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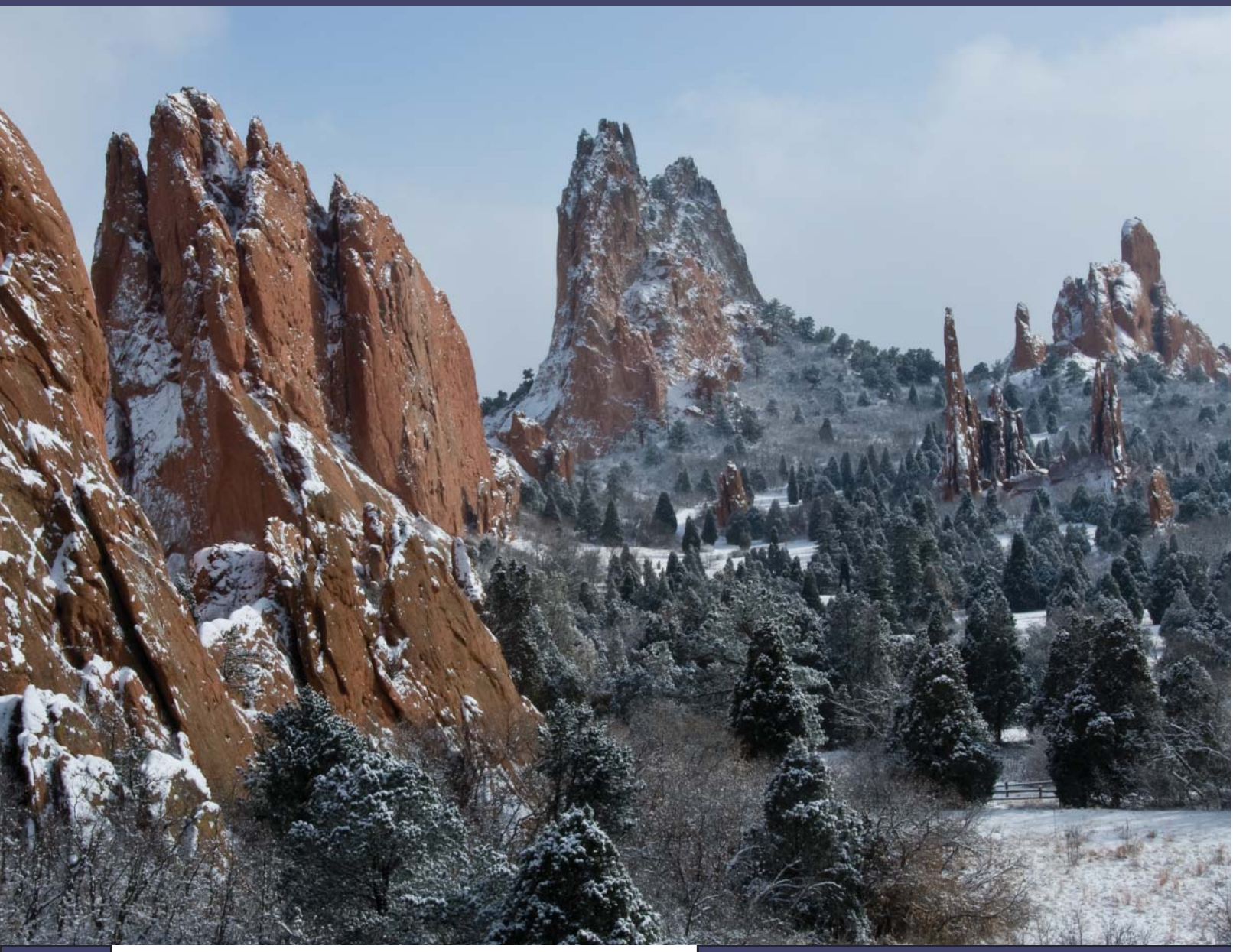
Volume 46, Number 1 JAN/FEB 2009



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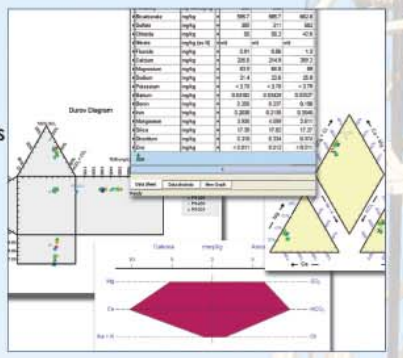

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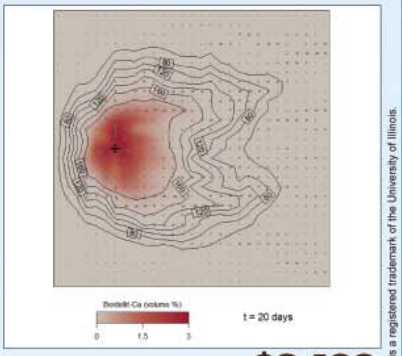

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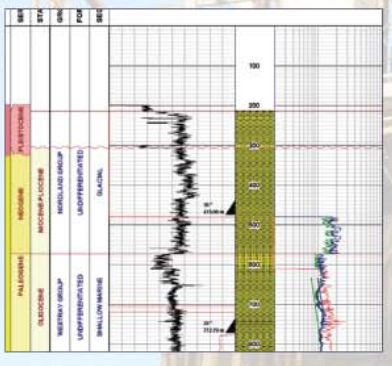

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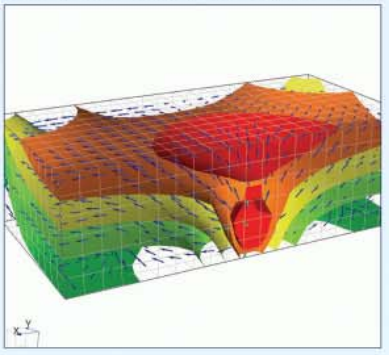

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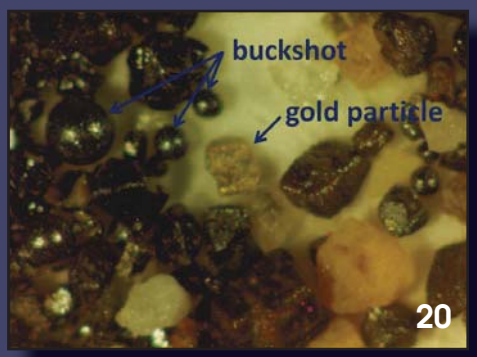

FEATURES

PEER REVIEWED ARTICLE

ON THE COVER - Paleozoic sandstones of the Fountain and Lyons Formations form striking vertical hogbacks at the feet of Pikes Peak and the Rampart Range in the Garden of the Gods Park, Colorado Springs, Colorado. Photograph by Daniel R. Heidenreich, CPG-10085.

DEPARTMENTS

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

The mission of the American Institute of Professional Geologists (AIPG) is to be the superior advocate for geology and geologists, to promote high standards of ethical conduct, and to support geologists in their continuing professional development.

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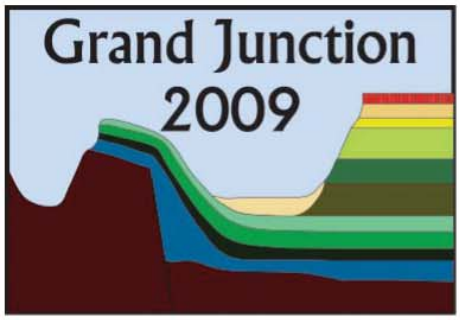

October 3 - 7, 2009
Grand Junction, Colorado

CALL FOR ABSTRACTS

Rocky Mountains and the Colorado Plateau

Canyons, Resources & Hazards

American Institute of Professional Geologists

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Mount Lincoln and vineyards.

