriptions sounded much more like me and the direction I’m heading than I liked and, when referring to kids’ innate willingness to take a chance at being wrong, he made statement that really hit me hard: “If you’re not prepared to be wrong, you’ll never come up with anything original.” The ability to take chances and be wrong is strongly discouraged by our culture, and as a result Robinson believes that we are educated out of our creativity.

In the RSA Animate talk, Robinson talks about an important part of creativity: divergent thinking. He describes divergent thinking as “the ability to see lots of possible answers to a question, lots of possible ways of interpreting a question...to think not just in linear or convergent ways, to see multiple answers not just one.” He sites a study that tested the divergent thinking capabilities of group of kindergartners and then retested them 5 and 10 years later, showing that this is something we are all naturally very good at (98% of the kindergartners tested to “genius” level) but that decreases with age and education. His explanation for this points to the factory-like nature of our system, where we are told there is one answer and one answer only to any problem we are given.

Robinson’s general premise throughout his talks is that our system suppresses students’ creativity by forcing them into an assembly line of overly-structured education, and that classes designed to allow for the exploration and development of creativity are deemed the least important. So why am I writing about this here, in a science-based publication? Science usually comes out on top in this debate, so we should be happy, right? The main reason is because listening to these talks put some of my personal frustrations into context, and I think it may for my peers as well. We have matured in the age of STEM. As scientists we (and we should) promote STEM education. An above-basic knowledge of science and math is something every decision-making citizen should have. Science does require a lot of creativity, especially geology as it is so observationally rooted. But, as I pointed out in the very first column I wrote, STEM is not everything.

Though I was by no means forced to overload with science classes as I did through high school and college, it was certainly encouraged. I took the one required art class in high school, loved it, and then filled my electives with AP microeconomics and the like in “prepara-

\begin{enumerate}
\item Robinson’s 2006 TED: \url{http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity.html}
\item Robinson’s 2010 TED: \url{http://www.ted.com/talks/sir_ken_robinson_bring_on_the_revolution.html}
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\item RSA: \url{http://www.thersa.org/}
\item Robinson’s RSA Animate: \url{http://www.youtube.com/watch?v=zDZFcDGpL4U}
\end{enumerate}
tion” for college. In college, I was never quite able to fit that studio art class I so badly wanted to take between all my science labs, though I did manage to take some piano lessons my last semester. My brain nearly imploded (not because of difficulty—that would have resulted in explosion and was also close to happening—but because of the required rearranging of my thought process). Now, in grad school, I have probably forgotten what piano I managed to learn, my mandolin is still collecting dust, and I have looked longingly at the evening craft workshops offered by the student center every semester. Though my kitchen endeavors offer some reprieve, I’m feeling the effects of intellectual imbalance but haven’t done anything about it. Why? Well…I might do it wrong.

As our field becomes more and more narrowed by specialization, and our education the same, we need to take it upon ourselves to expand our minds, keep them healthily balanced and at their top problem-solving potential. So my message to students of all ages, including myself, is this: be creative. Whatever that means for you, make time to do it. Allow that other half of your brain to grow a bit. If, like me, you have yet to find your creative vibe, be brave! I’m thinking woodworking sounds fun. Or maybe stained glass…
Teaching in the Geosciences: Information for Students

Michael J. Urban, MEM-1910

Recent or soon-to-be geology graduates may be weighing their job prospects in industry or other areas, like teaching. If you are one of these students – considering a career in secondary or post-secondary teaching – this article is designed to provide a little bit of background for you. Here are a few important things you should know.

1. Mathematics and science are high-need areas in teaching across the United States.
2. There is a shortage of qualified middle and high school geoscience (earth science) teachers.
3. You may be able to teach at the secondary (middle school, high school) level without a teaching degree, as part of a conditional or temporary license, depending on the state’s requirements where you’re seeking employment.
4. A graduate degree is needed to teach at the post-secondary level (colleges and universities).

Needed: Geoscience Teachers

The need for geoscientists exceeds the number of students majoring in the geosciences; the American Geological Institute’s forecast predicts a 35% increase in the needed geoscience workforce by 2018 (Gonzales & Keane, 2011). Unfortunately, fewer students are exposed to earth science in high school than to other science disciplines (e.g., biology, chemistry, physics) (Status of the Geoscience Workforce, 2009). This has been identified as one reason for lower enrollments in undergraduate geoscience programs at colleges and universities (Holbrook, 1997) and likely contributes to the shortage of potential candidates for employment in the industry. Another serious problem is that there are not enough certified earth science teachers to fill vacant positions (Lewis, 2008).

In the United States, high-need fields across most states include: foreign languages, reading, special education, mathematics and science (Teacher Shortage Area Nationwide Listing, 2012). Specifically related to the geosciences, there is a lack of certified secondary school earth science teachers and no advanced placement (AP) earth science option offered in high schools (Ridky & Keane, 1999; Ridky, 2002). Consequently, science teachers without earth science expertise end up teaching geoscience content (Ridky, 2002).

The majority of students are introduced to the earth sciences in middle school, grades 6-8 (Bezanson, 2007), and it is rarely offered at the high school level. In the year 2000, 19% of 8th grade earth science teachers had a major in a geoscience field (as cited in Lewis, 2008); in 2003, about 70% of high school earth science teachers were certified in the discipline (Bezanson, 2007). So what can we glean from these statistics? Most students will be introduced to earth science content in middle school or at the undergraduate college level (few at the high school level), and this means students may not consider geoscience as a career path when they are in high school. Students’ experiences in earth science classes may be less than ideal. We need more certified middle and high school earth science teachers, and as a society, need to value the earth sciences more than we do.

A Geoscience Imperative

The National Science Teachers Association (2004), in their science teacher preparation position statement, has stated that “to ensure all students have sufficient knowledge and skills in science and technology for success in the 21st Century, the nation must attract, prepare, and retain well-educated, effective pre-K-12 science teachers.” Having qualified earth science teachers is imperative considering the suite of contemporary issues the average citizen of today encounters and should understand: global warming, depletion of fossil fuel resources, alternative energy options, coastal flooding and more (Lewis, 2008). Additionally, the National Research Council (2011) has stated that “...today’s science students will become tomorrow’s citizens, who will require understanding of science and technology to make informed decisions about critical social scientific issues, ranging from global warming to personal medical treatments” (p. 5).

If we have a shortage of qualified earth science teachers, how can we hope to adequately address these problems? Certainly, any science teacher is able to work toward enhancing scientific literacy and preparing students to deal with these issues, but when earth science tends to be a weak concentration area for the majority of science teachers and is rarely offered at the high school level, a portrait of a serious problem emerges. One critical element qualified earth science teachers bring to the classroom is considerable content expertise and enthusiasm for their subject area. Any science teacher might teach an earth science course well, but would a teacher who majored in biology, chemistry, or physics pass on the same knowledge and passion for earth science as someone who majored in the geosciences?

Secondary Teaching Requirements

The traditional pathway most science teachers follow is that of a 4-year bachelor’s program of study in teaching. Such
programs combine science content with educational pedagogy and are designed to lead to state certification, after qualifying exams have been completed and passed. For those interested in the geosciences, this usually looks like a 5-12, 7-12, or 9-12 earth and space science teaching license. Other programs may allow students to double-major in content (i.e., geology) and education (i.e., teaching earth and space science). Post-baccalaureate programs may be completed by those who have an interest in teaching but already hold a 4-year degree. If you are just starting out in college, and know you want to become a science teacher, then it is useful to pick up a second science endorsement (such as a minor) as this will make you even more employable in most school districts.

Alternatively, because science is a high-need area around the country, individuals who possess a bachelor’s degree in a science field may be eligible for a conditional (or temporary) secondary teaching license (often good for one year, and renewable). Some states may require individuals teaching with a conditional license to be working on obtaining full licensure through an accredited program. Some incentive programs exist. The Federal TEACH grant (2012) is aimed specifically at recruiting and training teachers in high-need areas (like science and math).

Post-Secondary Teaching Requirements

For most post-secondary teaching positions, such as a community college instructor or university professor, you need no specific license. What you need is a graduate degree. For community colleges (2-year colleges), you typically need a master’s degree with at least 18 graduate semester credits in a discipline. So, to become a college geology instructor, you might hold an M.S. in Geology, or you may possess an M.A. with 18 graduate credits in geoscience-related coursework. You would then likely be qualified to teach introductory courses like physical geology, historical geology, or environmental geology.

To become a university professor, you usually must have a doctorate (e.g., Ph.D.). Universities (4-year and/or graduate colleges) may emphasize teaching or research, the primary difference being related to how much of your load is tied to each. Universities tend to offer the full gamut of courses in a discipline (assuming they offer a major or minor), and so you might teach introductory geology, mineralogy, paleontology, etc. based on your expertise. You may also teach graduate courses and advise graduate students. Some degree of research or scholarly activity is usually required.

In summary, if you have a passion for geology, geoscience, or earth and space science, and an interest in working with students, you may want to consider a career in teaching. There are many potential job opportunities available for qualified earth science teachers, and just because you may not hold a teaching degree, license, or certification, does not necessarily rule out the possibility for you (as there are alternative licenses available in many states). Earning a graduate degree may put you in a position to teach at a college or university.