Grand Mesa and blossoming orchard.

Colorado's 150th Gold Rush Anniversary

CALL FOR ABSTRACTS

Important Dates

May 1, 2009.....Abstracts due
May 15, 2009.....Authors notified
July 1, 2009.....Final abstracts/ papers due

Join us

in beautiful western Colorado's mountains, canyons, and incredible geology for a diverse program of scenic field trips, technical presentations, and social events. The formal sessions will begin on Monday, October 5 and will end Wednesday, October 7. Sessions will include a full day and two half days with field trips in the afternoon. There will be additional full and half-day field trips throughout the meeting.

Our technical program covers diverse geoscience topics including road construction through mountains and landslides, the impacts of energy development (petroleum, coal, and uranium), resource and reserve classification (it's been 100 years since H.H. Hoover defined proved ore), permitting issues, and geoscience software, its use and misuse.

Slumgullion Slide.

Field trips, many of which are very scenic—bring your guest along—will include a loop through the Colorado National Monument and a look at places where eastern museums stole Colorado dinosaur bones; a trip over Grand Mesa, an incredible bit of reverse topography, landslides, and scenic views; a trip to the Lake City area with the active Slumgullion Slide, along with many smaller ones; a trip over the Million Dollar Highway between Ouray and Silverton that will see very diverse geology, the ultimate in angular unconformities, a laccolith, an avalanche shed, and consideration of the impacts of naturally occurring hydrothermal alteration's acid drainage and its modification by mining; a trip to an underground uranium mine; a trip to an active oil rig; an examination of stream capture in the Unaweep Canyon; and everywhere, scenery that can't be matched elsewhere.

We're planning short courses and workshops on GIS and GPS use, various types of geoscience software, reserve and resource definitions, and permitting (regulations, legislation, and community relationships).

Social events will include tours of the local wineries and site seeing through the Colorado National Monument and Grand Mesa. You're invited to join friends on less formal tours, like a trip to Ouray's fabulous natural hot spring swimming pool.

Abstract Subject Areas

(suggested topics welcome)

FOC	Future of Coal
GEO	Geohazards: landslides, engineering geology, etc.
GIS	GIS and other computer applications
IMD	Industrial Minerals Geology
IRD	Impact of Resource Development on Local Communities
MNR	Mineral Resources
MTH	Mountain Highway construction and maintenance
PLI	Planetary Impact Geology
PRG	Permitting/Regulatory Issues
REC	Reclamation
RRD	Resource/Reserve Definition
TRE	Trends in Energy Development: oil shale, coal-bed methane, etc.
URG	Uranium Geology
WRI	Water Issues: acid rain, etc.
WRL	Water Law: fighting over water
WRR	Water Resources

How to Submit Abstracts

To have your abstract considered for a presentation or poster, please submit a one-page abstract and the Abstract Submittal Form by May 1, 2009. Abstracts must be in Word format, single spaced, 12 point Times Roman, and should not exceed one page. You will be notified by May 15, 2009 if your abstract has been accepted.

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS

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.
1400 W. 122nd Ave., Suite 250
Westminster, CO 80234

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.

A Mudlogging Geologist

James Foradas, MEM-0737

I recently transitioned from a position in archaeological geology in Texas, to a petroleum geology position as a mudlogging geologist in Alaska. I would like to provide some insights about mudlogging to our AIPG student members.

A mudlogger is a professional geologist responsible for operating a computerized logging unit at both onshore and offshore drilling sites. Mudloggers are responsible for evaluating the lithology of all strata penetrated by drilling and reporting any hydrocarbon discoveries by analyzing rock cutting samples from drilling mud, evaluating gas chromatography data used to screen for hydrocarbons in the cuttings, and sometimes analyzing geophysical data (e.g. wireline logs). Mudloggers also monitor aspects of rig operations and downhole conditions on a wellsite, and report suspected unsafe conditions to other rig personnel. Mudloggers provide time-sensitive geological and drilling data to clients in the form of daily reports and logs, often transmitted live via satellite. They also write longer summary reports upon well completion.

Arctic Triple Rig and a rigside camp on a drill pad in Kuparuk Oil field, November 2007.

With the push to explore for domestic sources of oil the demand for mudloggers is growing. Many such jobs are open to a variety of college graduates with just the B.S. degree in geology or a related field, computer literacy, strong communications and people skills, willingness to work 12-hour shifts with minimal supervision at remote onshore and offshore locations, travel, and the ability to adapt quickly to an ever-changing

A satellite camp near an ice pad on the Beaufort Sea, Prudhoe, Alaska, April 2008.

industrial and natural environment. In Alaska that environment is as ever-changing as it gets.

To be a successful mudlogger you have to be a team player and interface on a daily basis with industry clients, as well as many other field personnel in the diverse, dynamic world of the "oil patch." These skills are necessary when you consider you must work in some of the most remote and unforgiving environments on earth. However, you will be prepared to work in these places by ample safety and other specialized training once you have the job.

Mudlogging is particularly appealing to the recent college graduate with just a B.S. in geology. It is among the most lucrative jobs you can get right out of college, and depending on the company you can often live anywhere you want to between work assignments. In addition, the practical knowledge of the oil and gas industry gained as a mudlogger can often be the stepping stone for transitioning to other positions in the oil industry. Many well-site geologists and geophysicists I have met on the job here in Alaska started off as mudloggers, then went on to positions in well-site geology, MWD, wireline logging, and other related and more lucrative aspects of the industry.

So what should a student becoming a mudlogger be prepared for? Well, I can only speak for mudlogging in Alaska.

One thing to consider is no more weekends. Loggers and many other oil field workers up here work "hitches" not 5-day workweeks. A hitch is a continuous work period that lasts one or more weeks. Some hitches can last from rig-up to rig-down; i.e. the entire well. Hitches are typically followed by a week or more off (I typically work four weeks on and two weeks off). Think of it as an eight month work year, interspersed with 16 week-long vacations. Hitches vary depending on what part of the country you work in and the dynamic nature of the oil industry.

Each workday shift is called a "tour" (pronounced "tower"). Normally a tour is a 12-hour work shift, but tours can sometimes last longer if commuting time is involved, or if a rig-up, or rig down is in progress. The longest I have worked in one day was 24 hours.

Typically each logging unit has two to four personnel assigned to it, two mudloggers and two sample catchers. Sample catchers collect and process cuttings samples obtained from the shakers so that the mudlogger can analyze them under a microscope and UV light. Sample catchers also catalog samples so they can be stored for later analysis in various core repositories. Often a mudlogger will also act as a sample catcher, particularly if the drilling rate is slow. Typically, mudlogger trainees can expect to be sample catchers for a month or more before breaking out to logging.

During drilling, the mudlogger and a sample catcher work together to keep track of the lithology that the drill bit is penetrating. This is where all those hours in mineralogy, petrology and petrography pay off. In the complex delatic systems of Alaska's oilfields many of those rocks and minerals you thought you'd never see again after leaving college will come back to haunt you.