References


Holbrook, J., 1997, Career potential in the sciences, geology in the high schools, and why anyone would major in geology anyway. Palaios, 12, 503-504.


Ridkey, R., & Keane, C., 1999, Preparing earth science teachers: Why teacher certification should be part of the geoscience degree. Geotimes, 44(9), 23-28.


AIPG History

First AIPG Officers

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First AIPG Section Organized

The first section of AIPG was organized on September 26, 1964 at the Commodore Perry Hotel in Austin, Texas, at a meeting of Texas AIPG members and applicants attended by President Van Couvering.

The Texas Section at this meeting adopted a Constitution and Bylaws and elected the following officers: Michel T. Halbouty of Houston, President; A. Wayne Wood of San Antonio, Vice-President; James A. Wheeler of Houston, Secretary-Treasurer; Howard E. Rothrock of Coleman, interim Past-President and Delegate to the National Advisory Board; Frank B. Conselman of Abilene, Charles F. Passel of Fort Worth and John S. Rives of San Antonio, Ex. Committee members; Richard R. Bloomer of Houston, Chairman of the Screening Board; and Thomas D. Barber of Houston, Chairman of the Public Information Committee.
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Author: Robert Font, PhD, CPG, PG

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Getting a Job—Resumes, Networking, and Interviews

David M. Abbott, Jr., CPG-04570, Helen V. Madeksho-Hickman, CPG-07535
Michael D. Lawless, CPG-09224, Samuel W. Gowan, CPG-07284
Barbara H. Murphy, CPG-06203, Richard M. Powers, CPG-06765

Introduction

Sooner or later, we all will need to get jobs and most of those jobs will be in industry rather than academia. This paper focuses on important aspects of the job search, resumes, networking to find potential jobs, and interviewing. But first, you must answer two questions.

• What type(s) of job would you like to have? (What is your passion?)
• Where would you like to work?

The answers to these questions will be personal and may be specific or broad. Flexibility allows casting of a wider job-search net but there may be good reasons for specificity in either or both job and location. Related issues include:

• your ability and willingness to travel away from your home base, perhaps for an extended period of time
• your obligations to your family or other significant personal relationships
• your commitments to other personal interests (all manner of things; if something is important, you’ll know about it) that could be affected by your job choice
• the type of work you may wish to engage in, that may be geographically restricted

Once you’ve decided on the type(s) and location(s) of jobs you’d like to pursue, you’ll need to start working on your resume. All manner of resume advice and suggestions are available and so this paper will focus on some important points. A potential employer is interested in your knowledge (education), skills (all sorts), experience and how the knowledge, skills, and experience you have fit with those needed for a particular position. If the fit is good, you may get a job. If they are not, then you won’t. So before you apply for a job, find out whether you fit the requirements. This is where networking comes in, which will be addressed later. In addition to the information in this article, you are urged to download and read Reflections on a Geological Career, http://aipg.org/publications, which has good advice for those who have already begun their geoscience careers and are thinking about advancement or a new position.

Your Resume

A resume should be a concise, well-composed summary of your knowledge, skills, and experience. It will also include your contact information and a short statement of the type of position sought; it should also be tailored to the specific opportunity or company of interest. The resume of someone entering the geoscience profession will be longer on knowledge and skills due to the lack of experience while the resume of someone with lots of experience will emphasize that experience.

Things to Include in Your Resume:

• state the type of job you’re seeking—avoid cliché-type statements; be genuine
• your knowledge—the subjects you’ve taken that will be of interest to the employer including field camp, related sciences (math, chemistry, physics, business), computer modeling and languages, familiarity with procedures relevant to the job sought, etc., such as mapping, field skills, database management, microscope use, etc.
• internships held—demonstrates real-world experience even if the type of internship is not directly related to the position sought
• knowledge of finance—did you fund all or part of your education through scholarships, work-study, cooperative employment, summer work, or other part-time work during while pursuing your degree
• military service—describe duties, promotions, decorations, etc.
• successful passage of the ASBOG fundamentals test in anticipation of state licensure, if you have taken and passed it
• foreign language facility, if any
• geoscience computer software with which you are familiar—everyone knows or should know MS Office, although exceptional database skills may be worth noting; for example, GIS or ore deposit modeling
• publications and presentations—papers presented, senior-MS-PhD thesis, etc.
• awards from professional societies or industry groups
• past employment including teaching assistantships, research assistantships and internships
• professional society memberships
• certificates for specialized training such as OSHA hazardous waste training or MSHA mine safety training
• hobbies or skills that may be helpful in your job (for example, one student was hired to work at a remote drilling site for a summer because he noted in his resume that he liked to tell jokes. Another got a job because his resume included the fact that he’d worked for a time as an auto mechanic).
• carefully selected references for the job for which you are applying—sometimes these may be supplied later
• a personal photograph of yourself—this one is debated, some experts advise this and some don’t. For someone whom you have met it will help them remember you. Many of us are better remembering faces than names. Use a good, professional-looking head shot photo; something neither too informal but not too formal either.
Those against photos in part base their opinion on the fact that photo shows gender and race but these are not the issues they once were.

Things that lead to immediate disposal of your resume in the trash can:

- misspellings—don’t depend on spell check; remember form and from are both correct spellings
- incomplete sentences—except when grammatically correct as in bullet points
- bad grammar
- poor formatting and presentation
- political or community activism
- cute abbreviations, etc.: LOL, OMG, etc.
- overuse of buzz words
- bottom line—have at least one if not more people proofread your resume

Appended to the end of this article are two resumes, one for a student graduating with a Bachelor’s degree in May and another from a geologist with more experience. The differences between the two resumes in experience and publications mean that one resume is a single page and the other is two pages. These are not necessarily the best resume presentations but are typical of resumes received by employers. They don’t necessarily follow all the foregoing recommendations. Prepare your resume to reflect you using the guidance above and the two sample resumes.

Thoughts from a Recruiter: in today’s world, there’s no reason to “mass produce” resumes, sending the same resume to everyone. When a company advertises an opening or is known for doing a certain type of work, the candidate should produce a resume specifically for that position or that company, emphasizing aspects of his/her background and education that are specific to the job advertised or the prospective firm’s focus (and eliminating all inessential information). Each resume should be targeted—do your homework! In addition, it should be addressed to the correct individual by name, not “H/R Department” or “To Whom it may concern.” We have the Internet and telephones and that information is available.

Cover letters: when sending out a resume, include a cover letter or message that should specifically address a particular position being sought and how your skills meet the job requirements, where applicable. You can also state in the cover letter or message how this position fits in with your long-term career goals. Ask respectfully for the reviewer to consider you for the position. Remember the resume “do nots”—once again, have someone proofread the cover letter before sending it.

Networking

Networking is using your relationships with people and organizations to your advantage. Speaking with the right person at the right time leads to a job more often than any other single action. Networking at its best is when your references are people that know both you and your potential employer. Providing a personal connection takes some of the risk out of the hiring process for the employer and enables you to move up the preferred employee list. Talk to the folks who graduated ahead of you who are working in positions that might interest you. Alumni organizations, professional society meetings, people you know who are in the type of business you’re interested in, and all sorts of interpersonal connections can lead you to job leads by being in the right place at the right time and by being attuned to the possibility of finding a job. David Abbott learned of the open position for a geologist at the SEC from an SEC attorney with whom he volunteered as a Boy Scout leader. When he left the SEC, he became associated with Behre Dolbear & Company because he had worked with Behre Dolbear’s President on the SME Resources and Reserves Committee. Networking is important not only in obtaining your first position but also throughout your career. This is the main reason for being involved in professional and other organizations, including volunteer activities, throughout your career. Because Stephanie Jarvis, SA-1485, has been writing the Student Voice column in the TPG since the Mar/Apr 2010 issue, and she has achieved recognition throughout AIPG that will be of tremendous help for her in her job search.

Many employers, particularly small to medium-sized companies, prefer to find candidates through networking rather than advertising. Often job opportunities are not advertised, so the wider your network, the more opportunities you are likely to discover.

Follow up

A follow up contact with a prospective employer after an initial contact or submission of an application or resume can be very important, but requires sensitivity to the philosophy of the employer. Some prospective employers, particularly in smaller firms, often consider follow up contact to be a positive sign of motivation and initiative. These contacts can be tricky and require listening to the cues being provided by the prospective employer. Repeated contacts will be considered a nuisance if the applicant does not listen to suggestions. Large firms often indicate that attempted contacts outside of specified channels will be rejected outright. There is no easy path around these prohibitions unless the applicant has a trusted contact in the company.

Other Thoughts

Where are the Job Openings Listed? In our experience, the larger firms post their job openings on their own websites but those jobs are usually “old or existing” postings. Most large firms commit to hiring a few entry level candidates every year and they cultivate them—as interns, or by going to specific schools every year and seeing them at job fairs. They also advertise in publications and to a much lesser extent, newspapers. Some may post with on-line job search sites, but not so much the technical entry-level positions because they’d receive an overwhelming number of replies, mostly not relevant. To overcome or be a part of that “cultivation” is why it is so important to network. Basically, if you have to respond to a job solicitation, you probably are late in the selection process. The very best is if someone calls you to tell you that you should apply for a position because it would suit you. Calling on firms of interest in the area you want to work is one way of finding out if positions are open and where. The websites of the various professional organizations may have job postings. Pick an organization that lists the type of job you are interested in. But networking, discussed below, should not be ignored.