Mudloggers need to know the local geology of their work area. Predictive models for the well geology you're logging are often provided ahead of time by the well-site geologist. These senior geologists help develop and implement the well drilling plan. However they may or may not be present at the drill site. Either way it is up to you to stay in contact with them and the drillers

so they know what rocks are being drilled. Just think of the driller as the driver of the drill string, the well-site geologist as the geologist providing the "road map" on the trip to the pay zone, and yourself as their "Onstar operator" reading the "road map," telling them what lies ahead, and warning them of danger. This is because gasses and rock cuttings released by drilling travel up the drill string in mud to the surface and provide a glimpse into the lithology being penetrated long before geophysical tools and other analytical instruments reach the position just drilled by the bit. Depending on the lag time, which is the time it takes a freshly cut sample to travel up the drill string to the surface you might know the rock you're drilling through hours before the other instruments detect it.

There are fundamental differences to the way drilling is done through different strata so your observations are often used by drilling personnel to decide how to drill through a particular interval, where to set casing, when to expect a gas kick, and contribute to myriad other decisions that make drilling challenging and hard work. When the pay zone (e.g. an oil sand) is reached, you're often the first person to set eyes on it at that well. The information you provide to the client about the hydrocarbon content evident in gas and cuttings samples is used by the client to make production decisions. As an AIPG member you all realize that this information must be accurate, timely, and clearly conveyed to minimize potential problems to the rest of the drilling team. You're also often bound to confidentiality, since investors don't necessarily want information about their well made public.

Another very important thing to know is that you will be working in a "safety culture" where all personnel on site have "stop work authority" if they feel something is unsafe. People's lives and money may depend on your real-time decision in this job. So you'll have to learn quickly to work with others on-site to get the job done safely.

OK, enough about the work. What is it like off-tour?

Well, one thing the recent graduate should be prepared for is some dormitory life after college. Mudloggers working on the North Slope and at other remote locations in Alaska often live in "camps." Camps are much like dormitories, but often on wheels, and typically a lot quieter. Some camps may be rather "Spartan" with respect to amenities, but nearly all of them have an exercise facility, internet access, "morale" telephones, and a lounge with satellite TV. Accommodations on offshore oil platforms can be a bit more crowded, but generally offer some the same amenities as smaller camps.

Mudloggers on the North Slope sometimes stay at larger, better-equipped base camps that may include an airport, movie theater, game room, social activities, medical clinics, fire stations, gymnasiums and larger commissaries. Food in camps is almost always free, plentiful, generally good, and available at four mealtimes a day. Snacks are available 24/7; so watch your waistline. Camp life and/or per diem is also great on your pocketbook because your food and lodging bill on most mudlogging jobs in Alaska is generally nil. But always bring some cash and a charge card for that souvenir, or an emergency.

Pack for a long trip on any mudlogging deployment. But also ask yourself: "Do I really want to carry that bag down three flights of stairs from an icy helicopter landing pad in the dark?" Laundry facilities are available and often there is a housekeeper aboard the platform or in camp that will do laundry for you. Many smaller camps will have some things you might forget (e.g. toothpaste, shaving cream) on hand for sale.

The commute to work. Alpine Oil Field, Alaska, April 2008.

Like the Arctic natives that preceded us and live and work alongside many of us up here, you will live and work in close-knit groups as a mudlogger. Be prepared to have at least one roommate (hopefully your opposite tour mudlogger so you can have a 2-bed room to yourself for 12 hours), and be considerate and respectful to everyone in camp as if it was your own family; which in a sense it is. Learn and abide by each camp and worksite's rules. Good hygiene is also essential as infections can spread quickly in close quarters. Contact the ever-present camp nurse/medic if you even suspect you're ill, and remember you're often far from rescuers so take your time on and off work and think and act safely.

The downside to this lifestyle is its unpredictability, and I'm not just talking weather. Wells take on a life of their own immediately after spudding. There is a lot of time spent away from friends and family.

Fortunately, communications today make it possible to keep in touch with people worldwide daily; sometimes via a vid-phone or other web cam link. Missing milestones in your loved ones' lives is made up for by having a huge chunk of time to spend with them between hitches. Depending on the age of your kids, if you have any, you can get away with missing some holidays by telling them what you do: "I'm working at Santa's workshop drilling oil to make more plastic for more toys!" (That one only works for so long). Overall, you and your significant other should discuss the change in lifestyle that will occur before embarking on a career in mudlogging geology.

OK, if mudlogging in the Arctic and long hitches are not for you, there are also opportunities to work as a mudlogger in other parts of the country that are nearer "civilization." In such cases you often stay in a hotel and commute to work. It should be noted that some companies elsewhere have people camp out in the unit itself which combines the isolation of remote camp life with the lack of amenities of commuting to work. In such cases you literally sleep at work.

Another great thing about mudlogging is that it is never the same day twice on the job. In addition, the job is often "hurry-up and wait," much like college. There is often time between tours to study, read, write (including this letter) and work-out, while in a camp. Depending on computer arrangements you may have time to surf the web for online banking, research, e-mail and so on.

The people you meet en route to the job, and on the job, also make the job fun. I have met people from all walks of life while making the long journey to and from the worksite. These include professionals, students, travelers and tourists. Among these was a soldier's wife traveling with her infant son. Seeing

her in the airplane seat next to me made me realize that a month or two on the North Slope between seeing my loved ones is nothing compared to what her family goes through. Camps are also great places to network with people from around the world. It also helps that the work culture up here is second to none with respect to safety and protecting the natural environment and cultural resources.

A muskox herd grazes peacefully under a pipeline, Kuparuk Field, July 2008.

As with all jobs, mudlogging has its typical office life and logistical issues. These can sometimes get complicated in the Arctic. In addition, there can be a lot of travel involved. Being lowered by crane basket hoist to a waiting ice-breaker in a blizzard, to take a taxi on an icy road to an airport, then fly in three planes in 24-hours to arrive at an 18-hour rig-up after driving over ice roads in another blizzard: BTDT!

But then there are the perks. Like one recent summer hitch spent in Kenai. I spent every morning before work relaxing and socializing while having a per diem-paid breakfast at a nice restaurant. Every night after work was spent at the beach talking with the locals and watching the midnight sunset over the Redoubt Volcano across Cook Inlet. The North Slope also has its beauty - like seeing the Pleistocene meet the Information Age alongside the road.

All that, and a chance to show off your school colors where they have never been before. Being the northernmost working Ohio State Buckeye last year sure made up for any dark parts in the season.

The Redoubt Volcano at dusk as seen between beach dunes, Kenaitze Beach, Kenai, Alaska, August 2008.

The author supports his claim of being the "northernmost Buckeye" shortly after the Ohio State-Michigan Game, Kuparuk field Alaska, November 2007.

James (Demetrios) Foradas, Ph.D. is a mudlogger employed by the Alaska Division of Canrig Drilling Technology, Ltd, which provides a wide range of oilfield and other products and services to the global energy industry. An interdisciplinary researcher, Dr. Foradas received his B.S. in Geology, and his Ph.D. in Anthropology (Archaeological Geology focus) from The Ohio State University. His dissertation geochemically characterized prehistorically utilized flint deposits in the Pennsylvanian section of the Appalachian Basin in Ohio, and developed a non-destructive geochemical means to determine the origin of raw materials and artifacts derived from these sources. Dr. Foradas also has an A.S. in Marine Technology/Non-Destructive Testing from the College of Oceaneering and other specialized training to work in remote and hazardous environments. His professional memberships include AIPG, GSA, the Register of Professional Archaeologists (RPA), Sigma Xi, and other scientific societies.

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Alaska Section

We gathered for our Fall Section meeting to hear Dr. Chris Waythomas, Geologist from the Alaska Volcano Observatory, share his research on the eruption of Kasatochi Volcano on the Aleutian chain. His field work just prior to the August 9th eruption and his travels later in the month showed the unbridled force of this sleepy, now active, steaming volcano. The ash and chemical clouds changed history in the far northwest US and Canada, from sea level to 40,000 feet into the air. Air travel was halted, and the winds carried Kasatochi's threatening clouds into the atmosphere around the northern globe. The island's habitat on Kasatochi was destroyed, and future observations of the habitat's gradual return are planned. We were awed by Dr. Waythomas' presentation and the amazing photos of the island over time. We will pay more attention to this little island with big eruptions. We plan to invite another geoscience expert to speak to us at our Winter, 2009 Section Meeting planned to take place in Anchorage.

Dr. Chris Waythomas

Alaska Meeting Attendees

Illinois/Indiana Section

The Illinois/Indiana Section is pleased to announce the 2008-2009 affirmation of the following Section Board members: David Pyles, CPG-07364, KPRG and Associates, Inc. Westmont, Illinois, Section President. Erik Spande, CPG-09904, CH2M Hill, Chicago, Illinois, Section Secretary. Ramona Cornea, CPG-08983, LandTech, Inc. Rockford, Illinois, Section Treasurer. Craig McCammack, MEM-1295, of the V3 Companies, Chicago, Illinois, Marzi Sharfaei, CPG-10892, and Jeff Groncki, CPG-1118, of Malcom Pirnie, Schaumburg, Illinois, Marty Hamper, CPG-10250, of Arcadis-US, Chicago, Illinois. In addition, we also welcome our new Section Board member, James Adamson, MEM-1532, of the V3 Companies, Wooddale, Illinois.

Michigan Section

Michigan Section Students – An Ongoing Challenge

Last year I issued a challenge to our Section Membership to involve more students in our meetings in hopes of generating and maintaining interest and ultimately involvement in the Institute as they become professionals in their own right. This year I'm continuing that challenge with a little additional information for those whom I hope will take up the gauntlet.

As before, I'm offering to buy entrance for a student from Grand Valley State University here in Grand Rapids. That's my Alma Mater and I feel I owe them a bit of support. They're also local which makes it a bit easier for me to do so. As before, I'm asking the student to be at my door in time for us to make the social hour before the meeting. Also, I'm extending the other seats in my vehicle to other students and/or other members or guests who want to ride along. I'm letting them split the $25 if they wish to bring others. Last year three students from GVSU attended two meetings and I brought along one guest. We also had three other students attend that I'm aware of and a couple of other guests. Let's keep it up!

For this year, I'd like to add that I did a bit of research and have the names and contact information for 17 colleges and universities in Michigan that I'm willing to share. Likely I don't have them all and possibly some have changed. I'll ask Adam to post it on our web page. If you come across something new or can update the list, please let Adam know. What I'd like to ask is that everyone take a minute to check out the list, look around you, note which colleges and universities are within convenient reach and contact them. Ask if there might be students interested in getting involved with the MI-AIPG and attending the meetings. We have student chapters at CMU and EMU and there has been some interest in a chapter at WMU. I'll workon GVSU and we should see where else we can get a foot in the door.

So my challenge to you is this. I'm putting up $25/meeting out of my pocket. No, Aqua-Tech is not funding this, I am. Surely you can do the same once in a while to better your profession. After all, this is the American Institute of Professional Geologists and the encouragement of others to follow in our footsteps is part of the professionalism.

Lawrence M. (Larry) Austin, CPG, CP

Michigan Section Students – Exhibit Your Posters

If you have a poster that you are preparing or have prepared, please consider showing your poster at the next Michigan Section meeting. We would like your poster set up by 5 PM so it can be presented during the social hour, usually 5:30 PM to 6:30 PM. If you provide a poster at one of the meetings, Michigan Section will wave your $25.00 registration fee. This is a great way for you to get involved and meet other geologists in Michigan with whom one day you may be working. If you are seeking employment, consider also bringing a copy of your resume. Please contact Don Conway, CPG, the Section's Secretary to register a poster at our next meeting.

Timothy B. Woodburne, CPG
AIPG Michigan Section President

IN MEMORY

Donald Chance
MEM-1368
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April, 2008
Riverside, California

Cleveland M. Welsh
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September 19, 2008
Oklahoma City, Oklahoma

Benton M. Wilmoth
CPG-00375
Charter/Emeritus Member
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A Few Thoughts About Effective Communication for the New Year

Robert A. Stewart, CPG-08332

This issue of *TPG* is the first of two devoted to geoscience student affairs, and Larry Cerrillo's short contribution, Effective Communication (p. 23), should not be overlooked, particularly the admonition to be a good listener. A good sense of humor helps, too. Larry's article reminded me of a client from a previous employer. The client, whose ill-temper was explosive and legendary, was an old-school commercial real estate developer in Fairfield County, Connecticut, the state's so-called gold coast, owing to the proximity and influence of Wall Street money. The client was personally affronted that the state of Connecticut could have had the temerity to promulgate and enforce environmental regulations that affected ***him*** personally, and his grudge was permanent. Face-to-face meetings or teleconferences typically began with a loud, profane diatribe by the client, who would bemoan the latest slight inflicted by this agency or that regulator. Given the client's strategy to redevelop contaminated sites near the shore, there were always regulatory problems. So the client would bellow for the first 10 or 15 minutes of every meeting, finally tiring – quite hoarse from his efforts – and storm out in high dudgeon to leave his corporate attorney and my colleague to get down to business, despite scorched ears and a shared desire for a quick, third party consult with Dr. Daniels.

The site investigation and remediation reports for the client contained the usual results and discussion of soil and groundwater testing, native materials, anthropogenic fill, and a summary of the implications for regulatory compliance. The corporation counsel was the antithesis of his boss, and would patiently read each report, carefully weighing his boss's tolerance for reading technical matter against what the agency would need to understand the progress, and where the details became too dense, he would write "MEGO" in the margin. My colleague asked the obvious question the first time he saw the annotation, which proved to be an abbreviation for "My Eyes Glaze Over". The point was that our concept of necessary technical detail belied the real point of the report, which for the client was to make a specific demonstration of regulatory compliance, and that's what made the client happy, and quiet.

The MEGO concept has stuck with me as an editor – how much detail is needed? How much data are best assigned to summary tables and drawings? Does all the tedious QA/QC review need to be in the narrative, or can it be relegated to an appendix? How much factual information from test boring or test pit logs needs to be repeated in the report narrative? Are all the illustrations clear, and well-captioned? Does the client really give a hoot about those several hours you spent characterizing soil morphology to define the seasonal high and low water tables? (He'd better. Maybe the latter stuff can go to an appendix, but in Connecticut, unless you have a detailed hydrograph to track water table fluctuations, soil morphology counts for a lot, as the depth to the seasonal high and low water table drives the extent to which contaminated soil is remediated, and it's a faster way to make the same point than with a hydrograph.)

Happily, *TPG* has a dedicated band of associate editors to assist authors with technical articles, and yours truly, with the help of AIPG's headquarters staff, manages the rest. The breadth of contributions to *TPG* shows a group of students and professionals who lead interesting lives, and I encourage all of our members to submit a technical article, write a letter or op-ed piece, or send a photograph with a caption, and not just for the cover. As the editor for the Northeast Section from 2000 to 2005, I organized the newsletter around our advertisements and regular features, which were fixed for the year, and the remainder of the space was open to fill with contributions from the members, which by number of words or images varied considerably from issue to issue. Nature abhors a vacuum, as do newsletter editors, so I filled the open space with my own musings, photographs and public domain images related to geology. We have some of the same flexibility with *TPG*, particularly for photographs in addition to the cover photo, so if you have a favorite, I invite you to send it to headquarters with a caption.