Emphasis—Networking: maybe we ought to expand the definition of what we mean by networking.” “The purpose of this activity is to motivate people to help you in your search. They may provide names of firms; names of individuals in positions able to issue an invitation to interview; names of someone they know who may be somewhere (geographically, technically or department-wise) that are one way to meet these people, job fairs
are another, technical organizations are a third.

**Contacting HR:** but what if you live in Michigan and want a job in Texas and have no local contacts? A successful way to focus on the best position for you within certain parameters is to narrow your search scientifically. Identify the companies who hire geologists or the types of position you are looking for either nationwide or locally. Find out more about the firms, find out about their hiring process (from their website), and then contact the Human Resources Director or hiring manager personally (this is where networking comes in—to at least get the name). Contact should preferably be by phone, then email, then letter only if you cannot obtain more direct information. They will want to know if you have a geographic preference, and want you to send in a resume (via email is best). They will say they will send your resume on to technically specific or local hiring managers. Ask if you can be cc’d when they send your resume on (and follow up). Ask about how long they think the process will take and if they mind if you call back periodically to check. People get busy. Your life and future is urgent to you but not necessarily so much to them, even if they have good intentions. A well placed reminder is usually welcomed.

**Where Else Might Jobs Be Advertised?** Some firms place job ads in trade and organization magazines—*Groundwater* (NGWA publication) is an example, or *World Oil*. The firm ads in these magazines (most are also available on-line) will also provide the names of firms that offer the type of services you might want.

**Some Other Random Thoughts:** Most success in a job search comes from personal leads. Everyone wants to help young folks get started in their first position, so you just need to find the helpful people in the right position to hire you.

To get “cultivated,” students can get a job in a large or smaller firm as an intern, while still a student. A former intern for one of us calls regularly every year or so, with a career update, or needing a contact name or a reference, and she’s a great networker! I do not know how she initially made the contact, but she kept following up and asking for people to get her to the right person. Eventually her resume was forwarded by an engineer who barely knew what hydrogeology was, and she was hired for about eight weeks. She was outstanding as a student intern—a hard worker and accurate with spreadsheets, asked lots of questions, etc. If she had wanted to come back the following year or wanted a job in our geographic area, she would have been hired in a heartbeat and still would. Something to keep in mind is if you have a good work ethic and can get someone you know to provide that kind of reference, most employers are willing to teach the other skills, if you are willing to learn, and have the right level of qualifications needed for their hiring process (BS in Geology, MS, PhD, etc).

I think of a resume as a second step after an initial contact, or to document that it is worth spending time on this person because they have the basic skills I need.

The person who is the “decision-maker” on a hire, especially in technical positions, is usually the end user. Most HR people do not make the actual hiring decisions; they are there to fill in the paperwork and make sure legal requirements are met, and also to filter out folks that the busy technical folks do not have the time to interview.

**Comments from a Recruiter**

Jeff Ram of JRam Consultants provided the following comments to Helen Madeksho-Hickman. “In my experience, recruiters do not generally source new grads. But some recruiters do have positions for temporary jobs.” If you use a recruiter, discuss the types of positions they commonly fill to see if you and the recruiter are a good fit.

The environmental consultants I’ve worked with through the years have specific programs for college recruiting and usually have one or more H/R people responsible. In recent years, they’ve become more focused, spending their time and resources at a more targeted group of colleges. For example, a national engineering consulting firm with a large office in Gainesville might concentrate their efforts at only 3 or 4 Florida schools. Other offices of the same firm will concentrate on schools in their area.

In addition to on-campus interviews, we would recommend that a new grad scour job sites such as CareerBuilder.com, Monster.com and some of the targeted job boards such as getenvironmentalengineeringsjobs.com. It seems like there’s a new one springing up every week.

Regarding interviews, two documents that Jeff Ram uses to help prepare candidates for telephone and face-to-face interviews follow the appended resumes.
Education
College, Anywhere, NY
Candidate for Bachelor of Arts Degree, May 2013
Concentration: Geosciences
Overall GPA: 3.4 GPA in Concentration: 3.47
Senior Thesis: Modeling the Impacts of Development on Groundwater Discharge to a Stream

Related Coursework
- Hydrogeology
- Petrology
- Advanced-Hydro and the Environment
- Paleontology
- Sedimentary Geology
- Mineralogy
- GIS for Geoscientists
- Biology, Genetics and Evolution
- GIS Remote Sensing
- Biology, Cells and Ecosystems
- Structural Geology
- Calculus I

Work Experience
Montgomery County Park System, Baltimore, MD (June - August 2012)
Acquisition and Design Intern
- Created wetland cover maps for each park in the system.
- Conducted water quality and bathymetric studies on park lakes.
- Used GPS and ArcGIS to calculate volumes for park lakes and created bottom contour maps.

College, Anywhere, NY (May - Aug 2011)
Geosciences Summer Researcher
- Used ArcGIS, a soil-water balance model, and a recharge model to simulate how land cover changes affect baseflow to creek in central Wisconsin.
- Presented research at the Geological Society of America 2011 Annual Meeting.

National Park Service, GeoCorps, Virginia Beach, VA (May - August 2010)
Coastal Geologist / GIS Specialist
- Participated in the ongoing development of the Northeast Coastal and Barrier Network geomorphological monitoring protocols and data collection.
- Trained in field data collection using the NCBN protocols and evaluated existing data as well as imported and processed new data.
- Used ArcGIS to process and report Trimble GPS and Nikon Total Station data.
- Work was published in reports used for coastal management decisions.

Freedom Boat Club, Virginia Beach, VA (May 2008 – August 2009)
Dock Manager
- Oversaw the maintenance and rental of several vessels and aided club members in docking, boat handling, and navigation.
- Worked closely with members to organize outings.

Computer

Activities
College Varsity Football: Letter winner Fall 2010-2012. Team Co-Captain Fall 2012
Virginia Beach High School Football: Varsity letter winner 2006-2008
- Captain of the 2008 State Champion team.
- 2008 “All Shore” team member

Interests
Fishing, fly-fishing, boating, sports.
HOPEFUL GEOLOGIST

OBJECTIVE

Develop and apply Ground Water models to be used for Water Supply Planning and Consumptive Use permitting and compliance. Provide expedient responses to requests from the public. Manage outside contractors when needed.

SUMMARY OF QUALIFICATIONS

GW Modeling Tools: Modflow, GWVISTAS, Viewlog, MIKE SHE

Extensive Knowledge of the SFWMD Databases: Dbhydro, DCVP, Wilma. USGS –ADAPS database, some work with GENP

Advanced user of Excel: Including – Pivot tables, Macros, Filtering, Lookup tables, Charts, Queries to Dbhydro and Regulations database, Regression Tools. GIS; ARCGIS8 user, Arcview, RegGSS, Spatial Analyst, GRID, Arcedit, AML’s

Managed five peer-reviews of ground water models with outside reviewers. Ongoing management of public data requests. Orange County Water Shortage reports

Used SAS to reformat large data sets.

EMPLOYMENT

1997 - 2005    SFWMD West Palm Beach FL

Hydrogeologist, Water Supply Planning and Development, Model Application

- Ground Models using Modflow – Revision and calibration of Lower Kissimmee basin groundwater model (Glades, Okeechobee, Highlands model, Input Data Sets for KissEcModel, Collier (Included gathering data from outside sources (USGS, SJRWMD, SWFWMD). Data needed for Soils, Rain, Landuse, Water Levels, Surface water features and Well Data etc. Added Surficial Aquifer System to model.
- Team Leader on QA/QC of USGS GW Data for Office of Modeling.
- Team Member on the GW Monitoring Network Taskforce
- Team Leader on Potentimetric Water Level Maps for the LWC of Florida (Some Maps made with SURFER).
- Project Manager for peer-review of Ground Water Models.
- Section Contact for Public Requests.
- Created Excel Macro to run Weekly Water Shortage Reports.
- Wrote Groundwater and Water Quality Sections of LWC Water Supply Plan and Formatted draft North Palm Beach Ground Water Model
- Wrote SOW for Data Collection in the LWC.

1996 - 1997    SFWMD West Palm Beach FL

Staff Engineering Associate, Data Management

- QA/QC Data from DCVP using GVA.
- Completed Backlog of 30 years of Data for S-49.
1995 Geology Department, University of Florida, Gainesville, Florida
Research Assistant
- Organized study of the tidal influence on the hydrogeology at a fuel terminal.
- Actively assisted team in water and soil sampling.
- Analyzed data, using Excel and Surfer.
- Created cross-sections with data from well logs.
- Coordinated meetings

1993 -1995 Geology Department, University of Florida, Gainesville, Florida
Teaching Assistant – Geology and Oceanography

1992-1993 Weismann Institute of Science, Rechovot, Israel
Research Assistant
- Created Well Database in Excel.

EDUCATION

1993 - 1995 University of Florida, Gainesville, Florida
M.S. Major: Geology. Minor: Environmental Engineering.