With the beginning of 2009 *TPG* welcomes a new column, ***Hydrothink***, by William Stone. In his opening column, First, Characterize the Setting, Dr. Stone presents an example of the risks associated with overlooking basic geologic knowledge already compiled for a site. Indeed, ignorance is not bliss, and failing to appreciate what an hour's walk around the project area demonstrates may result in embarrassing and expensive consequences.

Got a concept for a column? Let us know – send us a sample. TPG is your journal!

Part II Student Issue March/April 2008 *TPG*

Dear Editor,

You will be pleased to know that we have compiled a complete list of outstanding earth science teachers receiving awards through the NAGT OEST program for 2008. Photographs and narratives will appear in the January issue of the *Journal of Geoscience Education,* along with the mention of your organization's involvement in the program. On behalf of NAGT, I want to sincerely thank you and your organization for bringing additional visibility and stature to geoscience education through your support of NAGT's award program.

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

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

Central Section
Teresa Lee Huckleberry
Eastern Section
John D. Moore
Pacific Northwest Section
Jeff Hashimoto
FarWest Section
Anna Foutz
Southeast Section
Tina Coleman
Southwest Section
Suzi Shoemaker
New England Section
Gregg Wachtelhausen
OEST Alabama
Jennifer Grant
OEST Indiana
Teresa Lee Huckleberry
OEST Alaska
Adam Low
OEST Louisiana
Wendy DeMers
OEST Florida
Kathryn Bylsma
OEST Maryland
Susan Phillips
OEST Georgia
Rebecca E. Chunn
OEST Michigan
Chris Bolhuis
OEST Idaho
Robert Walker
OEST New Jersey
John D. Moore
OEST Illinois
Kelda N. Hutson
OEST New York
Christopher Visco
OEST North Carolina
Robert Greenberg
OEST Tennessee
Tina Coleman
OEST Oregon
Jamie Rumage
OEST Virginia
Christopher Kaznosky
OEST Pennsylvania
Richard W. Schmidt
OEST Washington
Jeff Hashimoto
OEST South Carolina
Dina Ledford
OEST West Virginia
Tiffany Litton
Illinois-Honorable Mention Certificate
Charles Simer
Minnesota-Honorable Mention Certificate
Jim Rock

Community Mediator of the Year

Larry Cerrillo, CPG-02763, past president, recently received "Community mediator of the year" award from the Jefferson County, Colorado mediation program where he serves as a volunteer mediator. Larry has been doing mediation, facilitation and arbitration since 1998. In addition to certificates in environmental and public policy dispute resolution, and in land policy disputes, Larry has a certificate of advanced study in alternative dispute resolution from Denver University.

AGI Announces New Executive Committee Officers

Alexandria, VA - The American Geological Institute (AGI) welcomes three new officers: Richard M. Powers,CPG-06765, President-Elect, William Barkhouse, Secretary, and Donald L. Sparks, Member-at-Large.

Richard Powers, CPG-06765, is President and Chief Executive Officer of BCI Engineers & Scientists, Inc. He served as 2003 AIPG President and is currently AGI's Member-at-Large and International Year of Planet Earth representative.

William Barkhouse spent 30 years with ExxonMobil in various technical and management positions. He currently serves as the Society of Exploration Geophysicists Foundation Vice Chair.

Donald L. Sparks is Chair of the University of Delaware's Plant and Soil Sciences Department. Sparks serves as an AGI Foundation Trustee and is the past President of the Soil Science Society.

The new members of the AGI Executive Committee were installed during the Geological Society of America Annual Meeting in Houston, Texas on October 7, 2008.

The American Geological Institute is a nonprofit federation of 45 geoscientific and professional associations that represents more than 120,000 geologists, geophysicists and other earth scientists. Founded in 1948, AGI provides information services to geoscientists, serves as a voice of shared interests in the profession, plays a major role in strengthening geoscience education, and strives to increase public awareness of the vital role the geosciences play in society's use of resources, resiliency to natural hazards, and interaction with the environment.

AGI Announces Peter Scholle as its 2009 President

The American Geological Institute is pleased to announce ***Dr. Peter A. Scholle,*** MEM-0350, as its new President. He was inducted on October 7, 2008 at the Geological Society of America annual meeting in Houston, Texas.

Scholle, the current State Geologist of New Mexico received his B.S. in geology from Yale University and his M.S. and Ph.D. in geology from Princeton University. He was the recipient a Fulbright Fellowship and attended the University of Munich and also spent time at the University of Texas at Austin.

Dr. Scholle began his career at the Cities Service Oil and Research Lab. From there he became an assistant professor at the University of Texas at Dallas. He spent many years working for the U.S. Geological Survey in both Reston, Virginia and Denver, Colorado. Scholle was Chief Scientist for Carbonates at Gulf Research Company. He also served as the Albritton Professor of Geology at Southern Methodist University. Scholle began working for the New Mexico Bureau of Geology and Mineral Resources in 1999.

Besides his involvement with AGI, Scholle is a Geological Society of America Fellow, has held several leadership positions for the Association of American State Geologists including President for the 2005-2006 term, and has been involved in numerous committees and held leadership positions at SEPM (Society for Sedimentary Geology) and was Treasurer of the American Geological Institute from 2003-2005.

Larry D. Woodfork to Receive 2008 Ian Campbell Medal

Alexandria, VA - ***Larry D. Woodfork***, CPG-02370, has been named the recipient of the 2008 Medal in honor of Ian Campbell. Woodfork was presented this prestigious award at the Geological Society of America (GSA) Presidential Address Ceremony in Houston, Texas on October 4, 2008.

Woodfork earned his B.A. and M.S. Degrees in geology from Indiana University at Bloomington. He first joined the Indiana State Geological Survey as a graduate research assistant and then in 1968 joined the staff of the West Virginia Geologic and Economic Survey. Once there, he worked up to the position of Sate Geologist, which he held for 14 years before retiring in 2002.

He now divides his time between consulting on energy development and not-for-profit activities. He is the current Chairman of the Board of Directors for the International Year of Planet Earth and is active in several AGI Member Societies including the American Association of Petroleum Geologists, American Geophysical Union, Geological Society of America, and the American Association of State Geologists.

Woodfork is the 27th recipient of this award that is given annually in memory of Ian Campbell, a man of remarkable accomplishment and influence.

Woodfork's long history of service to the science and profession makes him extremely deserving of this honor. Previous recipients of this award may be viewed at *http://www.agiweb.org/direct/awards.html.*

Members in the News continued on Page 49

Committee Volunteers Sought

AIPG 2009 National President John Bognar has announced the formation of an ad hoc Energy Committee to develop an energy statement on behalf of AIPG. We are looking for geologists in all areas of energy including oil, gas, nuclear, geothermal, coal, oil shale, hydroelectric, wind, solar, fuel cells, biofuels, any new alternate energy sources, and mineral resources needed for use of these energy sources.

With AIPG's diverse membership, we are seeking members interested in serving on the committee and request a brief paragraph on their area of interest and willingness to participate. Please send your expressions of interest to aipg@aipg.org. Thank you.

LOOKING BACK-Part 3 of 4

Russ Slayback, CPG-02305

Reprinted from the Northeast Section Newsletter.

In the 1960s, Maurice Lyman Brashears, known throughout the industry as "Brash", was the main "rainmaker" at LBG. Brash had extensive contacts in the public water supply industry, in the industrial water supply area, and especially in the mine dewatering arena. For reasons that I have never understood, Brash chose Frank Crum, an LBG staff colleague and future partner, to be his warm climate person, and me to be his cold weather field person. Frank went on long field trips to Florida, the Carolinas and to both eastern and western Australia on water supply projects, while I was assigned to mine dewatering projects in northern Canada and Alaska. Of course, mine dewatering projects in Saskatchewan, northern Alberta, the Northwest Territories and Alaska, had to be done in winter, because the mud and muskeg would not permit trafficability for drill rigs in other seasons.

I felt myself quite put upon by this warm weather/cold weather selection, but in retrospect, it was a blessing for me, as I eventually became known to the mining industry as one of the guys to go to for large mine-dewatering projects.

The first was a proposed potash mine in central Saskatchewan, the heart of the wheat-growing area. The issue was whether a formation, the Dawson Bay, about 100 feet above the potash, which was found by exploration holes to contain vugs of super-saturated brine, was a substantial aquifer that might leak into the underground mine, possibly causing loss of life or making mining of the potash impossible. In frigid conditions, I conducted a pumping test of a production well at a depth of 3,000 feet at 2.2 gpm, and observed a similar well 500 feet away. The pumping was done by an oil-well pumping jack powered by a one-lunger gasoline engine. Out in the middle of the prairie, with no help, I had to smother gasoline fires caused by fuel-line leakage, to keep my test running. The results demonstrated that the aquifer was tightly bounded and was not really extensive, and the mine moved forward into production.

My next big mining project was Pine Point Mines on the south shore of Great Slave Lake in the Northwest Territories. The Pine Point lead-zinc operations were scattered along about 30 miles of an east-west Devonian dolomite reef complex, which contained localized pods of very rich galena and sphalerite ores. The ore in some of the pits was so rich that they assigned a mine geologist to ride on the electric shovel, directing the operator to dump left to a truck headed straight for the train to the smelter at Trail, B.C., or to the right to a truck headed to the onsite refining mill, based entirely on the sheen of galena left by the shovel bit. They had high-graded the ore above the water table, and were faced with large-scale dewatering to get to the deeper ore. Whereas many open-pit mines dewater by sumps and pipes running up the pit wall and away from the pit, this doesn't work where winter temperature are commonly less than minus 40^{o}F. If the pump stops for 20 minutes, the 38^{o}F ground water freezes solid in the discharge pipe and operations stop until the pipe can be thawed and drained. The solution was pit perimeter dewatering wells whose columns were insulated by the 38^{o}F ground water and rock mass.

Pit dewatering was conducted in this fashion for many years, with individual pits producing 12,000 to 50,000 gpd. The final pit, a very rich ore body discovered late in the mine life, was going to require pumping rates on the order of 90,000 gpd, which exceeded the electric power capacity available to the mine, and would have required supplemental diesel-powered generation at very high costs. An exceptionally creative grouting plan was devised by a Canadian mining engineering firm and had begun to be implemented, but the work went too slowly to be completed in the warm weather season, ended up being abandoned and went to a court case.

The most exciting mining projects of my career were in the Athabasca Tar Sands of northern Alberta. Brash and I got to work on two of the early tar sand projects – the politically-correct term nowadays is "oil sands". After Brash's untimely death in 1974, I inherited this area of practice and worked on several more. The tar sands are a fascinating deposit of heavy, sulfur-bearing oil that has the consistency of road tar. These Cretaceous sands of the McMurray Formation are water-wet, meaning that each sand grain has a microscopic film of water around its surface, and the bituminous oil fills the pore space. The established thinking is that the oil migrated into the McMurray Formation as conventional crude and the lighter fractions were subsequently driven off and lost to the atmosphere. When the in-situ deposit is excavated by mining and broken up by crushers, washing the crumbled sand in hot water results in exceptionally high recovery of the bituminous petroleum, generally in the range of 95 to 98 percent recovery.

The almost uniform hydrogeologic problem in the mineable tar sand deposits along the banks of the Athabasca River is that most of the ore-grade material is underlain by brackish to saline ground water that lies in low-elevation channels on the underlying Devonian carbonate rock surface. If these water sands are not depressurized they can cause slope stability problems during the variety of excavation mining methods that have been employed in the region. In my first such exercise, at the huge Syncrude project, I designed a system of some 300 wells in five rows along a 2 ½-mile opening mine cut, wells that cost $10,000 to $12,000 each, and wells that produced an average of only 7.5 gallons per minute each, but were effective in controlling the aquifer pressure. I looked up from my hand-held calculator and realized that I had just designed a depressurization system that was going to cost 3 million dollars, without even considering the support infrastructure. That may not sound like much today,

but in 1976, it was a substantial capital cost.

I also got to serve for 14 years on Syncrude's Geotechnical Review Board (GRB), a fascinating group of experts in all aspects of mining and slope stability. The original GRB consisted of 14 members charged with determining whether Syncrude should proceed with its commercial mine using large walking draglines or go with the more conventional truck-and-shovel or bucket-wheel excavator methods of mining. Syncrude conducted a 2-year test pit using a small walking dragline that worked within the mine pit, and, among other things, demonstrated the efficiency of the dragline method and the crucial importance of control of the basal water sands. Although the original test pit scheme was to depressurize the water sands from wells on the pit rim, I ended up taking over the program from the previous consultant and installing seven wells within the mine pit so that the test pit could be completed before winter rolled in. It was a plumber's nightmare but it worked, and as a result, LBG was selected to design the depressurization system for the commercial mine.

The GRB recommended the dragline mining method after much debate and soul-searching. This was a once-in-a-lifetime experience, sharing views on all aspects of the mining problems with Arthur and Leo Casagrande of Harvard and MIT, Bob Hardy of R.M. Hardy Associates of Edmonton, Elmer Brooker and Dave Devenny of EBA Engineering in Edmonton, Karl Tayor of Bechtel, Chuck Brawner of Golder-Brawner and later the University of British Columbia, Frank Patton, renowned landslide expert from Vancouver and founder of West Bay Instruments, Gerry Kendall, reservoir geologist with Imperial Oil, Fred Matich of Geocon in Toronto, Herman Knight of Peabody Coal, Nordy Morgenstern, geotechnical soil-mechanics specialist of the University of Alberta and, later, Don Pollock, a weak-clays expert from the University of Saskatchewan. In the final meeting before the dragline recommendation was made, Herman Knight, the dragline expert, told Syncrude that their economic model should include the loss of one dragline within the first ten years of mining, a sobering moment, considering the replacement cost of one dragline was about $75 million, and such an accident might involve human lives.

Syncrude acquired four walking draglines whose size was mind-boggling. Built by Bucyrus Erie and Marion, they were shipped to the site in pieces and assembled onsite. The dragline components were so large and heavy that a new highway bridge had to be built over the Athabasca River at Fort McMurray. The dragline tubs were 90 feet in diameter, the dragline buckets were 80 and 90 cubic yards capacity (two pickup trucks could park side-by-side inside a bucket, and the booms were 360 feet long. The draglines worked four quadrants of the mine, sitting on top of a prepared flat tar-sand surface that had been cleared of overburden by trucks and shovels. The draglines worked above a sloping highwall averaging a 55-degree slope and ranging in depth up to 180 feet.

The dragline ore production was piled into windrows and then loaded on long conveyors to the upgrading plant by large German bucket-wheel reclaimers. The mining and loading sequence was an extremely difficult but efficient bit of mechanical choreography that worked most of the time.