1989 - 1992 Hebrew University, Jerusalem, Israel
B.Sc. Major: Geology and Atmospheric Sciences.

1997 – Present Toastmasters International ATM-S, CL
- Served as Treasurer, V.P. of Education and Secretary.

Additional classes in Florida Water Law, GIS and Project Management

MEMBERSHIPS
- Geological Society of America
- American Water Resources Association
Five Ways to Do Better in Phone Interviews

From conducting many phone interviews—on both sides of the hiring equation—here are five tips on how to do well in a phone interview.

1. Take note of your surroundings.
   - If you have an interview scheduled, take precautions beforehand to get in a good spot physically. Don’t take the interview in the office where you can’t talk freely.
   - Don’t use your cell when there is too much noise in the background. And don’t be walking from one place to another because the breathlessness that comes from walking and talking at the same time subconsciously conveys lack of authority to someone who doesn’t know you.
   - If you did not schedule it beforehand, feel free to ask the interviewer if you may call back at a better time. You will not sound disinterested, but rather, you will sound concerned for managing your life organizing your commitments.

2. Stand up. No kidding. You will sound more self-confident and dynamic if you stand while you speak rather than if you sit.
   - Walking around a bit, but not too much, also keeps the call going smoothly. If your body is confined, your speech sounds different than if you have run of the room. It’s one reason that the best speakers walk around instead of standing in one place at the podium.
   - Using hand gestures is very natural for talking, so allow yourself to use them, even though you are on the phone. You don’t have to force it. They will just come, as long as your hands are free. And you want to sound natural on the phone because authentic is more likeable than stilted. So walking around a room with a headset will actually give you the freedom to be more of yourself on the call.

3. Dress appropriately for the interview—even though no one will see you.
   - The emails you write to a hiring manager are different than emails to your friends, you should not talk to an interviewer the same way you talk with your friends. You know this, but the shift is difficult without practice.
   - A way to compensate for this is to dress for an interview even though the interviewer can’t see you. When there’s a risk of sounding too casual or unprofessional on the phone, dressing up a little may actually change how you sound.

4. Prepare for the most obvious questions.
   - A resume is to get someone to pay attention to you. An in-person interview is to see if people like you. Somewhere in between those two events, people need to make sure you are qualified and you don’t have any huge red flags. So in a phone interview you can expect people to focus on those two areas.
   - You will probably get questions asking you to show that you actually have the skills to accomplish the goals for the open position. Be prepared to give organized, rehearsed examples of how you have performed at work in the past in order to show your skill set.
   - Also, be ready for a question about the most obvious problem on your resume—often frequent job changes or big gaps in work. These are answers you should practice. Even if your answer isn’t great, a good delivery can make the difference between getting through a phone screen or not.

5. Don’t forget to close.
   - Your goal for a phone interview is to get an in-person interview.
   - So don’t get off the phone until you have made some efforts to get to that step.
   - Here are a few suggestions
     1. “I feel comfortable with you and with the position we’ve discussed. How do you feel?”
     2. “Do you have any concerns about my ability to do the job and fit in?” This gives you both the opportunity to address and eliminate a potential problem.
     3. “It has been an interesting discussion. I would very much like to pursue it further.”

And remember a key component of any successful interview—even for a phone interview: A thank you note sent within a few days of the interview to show you are interested.

Interview Preparation for Candidates

Preparation is the key to a successful interview. Thorough preparation enhances your chances of accomplishing the two main objectives of an interview.

- As the candidate your objective is to have the interviewer believe that you are the best person and the right person for the job. To do that implies no commitment to take an offer if you get one but it is nice to get the offer. You also want to learn those things you need to know about the position and the company so that you may make an intelligent decision about the job.
- The interviewer’s objective is to decide whether or not you are an appropriate person to fill the position. Your job history and educational background as well as qualitative issues such as your strengths and accomplishments, level of motivation, attitude and personality will all be “under the microscope”. In other words, to find out if you are the right person for the job, the interviewer wants to know about your potential for promotion.

1. These tips for interviews come from Jeff Ram of JRam Consultants and have been edited for this article.
and whether or not you will fit into the company environment.

Know Yourself

Honestly assess your employment background and develop explanations for any weak points. Prepare a list of tough questions that may be asked, then develop answers to those questions.

- Why would you consider a career change at this time?
- What are your strengths? What are your weaknesses?
- What do you like the most/least about your current job?
- Why should we hire you?

Research the Company

Researching the company is necessary to learn as much as possible to ensure the prospective job is a good fit for you—and, equally important, to impress the people with whom you will interview. Utilize the Internet to review annual reports. The Internet offers a wealth of company information and industry statistics. You can also learn from your industry’s trade journals.

- Find their homepage.
- Follow the company’s stock price, if it’s publicly traded.
- Know the company’s products and services.
- Be prepared to tell the interviewer why their company is attractive to you.
- Talk with company employees.
- Talk to customers of the company.

Your account executive, if you are using a recruiter, will provide an interview timetable, including names and titles of persons with whom you will be talking. Solid company research will enable you to confidently say at the end of your interview “I’m interested in pursuing this opportunity, what’s the next step?” Your goal is to get an offer or a date for the next interview appointment.

The Interview

Appearance: Men

- A dark suit is appropriate for most positions.
- Wear a white or pale shirt, freshly laundered and well pressed.
- Wear a quiet tie with a subtle design and a hint of color.
- If you work in a “business casual” environment, have a matching sport jacket in the car to wear during the interview.
- Shined shoes, over the calf-length dark socks.
- Do not show any tattoos or piercing or have an extreme hair style or color.
- Wear minimal jewelry, and mild, light fragrances only.

Appearance: Women

- Wear a suit or tailored dress in basic navy or gray.
- Blouses should be tailored and color coordinated.
- A closed-toe pump, flats, and natural colored nylons.
- Light colognes or avoid fragrances.
- For good posture cross legs at the ankles, not at the knees.
- Do not show any tattoos or piercing or have an extreme hair style or color.
- Wear minimal, tasteful jewelry, and mild, light fragrances only.

Interviewing can be a stressful situation, you want to be yourself and really show your capabilities. Here are some simple suggestions that we’ve developed that will make interviewing easier.

A Typical Sequence of Events is:

- Arrive no earlier than fifteen minutes before the set time, but no later than five minutes prior to the interview.
- Interview with personnel office representative (general questions, review of the company and their benefits).
- You may be asked to fill out an application. Complete the form in full and leave no blanks.
  - Do not write “see resume” as a response to any application question.
  - Respond to “expected salary” questions as “open” and answer “currently salary” questions truthfully.
  - List references, if requested (you should have this prepared on a separate sheet and should be taken to all interviews).
- Your recruiter’s name, if you are using one, should be your response to any “referred by” questions.
- Interview with immediate supervisor and peers.
- Interview with the hiring authority (manager, etc.)
- Shake hands firmly and maintain eye contact with all interviewers.

Typical Interview Questions and Responses

You should give complete but brief and relaxed answers to questions. When possible use questions as a basis for developing information that you want to make sure is presented. Continue to sell yourself in a positive way.

- Describe current/past jobs in terms of duties and give indicators of good performance such as raises, sales volume, promotions, money saving ideas/projects.
- Include short stories involving problems or challenges and how you were able to solve it or overcome them.
- Describe the results you achieved.
- Remember to keep your answers brief and focused while exploring opportunities to convey all relevant qualifications.

Background Questions

“Tell me about yourself.”

- Answer these questions in terms of the qualifications required of the position.
- Keep responses concise and brief and avoid being negative about previous jobs and bosses.
- The “Tell Me” question means, “tell me your qualifications.” Start with your education and discuss your employment experiences.
- Gear the response to the duties and responsibilities of the position for which you are interviewing.

“What are your greatest strengths?”
• Keep this as job related as possible by relating to a job task/skill that you know to be an asset of yours.
• “I like people” is not a good answer.

Salary Questions
• Do not state a starting figure. The correct way to answer that question is to set a floor and put the ball back in the interviewer’s court. Say: “Last year (in my last job) I earned $X.xx (be accurate here, as the company may require a W-2 or a tax form from last year.) Then add…, “but I am interested in the opportunity. If the opportunity is right for me, and you think I’m right for the job and the company, I’m sure you’ll make a good and fair offer.”
• State your current salary truthfully. If you are due to a raise in the next three months, state the approximate percentage you expect. Be sure to explain that you have included bonuses, commissions, and overtime pay, if applicable.

Motive Questions
• What can you contribute to this company?
• Where do you hope to be in five years?
• What interests you most about this position?

This type of question should be answered enthusiastically. Show the interviewer you are interested in the position and relate the answers to the duties and responsibilities of the job.

Personality Questions
• What do you do in your spare time?
• Present yourself as a well-rounded person. Your answer gives you dimension.
• Name some hobbies.

Job Satisfaction Questions
• Why are you looking for another job?
• What do you like most/least about your previous job/jobs?
• Why did you leave your previous employer/employers?

Never speak poorly about former employers. Be positive. You are providing clues about the environment you seek.

Other Questions to be Prepared to Answer
• Are you willing to relocate?
• May we check your references?
• May we verify your income?