The testing program for the commercial mine involved two pumping test patterns in the north and south sectors of the commercial mine area. We started as soon as the muskeg ground froze solid enough to support a rotary rig. It was cold – 30 to 40ºF below zero, but reasonably comfortable, and we had a heated trailer not far from the center of the patterns. However, midway through our program, the tree-clearing effort reached us. They used D-9 Caterpillars and struck the trees with the dozers blades about 4 feet off the ground – the frozen jackpines just shattered. It changed our lifestyle considerably because now the wind ripped into us anytime we stuck our heads out of the trailer – 40 below zero with a 30 to 40 mph wind is truly brutal.

The pumping tests were fascinating. After pumping off the initial static head and reaching about half of the available drawdown, we started to see foaming of the discharge water and a rapid increase in the rate of drawdown. We determined that dissolved gases in the formation water were evolving due to the pressure drop, and it was starting in the formation near the well screen. The apparent transmissivity dropped to about one-seventh of the initial transmissivity and we realized we were on a classic relative permeability curve, with the evolved gas freely capturing the heart of the connected pore spaces and the permeability to water diminishing as it was driven to the edges of the pore spaces. Petroleum reservoir engineers call this solution gas drive or depletion drive. We had no classic hydrogeological solutions to computing mutual well interference with this gas problem. We consulted reservoir engineers at Imperial Oil (Exxon of Canada) but while they knew how to calculate the impacts on a pumping well, they had no models for superposition, or mutual interference among multiple wells. We ended up doing some laborious calculations based on our field observations of about a one-seventh drop in transmissivity. It wasn't high science but the job got done. I withdrew from the GRB in 1987, when the Syncrude mine had moved out of the Devonian low where the main basal aquifer was present and the remaining depressurization problems had become routine.

Our work at Syncrude led to other consulting assignments for Suncor and Shell, and for proposed but never implemented plans for other tar sand mines. We recently performed a senior peer review of the hydrogeology of the Horizon Project for Canadian Natural Resources Limited, who will open the next commercial oil sands mine.

Gold mining has also been a major feature of my career. The first such experience was the Valdez Creek Mine just across the river from Denali (Mount McKinley to you lower 48 people). This was a placer deposit that was panned for gold during the Klondike Gold Rush of the 1890s. When the panning gave out, the miners dug into the sides of the steeply-incised stream banks, and used wooden cribbing to support the workings, but ground-water inflows became too great to manage and the workings were abandoned. Depending on who you talk to, the "mother lode" was six to ten feet above their heads when the water drove them out. Valdez Creek Mine went after the gold by brute force, an open-pit mine with dewatering wells to control the ground water. An interesting wrinkle was that Astroturf was used to line the mechanical sluice boxes and trap the gold nuggets and dust.

Placer gold deposits are relatively rare today, as they were easy to find and were mined out long ago in most places. Disseminated gold has become a major mining focus all over the world, as deposits of less than a half ounce of gold per ton of rock can be economically viable depending on site conditions. This gold cannot be seen with the naked eye, but it's there. The gold can be abstracted by heap leaching technology,

in which the crushed ore is placed on specially prepared and lined pads, and treated, with leaching solutions that separate the gold from the rock. Barrick Gold Corporation, a Canadian company based in Toronto, has been an especially good client for LBG with projects in Nevada, Alaska, Peru, Chile, Tanzania, Dominican Republic and Papua-New Guinea. Hydrogeologic problems associated with such mines include dewatering, minesite water supply, disposal of dewatering water, water quality issues, and permitting.

Quarries for aggregate or rock products can also be interesting. My first quarry job was for a cement limestone quarry north of St. Louis on the banks of the Mississippi in 1967. We were able to demonstrate, by classic pumping test methods, that the mine was set back sufficiently from the river that the cone of depression in the alluvial aquifer above the limestone would come nowhere near the Big Muddy. The onsite geologist, Erwin Pennington, was on his first professional job and he later became a CPG. Thirty-odd years later, Erwin called me to tell me that this quarry was nearing closure and that his last professional job before retirement was to retain LBG for their next major limestone source south of St.Louis. With a myriad of hydrogeologic and engineering issues, that quarry project is now under construction.

Another memorable quarry job was in northwest Michigan on the banks of Lake Michigan. Again in limestone, the mine operators were very concerned that their pumping rates were increasing sharply and they feared that they might be opening connections to Lake Michigan, a concern that had major ramifications because they were planning to deepen the quarry by two more lifts. A review of the quarry history showed that the pumping-rate increases coincided with widening the quarry across the direction of ground-water flow from the interior uplands to the lake, the point of natural ground-water discharge. There was no more room to widen the quarry, so going down was the only option. There was no evidence of a direct connection to the lake, and deepening would cause some further increases in pumping rates but only because the cone of depression would need to be deeper but not much wider.

Have You Paid Your 2009 Dues?

Pleae look at your label on the cover of this issue to see if your 2009 Dues have been received. If "2009 Dues Not Received" is on your label, we have not received your dues as of December 12, 2008. Please contact us if your records show otherwise. In accordance with Article 8, Section 8.2.1, of the Bylaws, Annual Membership dues are due and payable ***January 1, 2009***. Those Members whose dues are not paid by ***February 15, 2009***, will be suspended.

Robert G. Font, CPG-03953

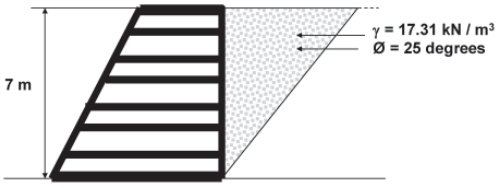
1. A critical element in one of the following minerals may be used as a depolarizer in dry cells, in the removal of color from glass that is colored green by iron impurities and to improve rolling and forging qualities, strength, toughness, stiffness and hardness in the development of steel.
   a) Pyrolusite
   b) Pitchblende
   c) Cinnabar

2. This mountain range stretches between the Black and Caspian seas and is believed to have formed as part of the Late Alpine orogenic episode which took place 24-28 million years ago. Collision between the Arabian and Eurasian plates gave rise to this orogen and strong earthquakes still occur in the general region influenced by the lateral-slip motion between plate boundaries. Large hydrocarbon reserves are related to this area.
   a) Grampian Mountains
   b) Carpathian Mountains
   c) Caucasus Mountains

3. These Mesozoic-age, bivalve mollusks (pelecypods) were reef builders living in what we expect to have been warm, shallow, well-oxygenated waters.
   a) Turritella
   b) Rudistids
   c) Globotruncana

4. You are a geologist helping your company and engineering team evaluate the potential stability of a 7-meter high (H = 7m) retaining wall. Consider the situation depicted in the drawing below. Assume that the "active Rankine zone" is confined to the sandy triangular backfill, that geostatic stress conditions apply, that the unit weight of the fill material is $\gamma = 17.31$ kN/m^3 and that it remains constant with depth, that the coefficient of friction is 0.4663 (ø = 25 degrees), that the coefficient of active earth pressure Ka = Ph/Pv = 0.406 and that there is no friction between the back of the retaining wall and the fill material. For the structure to remain stable, the horizontal component of the active thrust must be less than the resistance offered by the passive zone, the shear force at the base of the wall and the weight of the wall. Then, what is the combination of horizontal stress (Ph) at the base of the wall and total horizontal thrust (Pah) for this case?

   a) Ph = 30 kN/m^2 and Pah = 203.22 kN/m of wall.
   b) Ph = 49 kN/m^2 and Pah = 172.18 kN/m of wall.
   c) Ph = 73 kN/m^2 and Pah = 603.15 kN/m of wall.