Questions to Ask Employers During the Interview
To complete the two-way conversation as mentioned earlier, you must ask questions and take an active role in the interview. This demonstrates the importance you place on your work and career. Remember your questions can help you determine if this is the right job for you. The research you did earlier on the company should form a basis for some of your questions. Here are some guidelines and examples:
• Ask job related questions. Focus on the job, the company, products, services and people.
• Ask about your potential peers, subordinates and superiors.
• Before you interview, write your list of Interview Questions - take them with you.
• Do not cross examine the employer.

Interest Questions
• Why do you want someone for this job?
• How many people have held this job in the past five years?
• Were they promoted or did they leave the company?
• Why isn’t this position being filled from within the company?
• What are examples of the best results produced by people in this job?

Interest Questions
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• Why isn’t this position being filled from within the company?
• What are examples of the best results produced by people in this job?

Qualification Questions
• What would my responsibilities and duties be?
• Describe a typical day on the job.
• What are the most difficult aspects of this position?
• Describe the department’s/company’s growth in the next two years?
• What is the philosophy on training and development in the company?
• How do you think I’d fit into this job on your team/into your organization?
• What types of projects would I be involved in now? Within the first year?

Ask for the Job. If you like what you see, make a positive statement about the position. If you are sincerely interested in the position and are satisfied with the answers given, you should ask the interviewer if he/she feels that you are qualified for the position. A typical conclusion might be “I’m interested in being a part of your team, what’s the next step?” Many times the difference in getting “An Offer” and “Not Getting an Offer” is your failure to ask for the job. Ask for the job!

Here are 14 Effective Ways to Close an Interview:
(Multiple choice. Pick one or two that are comfortable.)
1. “I feel comfortable with you and with the position we’ve discussed. How do you feel?”
2. “Do you have any concerns about my ability to do the job and fit in?” This is an important question because it shows humility and gives you both the opportunity to address and eliminate a potential problem.
3. “Can you extend an offer at this time? Or would you rather set up another meeting?”
4. “How do I compare to other candidates you have interviewed?”
5. “I have a lot of information, and everything I need to proceed to the next step. Is there anything else you need from me?”
6. “I’m ready to make a decision based on the information I have. Is there anything else you need to make an offer?”
7. “What’s the next step?”
8. “When should I follow up with you? Would it be appropriate to call next week?” This ensures closure, if not that day, in the near future.
9. “Is there anything personally or professionally that you believe would prevent my being a solid contributor in this role?” If “no”, you can assume that the next step is working out the hiring details. If “yes”, then you are positioned to address the interviewer’s skepticism and quell it.
10. “I am very impressed with what I’ve seen here. And I really look forward to accepting an offer from you.”
11. “It has been an interesting discussion. I would very much like to pursue it further.”
12. “I’m sure that when I think about today’s conversation, additional questions will come to mind. Is there a convenient time during the next several days when I can call you to pursue these questions?”
13. “Is there anything else that I can elaborate on so that you would have a better understanding of my qualifications and suitability for this position?”
14. “Mr. Employer, your search is over. You will not find anyone else who will do this job as well as I can. If I were you, I would cancel all of the other interviews and make me an offer.”
Each of these 14 comments is a proactive close. Each has been field-tested and works. So pick one or two you like and go for it.

**Ten Reasons Employers Reject Candidates**

- **Lack of Research.** It is obvious when candidates have not learned about the job, company or industry prior to the interview. Visit the library or use the Internet to research the company, and then talk with friends, peers and other professionals about the opportunity before each meeting.

- **Not having questions to ask.** Asking questions shows your interest in the company and the position. Prepare a list of questions in advance.

- **Not readily knowing the answers to interviewers’ questions.** Anticipate and rehearse answers to tough questions about your background, such as a recent termination or an employment gap. Practicing with your spouse or friend before the interview will help you to frame intelligent questions.

- **Lack of Career Direction.** Job hunters who are not clear about their career goals often can’t spot or commit to appropriate opportunities. Not knowing what you want wastes everyone’s time.

- **Appearance.** Many candidates do not consider their appearance as much as they should. First impressions are quickly made in the first three (3) to five (5) minutes. Dress based on the company’s culture.

- **Too much Humility.** Being conditioned not to brag, candidates are sometimes reluctant to describe their accomplishments. Explaining how you reach difficult or impressive goals helps employers understand what you can do for them.

- **Not relating skills to employers’ needs.** A list of sterling accomplishments means little if you can’t relate them to a company’s requirements. Reiterate your skills and convince the employer that you can “do the same for them”.

- **Poor Attitude.** Many candidates come across as arrogant. While employers can afford to be self-centered, candidates cannot.

- **Handling salary issues ineptly.** Candidates often ask about salary and benefit packages too early. If they believe an employer is interested, they may demand inappropriate amounts and price themselves out of the jobs. Candidates who ask for too little undervalue themselves or appear desperate.

- **Job Shopping.** Some applicants, particularly those in certain high-tech, sales, and marketing fields will admit they’re just “shopping” for opportunities and have little intention of changing jobs. This wastes time and leaves a bad impression with employers they may need to contact in the future.

**Final Wrap-Up Questions**

Your final objective should be to find out one of the following three things. Does the interviewer have enough information regarding your abilities as a candidate to:

- extend you a job offer
- require one further interview/meeting prior to making a decision
- decide that you are not the candidate that they are looking for

In order to attain the final objective above you must ask questions so that you can determine these answers. While you do not want to back the prospective employer in a corner, keep in mind that employers want to see initiative and high interest on the part of the candidate. In order to maintain your value as a candidate while in front of the employer ask the following:

**You Are Not Finished Yet**

The interview is done but there is still more you can do to make a good impression. Always follow-up an interview with a thank-you letter in a few days. Refer back to the interview and emphasize how your skills fit the position, and be appreciative of having the opportunity for the interview and your positive impressions of the employer. If you decide you are no longer interested in a particular company or position, let the prospective employer know your decision.

Now comes the hardest part: waiting for an offer or another interview. Call the interviewer for an update, if you haven’t heard anything in a week. Persistence counts when looking for a job.
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12000 N. Washington Street, Suite 285, Thornton, CO 80241 – (303) 412-6205 - aipg@aipg.org

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| □ Home | □ Business | Male □ Female □ |

| Street: | Year of Birth: |

| City: | State: | Zip: | Country: |

| Work Ph: | Home Ph: | Cell: |

| Email: | Yr Highest Degree Awarded: |

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**University:**

I am a State Licensed PG in the following State(s):

**ATTESTATION:** I attest that I meet the requirements for AIPG Professional Member (30 semester hours/45 quarter hours in geological sciences with a BA or higher degree) and agree to abide by AIPG Bylaws and Code of Ethics.

** Applicant Signature:**

**Date:**

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Managing Disaster Debris in an Environmentally Responsible Way

Mark M. Dennen, CPG-09637
Principal Environmental Scientist,
Rhode Island Department of
Environmental Management

The human and financial cost of natural and man-made disasters, both in terms of the risk and destruction, is immediate and obvious, so it is on the 24/7 news cycle. After the news coverage has stopped, the issue that is often the most costly and persistent is disaster debris management. The waste that was managed from Hurricane Andrew totaled between 20 and 43 million cubic yards\(^1,2\). If this waste were put into trucks packed end to end, the line would go from Florida to California and halfway back. Hurricane Katrina left over 95 million cubic yards of waste. How much Superstorm Sandy will generate is not known at the time of this writing.

Following events such as Hurricanes Andrew and Katrina, and the World Trade Center attack, Rhode Island’s Emergency Management Agency (RIEMA) realized our state needed a plan to allow us to prepare for debris on such a scale. My counterpart at RIEMA, James Baker, understood that environmental issues are such an important part of debris management that he proposed we jointly write it while getting significant input from Department of Transportation and other agencies.

My function in the process was to consider the environmental impact of debris management (related to my normal duties in hazardous, medical and solid waste regulation). For this article I will focus on environmental concerns relative to disaster debris management. There are two very important reasons environmental regulations are a critical concern in disaster debris management:

1. The volume of waste resulting from a single major disaster in our state could equal the amount typically generated over a 5-year period.
2. In the event of a Presidential Disaster Declaration, states and local communities can be reimbursed for approximately 75% of their costs. However, this reimbursement is specifically dependent on the cleanup following all local, state and federal environmental regulations. If an environmental regulation is violated, FEMA, after the fact, can and will disallow all or part of the cleanup costs, leaving state and local government on the hook for the bill.

Types of Disasters

The natural disasters we planned for include hurricanes, earthquakes, floods, tornadoes, ice storms and epidemics of human or animal origin. All have the potential to generate large quantities of waste. Among man-made disasters, terrorism is the greatest concern for generating waste. While hurricanes have traditionally generated the most debris in the United States and are the focus of this article, I had the opportunity to tour the China Beichuan Earthquake Zone in 2009, and the quantities of debris there were truly breathtaking in comparison.

Nature of Disaster Debris

1. Green Waste/Vegetative Debris
   Green waste is that portion of the clean wood waste stream consisting of vegetative debris including all portions of a damaged or downed tree, to include the stump, limbs and other brush.

2. Putrescent Municipal Solid Waste (MSW)
   This source is primarily food spoilage and contaminated or damaged recyclables such as wet or mildewed newspaper, cardboard, etc. which require immediate disposal.

3. Construction and Demolition Debris (C&D)
   C&D consists of debris resulting from structural damage to buildings as well as buildings that will require demolition as a result of the disaster event.

4. White Goods
   White goods are a category of scrap metal and include appliances such as stoves, refrigerators, freezers, dishwashers, washers, dryers, microwave ovens, air conditioners, and other similar types of appliances.

5. Hazardous Waste
   Hazardous waste can come from industrial settings, where hazardous products or wastes are released from storage. In many cases, what we have seen is that a flood or surge may carry away above-ground tanks and release their contents as they are transported to another location. More commonly, household hazardous waste such as automobiles, fluids, batteries, paints and stains, cleansers, photo chemicals, lawn-care chemicals, and pesticides are either released during the flood or placed on the curb by the homeowners after the event.

6. Electronic Waste
   Electronic waste (e-waste) includes items such as stereos, televisions, VCRs, DVD players and computers and peripheral accessories, telephones, and other devices.

7. Soil, Silt and Sediment
   Soil, silt and sediment can be defined as residuals deposited by receding flood waters and may include historical sediment from nearby water bodies, soil from yards, road and construction debris, and other material.

8. Stray and Abandoned Vehicles and Vessels
   Abandoned vehicles are defined as cars, trucks, motorcycles, recreational vehicles and abandoned boat, including both recreational and commercial vessels.

9. Animal Carcasses
   Natural disasters and lack of services that follow can kill large numbers of
livestock, leaving an infectious and noxious problem. Also, infectious disease outbreaks can necessitate the killing of large numbers of animals.

Challenges to Managing Disaster Debris

A storm brings a coastal surge and often torrential rains, making rivers overflow their banks. As a storm causes the water table to rise, the first human structures to feel the effects of the flood are sewers and septic tanks. Add to that the number of hazardous products, such as oil, solvents and innumerable hazardous material destroyed by a surge or flood, and not only do you have flooded communities but also communities immersed in hazardous waste and infectious materials. When they dry out, these materials may result in toxic or infectious dust that can become airborne.

The biggest challenge in a major disaster is where to put the waste. Fixing roads, bridges and power lines is dependent on removing enough debris to allow crews to get there. The next step is to start to rebuild homes and businesses. In order to do that, we need a final home for all this waste.

Even if we had room in Rhode Island’s only landfill to manage a large volume of disaster debris, even when roads are not damaged by a storm, it is not realistic to believe all the waste can be trucked to that one location in a reasonable amount of time. A more practical solution is the use of Temporary Debris Storage and Reduction (TDSR) Sites. By locating TDSR sites around the state, waste can be trucked, separated and ground. This drastically reduces volume and therefore transportation and disposal costs as well. However, as this waste presents environmental risks, the location and nature of TDSR operations must be carefully considered.

Environmental Resources at Risk

Due to its small size and dense population, Rhode Island has relatively small and stringent rules regarding the transportation, storage, treatment and disposal of waste. Hence, locating waste management areas, even temporary ones, must meet our regulatory requirements.

Aquifers - Rhode Island tends to have a relatively shallow water table, often less than 20 feet deep. Consequently, most private and public wells are in fractured bedrock aquifers in igneous and metamorphic rocks. Waste Management Facilities (WMFs) are prohibited in areas that overlie specially designated GAA aquifers, which fall into either of two categories:

1. Designated sole source aquifer – these are usually located in highly permeable glacial outwash deposits, store significant quantities of groundwater, and transmit groundwater contamination very quickly. The largest of these occupies a significant portion of the southwestern part of Rhode Island, extending into Connecticut, as shown in Figure 1.

2. Located within the wellhead protection area of public and private drinking water supply wells, where contamination over a small area can affect a large population.

Surface Waters - We also make every effort to avoid locating waste management facilities within the watershed of a Class A water body. These are drinking water reservoirs and the surface waters that feed them. The largest of these is located in a very large portion of the western part of the state (Figure 1).

Air Resources - Rhode Island, due to its population density and location, has relatively high levels of air pollution. Therefore, in such areas, EPA and RIDEM regulations do not allow burning of waste for any reason.

Rare and Endangered Species - In spite of its dense population, Rhode Island has and protects both state and federally designated threatened or endangered species. These laws prevent
clearing or disturbing habitats crucial to these species. Coastal areas, especially salt marshes, frequently serve as habitats for these protected species.

Environmental Justice Concerns
In locating waste management sites, one must be conscious not to locate them in areas that unfairly subject minority communities to a disproportionately large amount of waste management activities.

Where to Disaster Debris Disposal Sites?
Rhode Island’s geography is such that the eastern and northern portions of the state are densely populated. As there is little open space, lots of traffic, many neighbors to be bothered and a number of environmental justice areas in these communities, they don’t seem like good locations for waste storage. This would push us to the conclusion that we should locate waste management sites in the less populated areas of the west and southwest. The problem is, this is where most of the GAA aquifers and drinking water reservoirs are located.

Therefore we are always choosing between less than ideal locations. The worst of all possible options is leaving the waste where it is, often in residential or environmentally sensitive areas.

C&D waste presents a much greater environmental challenge than the other waste types. It is often the most voluminous type of waste. First and foremost, it is a regulated solid waste. Additionally, some of it will be coated with asbestos, painted with lead paint or soaked with other hazardous materials. Furthermore, the gypsum in wallboard, a common constituent of C&D waste, when mixed with wood in a moist environment can generate huge quantities of hydrogen sulfide gas.

Green waste, often the largest waste stream from wind events or ice storms, is the biggest challenge, as it destroys power lines and blocks roads and trails. In some ways, it presents the least environmental threat when properly segregated. Where possible, green waste can be ground in place and used as mulch in the forested areas where it is most common. Some of it will need to be trucked away, but fortunately, it is unique in that when properly segregated, it can be stored upon GAA aquifers. Although the trees and brush themselves prevent few environmental hazards, one must still consider some issues:

- It can present a fire hazard, and piles must be stored in accordance with fire regulations.
- It cannot be stored near airports, among the few tracts of publicly owned lands in the state, as possible fires could disturb aviation.
- Grinding equipment may spill oil onto the ground that will require sampling and possible removal as contaminated soil.
- When wood is moved significant distances, there is a danger that invasive species, such as the Asian Longhorn Beetle, can be spread from quarantined areas. This is another strong argument for the need to spread TSDR sites throughout the region.

Sediment can run the gamut of regulatory concerns. As discussed later in this article, Hurricane Sandy generated large quantities of mostly uncontaminated sand in coastal communities along our southwest shoreline. Normally, one would not allow the storage of waste within the 100 year flood plain, but because this was not waste, we allowed its storage in a beach parking lot pending its use in dune restoration. However, as explained previously, there are many situations in which it may be contaminated with sewage, oil or hazardous materials. In these cases, it may be useful as landfill cover.

Animal carcasses, especially from a disease epidemic or quarantine, could pose a significant problem, even in a comparatively non-agricultural state like Rhode Island. These must be managed very quickly to minimize odor problems and to prevent vermin from spreading disease. In Rhode Island our relatively shallow aquifers may preclude burial in many areas and incineration is not permitted in the state at all. Therefore, these wastes may have to be managed by above-ground composting per USDA guidelines, and as supervised by the State Veterinarian or Department of Agriculture.

The other forms of waste are solid and hazardous waste. It is important to move these relatively quickly, as they may be spread over protected aquifers or other sensitive environments. Industrial hazardous waste and hazardous products will be released right away, but household hazardous waste will continue to be generated long after the event by residents and contractors doing cleanups.

These wastes require TSDR sites for management. Proper location of TSDR sites can be a problem because:

1. Private lands are for the most part, not available for consideration. No matter how much property is damaged, a property owner still has land rights. Very few private land owners want trash on their property, and federal rules do not allow the purchase of land in these situations.

2. Closed landfills might seem a logical choice because they comprise less than pristine, publicly-owned land that is free of buildings and trees, and already have a network of monitoring wells installed. However, a multi-million dollar engineered cap could easily be damaged by the weight of subsequent truck traffic and placement of additional waste. If it has yet to be capped, there is a concern that the public agency doing the storage might be held responsible if the site is required to be capped at a later date. However, in a state with as little land as Rhode Island, closed landfills cannot be overlooked completely and may be especially useful for hazardous waste.

3. Airports often have large tracts of cleared, publicly-owned land. Due to the use of jet fuel, these sites are often less than pristine. Furthermore, they often have good highway access. Since 9/11, there are heightened security concerns about people being on airport property. Also, there are FAA restrictions on the height waste can be piled so as not to present an aviation hazard. As previously mentioned, green waste, if it catches fire could pose an aviation hazard as well as putrescible food waste that could attract sea gulls, which are hazardous to aviation. Still, airports can be good sites for C&D waste.

Public parks and recreational fields are areas that are cleared, publicly-owned and widely distributed. Furthermore, they are not used as much in the winter. However, these resources are precious to the community, and the thought of trucking in large quantities of potentially contaminated waste can cause great public concern. Despite these concerns, these sites can often be the first choice for TSDR sites. If a hurricane hits in the fall, the timing can work out as these sites are used much less as recreational resources in the fall than in the summer.
5. Larger state parks and conservation areas represent the largest available public acreage. They also frequently include (intentionally) rare and endangered species and are often located in watersheds of reservoirs or protected aquifers. Legal complications may arise, because many of the sites were purchased with an easement to prevent the land from being cleared or otherwise developed. This usually does not include temporary storage. However, parking areas and fields within these parks may be useful to handle huge quantities of green waste. Often the ground waste can be used as mulch for projects within the park.

Safeguards at TSDR Sites

Regardless of what site is chosen, there are certain things that must be done if the site is used:

1. The site must be monitored to ensure contractors are only bringing the waste approved for that site.
2. FEMA has found that of all the disaster issues, debris management is the most fraught with fraud. There must be monitoring to ensure the waste brought to public sites is from public sources and not private businesses. They also need to ensure that trucks are delivering quantities matching what the agency is being billed for.
3. Any site chosen must undergo groundwater monitoring and soil sampling before and after waste storage to ensure the property is restored to its original condition. Analytical testing is usually performed on groundwater samples from micro-wells and grab samples of soil. Normally the samples are analyzed for metals, volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH).
4. If there are wetlands in the vicinity of the debris management area, siltation barriers must be placed to protect the resources.
5. One must always remember these are Temporary Debris Storage and Reduction Sites. So that they do not become permanent landfills, one must make sure waste is leaving at a similar pace to the delivery rate. Whenever a site is in operation, it must have a debris monitor present, and as the state environmental agency, RIDEM must monitor the monitor.

In 2011, Hurricane Irene struck a glancing blow to our state, generating mostly green waste. This brought attention to the need to pre-identify sites as well as the need to have a complete Disaster Debris Management Plan. After much review and revision, our plan was signed by all the relevant agencies in September of 2012. Our Department of Transportation worked on making concrete plans to have site use agreements in place. As if on cue, Hurricane Sandy hit the following month. Although Rhode Island suffered much less than Connecticut, New York and New Jersey, four Rhode Island counties were eventually declared disaster areas.

The hardest hit area was the coast of Westerly, a town that borders Connecticut. I had heard the beach areas suffered major damage but was shocked to actually see it. This was erosion and sedimentation on steroids. Dunes twenty feet high were completely wiped out, as was much of the beach (see Figure 2), exposing pilings that had probably not been seen since the early 20th century. A row of dunes as far as the eye could see was completely gone, as was much of the beach. The violence of the storm had not only exposed a layer of glacial till that predated the dunes, but it had ripped up much of the till and carried it inland along with the dunes. The streets and front yards had a coating of sand five feet high (see Figure 3). One home was pulled off its foundation and deposited whole in the middle of a street.

The task of rebuilding the dunes and beach is not just an aesthetic one. Now that they are gone, the coast is particularly vulnerable to erosion from the next storm. Part of the salt ponds behind the beaches are partially filled with sand, further reducing the capacity of the area to hold storm water.

As with any event, things come up in the real world that you don’t plan on. For instance, we did not anticipate that our biggest challenge would be where to store the beach sand that covered the town. We had envisioned all our TSDR sites to be located outside of the 100 year flood plain. However, to truck the sand far inland only to truck it back for dune restoration projects would be ridiculously expensive. The solution was to store the sand in the beach parking lot. The reason this is permissible is that technically, clean sand is not a waste and therefore not jurisdictional under state and federal rules. We also had to use part of the parking lot to stage debris. One could not bring waste into a 100 year flood plain to store or process debris. However, the beach and the neighborhood formed a continuous debris field, and we were able to choose a portion of this debris field (the parking lot) to stage waste for separation and reshipping to its final resting place (a landfill).

Figure 2. Remnant of sand dune with exposed till.
Unanticipated issues like the one above are unavoidable, but having a plan where all the parties have formally agreed to what they will do and knowing how the different agencies relate to one another in the situation proved to be of tremendous value. We will use our own experience and that of our neighboring states to improve the plan.

With global warming, such large storms may become more frequent. Their devastating storm surges will be made worse in the event of a rising sea level. Erosion and sedimentation on a catastrophic scale are not only foreseeable but inevitable. Once you accept that, the biggest lesson to take away from this experience, and which I wish to stress to others, was the value of actually having a plan.

References


Special thanks to Karen Dennen, Laurie Grandchamp and fellow CPG’s Margaret Bradley, CPG-09082, Cynthia Gianfrancesco, CPG-11542, and Sofia Kaczor, CPG-09393, for editorial assistance.

Mark Dennen, CPG-09637, is a Principal Environmental Scientist and has a B.S. in Chemistry/Geology from Bridgewater State College and a M.S. in Geology from the University of Oklahoma. He has worked for the Rhode Department of Environmental Management for 23 years, following work as an environmental consultant. His work at DEM involves regulatory oversight and rulemaking of hazardous and medical waste generation, treatment and disposal. Other areas of responsibility include landfill closures and disaster response planning. Prior to this, he worked in Site Remediation and Superfund cleanups as well as the development of the Department’s soil standards. Outside of work he is also an instructor of martial arts and CPR.
Arizona Section

SAVE THE DATE—February 15-16, 2013 Dinner Meeting and Business Meeting. The Arizona Section of AIPG is pleased to announce the plans for its 2013 Dinner Meeting and Business Meeting, which coincides with the world-famous Tucson Gem and Mineral Show.

Dinner Meeting – Friday, February 15, 2013 from 6 pm to 9 pm. Join dozens of fellow geologists from around the nation for an evening under the stars at Tin Town in beautiful Tucson, Arizona. Tin Town is a “museum” with a Western Mining town theme and is filled with mining equipment, spectacular mineral specimens, western antiques, and other unique items of historical interest collected and displayed by owners Gary and Pat Homan.

The Dinner Meeting begins with a social hour from 6 pm to 7 pm that will allow you to wander around Tin Town examining the outdoor and indoor displays, meet and converse with many geologists and guests, and enjoy live jazz music and entertainment by Joe Bourne (see www.joebourne.com for a preview of his music). There will be appetizers for us grazers, and a watering hole with a cash bar offering a selection of wines and beers.

At 7 pm we will be seated for a catered dinner that includes Italian sausage pasta, salads, beans, potatoes, desserts and non-alcoholic beverages. A vegetarian main dish will be available upon request. After dinner you can expect some introductions and a few words from the Arizona Section officers and perhaps from a few National Executive Committee members, followed by more socializing. Cost is $40 per person.

Business Meeting – Saturday, February 16, 2013 from 9 am to 11 am. The annual Arizona Section business meeting will be held at the Arizona Geological Survey (AZGS) office located at 416 West Congress Avenue, Suite 100, in downtown Tucson. Parking will be available at the back of the building, and a parking pass will be provided by AZGS. The business meeting will include introduction of the outgoing and incoming Arizona Section officers, followed by discussions of planned and proposed field trips, financial business, and outreach programs.

David Palmer,
Arizona Section Editor

California Section

Verdict of the June 2012 Field Trip with Dr. Eldridge Moores with UC Davis AIPG Student Section and AIPG Members: A Success—The University of California-Davis AIPG student chapter and the California Section of AIPG had a terrific two day field trip through the Sierra Nevada range. The intent was to provide an informal environment for students to interact with professional geologists while learning more about the local geological environment. The trip was led by UCD Distinguished Emeritus Professor Dr. Eldridge Moores who is internationally known through his research as well as through the popular geology books of writer John McPhee.

The trip was well received and another trip with the UC Davis AIPG Student Section and AIPG members (from all sections) will occur in May 2013. Stay tuned!

James, Jacobs,
California Section President

Michigan Section

New Student Chapter—Wayne State University has started an AIPG student chapter, effective November 16, 2012. The section sponsor for the student chapter is John Barkach. Congratulations Wayne State.

Michigan Section AIPG Awards Information—How many of you know that the Michigan Section has an awards program and provides grants to educational applicants each year? Did you know that over the past several years the Section has provided Grants to a variety of applicants that ranged from $500 to $1,000 each? For those members that attend the annual general meeting at the end of the year, they have had the pleasure of witnessing the distribution of both the awards for our membership, as well as grants to deserving recipients.

As the Chairman of the Awards Committee, it is my pleasure each year to coordinate both the awards and educational grant programs, and I would like to take this opportunity to remind the membership that they can help make both of these programs an ongoing success. The various awards available include: Longevity, Outstanding Contribution to the Michigan Section, and Geologist of the Year. The longevity award is easy to get, as you just have to put up with the rest of us year after year and keep paying your dues. The remaining awards (Geologist of the Year and Contribution to the Section) are awarded based on a nomination and voting process by the Awards Committee. This is where each of you can contribute by nominating a member/nonmember for an award. The nomination forms are available online or an email with your nomination sent to jason.lagowski@arcadis-us.com will suffice.

The educational grants are also a great opportunity to help your local school or organization that is involved in earth science education raise additional funds for a specific project. We have struggled in recent years to get nominations for some of these awards and as a result did not make an award. So spread the word that these grants are available for deserving groups and remember...
that the kids involved in these types of programs are the future membership of this and/or other AIPG Sections. In addition, consider your colleagues and decide whether they might be worthy of one of our Section awards.

Jason Lagowski, Awards/Educational Outreach Committee Chairman

Ohio Section

Geologic Walk Through Time and Map-On July 25, 2012, Ohio Section members joined former Ohio first lady Hope Taft at the ribbon cutting ceremony of the permanent Geological Walk Through Time and Map at the Natural Resources Park located on the grounds of the Ohio State Fair. The Geological Walk Through Time and Map is a 286-foot-long educational brick path going through 450 million years of Ohio’s geologic history. The exhibit, initiated by first lady Taft a decade ago, is one of the largest outdoor geological maps in the world. It depicts the bedrock geology of each of Ohio’s 88 counties. The Geological Walk Through Time and Map honors the 175th anniversary of the Ohio Geological Survey. According to first lady Taft, the educational exhibit will encourage a better understanding of the importance of Ohio’s geologic history.

Ohio Section was proud to contribute $2,000 towards project construction.

State Geologist emeritus Tom Berg and other Ohio Section members in attendance extended their “THANKS” to the former first lady. As Tom stated, “What we saw and participated in at the Fairgrounds would never have happened without your persistence and dedication. The science of geology has taken an enormous step ahead in Ohio because of your efforts! And of course, the new bedrock map of the state released in 2006 is the basis of what people are seeing at the Fairgrounds. For that, we owe a huge debt of thanks to the untiring efforts of Mac Swinford, Ernie Slucher, Glenn Larson, Greg Schumacher, Doug Shrake, Mike Caudill, Ron Rea, Dennis Hull, Larry Wickstrom, Rick Pavey, Ed Kuehnle, and Donovan Powers of the Ohio Geological Survey, and Chuck Rice of the U.S. Geological Survey. These geologists, specialists—and many, many others at the Ohio Survey worked for 17 years to make a new bedrock map to replace the 1920 version. Economic, environmental, public-safety, and natural-resource decisions in Ohio will be significantly and substantially better because of the new mapping.

Matt Justice, Section Editor

Virginia Section

Virginia Section Field Trip-The Virginias Section hosted a business meeting and memorable field trip on Saturday, September 8, 2012 near Leesburg, Virginia. The meeting and start of the field trip was held at the Temple Hall Farm Regional Park. The field trip to the Karst of Loudoun County was led by Dan Doctor, Steve Stokowski, and D. Fenster. We were provided with an update of AIPG Section and National activities, had a nice picnic lunch, and then were presented with an informative overview of the regional geology and our first look at some of the outcrop. Our leaders showed us regional geologic maps and cross sections to illustrate their discussion. The field trip included several stops within the Mesozoic Culpepper Basin in eastern Loudoun County. Dan and Steve explained that the basin is one of a series of basins that formed as a result of continental rifting during the breakup of the Pangea supercontinent that began about 235 million years ago. The basins along the eastern seaboard of North America were filled with sediment during the Mesozoic Era, in the Jurassic to Cretaceous periods. Faulting caused the sediments and intrusive rocks of the Culpepper Basin to be gently inclined within a half-graben structure. The focus of this field trip was on the geologic aspects of a limestone conglomerate unit in the Culpepper Basin and some of the geologic hazards, groundwater, and environmental issues associated with residential and commercial development in the karst area. Loudoun County developed the Limestone Overlay District to address these karst-related issues. Future construction requires engineering geology and groundwater investigations and related investigations in this District.

Our field trip stops included outcroppings of the limestone and siltstones of the area, a large karst spring which drains the limestone conglomerate, the site of a new large high school in which the building program included several geologic and hydrogeologic investigations to determine the locations of sinkholes, and along the Potomac River to a bluff with siltstone intertonguing with the limestone. We also were treated to some interesting details of local history and details of the Civil War battlefields.

As a visitor to the Virginias Section field trip, I had a wonderful and memorable time. It was nice to see old friends (in the nicest sense), meet new member
friends, share information about what’s happening at the national level of AIPG, and learn more about the geology of the area.

Barbara Murphy, 2012 AIPG President

Wisconsin Section

Dear Ice Age Trail Supporter-
Thank you to those who participated in the Ice Age Trail Alliance’s Mobile Skills Crew season finale at Devil’s Lake State Park, October 18th – 21st. The power of volunteers’ spirits shined brightly through some dreary weather. It was the largest turnout of the year; approximately 275 participants contributed more than 3,800 hours helping sharpen the identity of the Ice Age National Scenic Trail in Wisconsin’s most frequented state park (Devil’s Lake receives some 1.7 million visitors annually). At the project, our volunteers:

• Vastly improved 6.3 miles of trail signage by painting yellow blazes and installing trail signage posts.
• Eradicated scores of invasive autumn olive, buckthorn, and honeysuckle plants along 3 miles of the Trail.
• Constructed 20 new drainage dips and maintained 10 existing ones.
• Rerouted a quarter mile of Trail to avoid a chronically wet area.
• Improved 3 additional miles of trail tread.

We’d like to extend a special thanks to... Rachel Jacobson, Acting Assistant Secretary of the Department of the Interior. Ms. Jacobson’s visit may yield some wonderful opportunities for the Trail and the lands that host it.

• Devils Lake State Park staff, in particular Ryder Will and Steve Schmelzer, for providing camping, shower facilities, and overall project assistance.
• Al Sulzer and all who helped plan prepare and serve well over 1,000 meals under trying conditions.
• The Lodi Ouisconsing School of Collaboration students, staff, governance board and parents for lending hands and hearts to the Ice Age Trail.
• The Madison REI store for Saturday’s raffle, gifts, and significant financial support of the MSC program.
• Dick Jones for routing eight handsome trailhead entrance and destination signs.
• The IATA’s Baraboo Hills Chapter.
• Participants from our partner organizations, including Groundwork Milwaukee, UW-Madison’s Hoofer Outing Club, the UW-Eau Claire Service-Learning Program, The Crossing at UW-Madison, Iowa State Parks Trail Crew, AmeriCorps Partners for After School Success (PASS), Wisconsin Meet-Up, and the Wisconsin Section of the American Institute of Professional Geologists.
• All Crew Leaders for your infinite patience amidst the cheerful chaos.

First Wisconsin Master Naturalist Pilot Course Completed—The first Wisconsin Master Naturalist Pilot Course was completed on December 12, 2012. WI AIPG Chapter provided a member geologist to help develop & provide training on Wisconsin geology. The naturalist students also received training on Wisconsin ecology and natural systems. The certified Master Naturalists are a special group of naturalist volunteers who will be involved in a variety of environmental and wildlife activities throughout Wisconsin. The next training will be held in Milwaukee starting on February 27, 2013. For more information go to http://county.milwaukee.gov/MasterNaturalist11380.htm.

Christine Lilek
Section President

AIPG History

Colorado Organizes AIPG Section

Colorado became the second state to create an AIPG Section, as a result of action of a founding meeting of 32 AIPG members at the Petroleum Club in Denver, Colorado, on October 15, 1964.

The following officers and executive committee men were elected: W. W. Mallory, President; R. Dana Russell, Past-President; Jack W. Knight, Vice-President; Keith M. Hebertson, Secretary-Treasurer; Dudley W. Bolyard, Harry W. Oborne and Charles S. Robinson, Executive Committee men.

The Colorado Section will become operational as soon as its Constitution and Bylaws have been approved by the Executive Committee of AIPG.

AIPG’s 50th Anniversary

Come join us in Colorado for the AIPG annual meeting as we celebrate 50 years.
AIPG STORE  Check out our new items!

NEW Rapid Dry Sport Shirt by Port Authority
Fabric/Style: 5.6-ounce, 60/40 cotton/poly baby pique, Rapid Dry™; hemmed sleeves, double-needle stitched, side vents. Features 3-button placket with pearlized buttons. Available Colors: Burgundy, Charcoal, ClassicNavy, CourtGreen, Dandelion, DarkGreen, JetBlack, LightBlue, Papaya, Red, Royal, Seafoam, White. Sizes: Small-6XL
Price: $33.50 (2XL-6XL extra charge)

Colors in the photo are: black, sea foam, royal, white, burgundy, and charcoal

NEW Sport-Tek Dri Mesh Short Sleeve T-Shirt
Fabric/Style: 3.5-ounce, 100% poly double mesh; double-needle on armholes, shoulder, bottom hem and side vents. Available Colors: Black, DarkGreen, Maroon, Navy, Red, Royal, SteelGrey, White. Sizes: Small-4XL
Price: $25.00 (2XL-4XL extra charge)

Colors in photos are: maroon, royal, dark green, black, steel grey, and navy

AIPG Expandable Briefcase has the 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. Dimensions: 15.75"w x 11.75"h x 6"d (expanded), cubic inches: 1,100 (expanded). Available Colors: Black, Hunter, Navy, Red, Royal.
Price: $30.00

Colors in the photo are: black, sea foam, royal, white, burgundy, and charcoal


NEW Pen and Pencil Sets!-Custom engraved pen and pencil. Mechanical pencil for precision writing. Hi-gloss finish and stylish, silver accents. Patented lathe lines around each barrel. Sapphire Blue. Price: $15.50

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