Answers on Pages 25

Energy for America is a Patriotic Issue

John L. Bognar, CPG-08341

James Madison, fourth U.S. President, American patriot and father of our U.S. Constitution foresaw the United States would wholly surpass its former mother country in population and would become vastly larger geographically. Seeing this prospect, in his wisdom he wove into the U.S. Constitution the checks and balances needed in the future to support our inalienable rights of life, liberty, and the pursuit of happiness for what would become our vast American society. Madison was not without his detractors. Indeed that summer of 1787 in Philadelphia was politically very contentious, sparking divisive debates with threats of violence and secession. Simply stated however, Madison and the other writers managed to contrive a very well thought out plan for posterity. Madison himself noted that the Constitution was not perfect, but on the whole was the best plan from the best of the knowledgeable. It is James Madison's forethought about you and I that has us living in the greatest nation on earth in 2009.

Madison and his contemporaries established the republic and the rules that are the catalyst of capitalism driving our economy. In Madison's day the country ran on solar energy and biofuels of sort. Energy was plentiful and certainly not political. The sun grew the forests used to heat buildings as well as feedstock to supply the animals of labor and transportation. The sun ruled the winds that powered our ships. Shortly after the adoption of the Constitution, less than one generation, the beginning of the industrial revolution was emerging and the need for new forms of energy and its infrastructure to drive our factories and power our growing cities would come to the forefront. Our economic system of capitalism inspired and rewarded entrepreneurs to harvest and distribute energy in many forms to support and sustain the industrial revolution, the mechanical transportation revolution and now our modern high standard of living that we Americans have worked so hard to achieve. Looking back no patriotic American would dare apologize for our historic application of energy; for that is a triumph to be heralded; that is the American way; that is what makes us great.

Americans saw the winds of change alter the modern energy landscape in 1973 when the first oil embargo skyrocketed gasoline prices from 25 cents to 50 cents per gallon literally overnight, and then again in 1979 as we saw filling station lines and one dollar gasoline. For better or worse, we have not altered our main source of energy since 1973, or prior for that matter. Today in 2009 we are seeing a very new dawn in the world of energy as its availability and use is more and more constrained and controlled by politics. Our society has grown to be very sophisticated and complex while our energy needs are immense and wide-ranging. New in the last generation, Americans demand that energy be supplied in a manor protective of the environment. Even though domestic oil production does not supply a significant percentage of our oil needs, regulations exacerbate the American dependence on foreign oil. New competing demand from emerging foreign economies contributes to the high price of energy. It is now past the time to think earnestly about energy for America.

Today; yes, right now, Americans need to take a page from Madison's play book to draw upon the nation's most knowledgeable persons, to create a very well thought out plan for posterity even though we are in this politically contentious time. It is essential that we patriotic American geologists together contribute forethought to benefit not so much our generation, but Americans yet to be born. Professional geologists more than any other profession also know the whereabouts and the abundance of the raw materials for most forms of energy.

Now is the time, as the high price of energy has vaulted the public into awareness. Most citizens now think about and believe that oil is finite as it hurts them in the wallet, day in and day out. Whether or not it is true, there is wide spread belief by the American proletariat and many in mainstream media and political power that new pragmatic technologies are just around the corner waiting to make fossil fuel antiquated and America energy independent. The geologic profession has an unprecedented opportunity to seize the public's attention and provide near and long term energy solution guidance to a society that now is prepared to take heed. The public may or may not like what we have to say regarding the near and long term energy picture, but we as professional geologists and patriots should say it.

Because we are a professional organization of professional geologists from all walks of the profession, not tied to any particular form of energy, and not receiving any funds from any energy providers, the AIPG is best suited to provide an unbiased, uninfluenced observation regarding the status and future of American energy. The AIPG will contribute to the American energy dialog with the intent to share our collective knowledge as to what is really possible now, what is pragmatic for the near future (10-25 years out) and the deeper future, say 25-50 years from now. I have asked 2009 Advisory Board Representative

Ron Wallace, CPG-08153 to populate and head-up a committee to establish a formal AIPG energy statement. Ron is looking for AIPG members that have experience in energy. Those who would like to make a difference and have a background in oil & gas, nuclear fuel resources, tar sands, oil shale, geothermal, coal, coal methane, hydroelectric, hydromechanical, wind, solar, bio-methane, photovoltaic and any others, are asked to join Ron's committee to develop this important statement. The statement once completed will have the weight of our 5000 plus professional geologists. To promulgate our knowledge and our message, the statement can then be shared with politicians, legislators, government officials, environmental groups, think tanks, schools & universities, newspapers & periodicals, talk radio, and the main stream media to mention a few.

James Madison and the American society boldly tackled the most important issue of their time; establishing the law. Each ensuing generation of Americans has undertaken and resolved the issue of their time. Nothing worthwhile is easy to accomplish, but it is our generation's duty to assist our American society to alleviate the most important economic and some would say security issue of our time; energy. The AIPG looks forward to your professional contribution to the energy discussion.

STUDENT APPLICATION FORM

American Institute of Professional Geologists
1400 W. 122nd Ave., Suite 250, Westmisnter, CO 80234
303-412-6205 • Fax 303-253-9220 • aipg@aipg.org • www.aipg.org

Date received: _____ Member #: _____

Amount paid: _____ Date approved: _____

For Headquarters use. Donot write above this line.

Application for Affiliation as a Student Adjunct

Complete ALL sections. Read the Bylaws and Code of Ethics. If applying between November 1 and June 30, the application fee is **$20**; if applying after June 30, the fee is **$10**. Please PRINT or TYPE.

Current academic standing: ☐ Sophomore ☐ Junior ☐ Senior ☐ Masters Candidate ☐ Doctoral Candidate ☐ Post-Doctoral

Last Name: First Name: Middle Initial :

College/University: Geological Degree: ☐ BA ☐ BS ☐ MA ☐ MS ☐ PhD ☐ None Year:_____

Address: City: State/Zip:

School Phone: Home Phone: E-mail:

ATTESTATION: I attest that I meet the requirements for AIPG Student Adjunct (currently enrolled in a geological science degree program) and agree to abide by AIPG Bylaws and Code of Ethics.

Applicant Signature: Date:

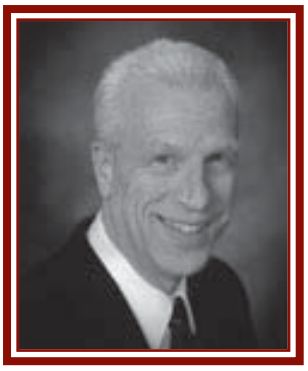
Have your faculty sponsor complete the statement below before submitting **OR** AIPG will contact your sponsor(complete name & ph. #)

Faculty Sponsor's Statement

I certify that I am a member of the faculty of the _____ department at _____ _____, with the rank of _____, and that the statements made by the applicant in this application are true to the best of my knowledge or belief. I am ____/am not ____ the applicant's faculty advisor.

Name: Phone:

Sponsor: Signature: Date



Students! Help Wanted

William J. Siok, CPG-04773

All of us practicing geoscientists need your help! All of us living in the US have heard about and have an understanding of the concept of generation gap. Commonly accepted examples of the gap are differences in preferences for music, clothing styles, cars, etc. Topical issues are interpreted from vastly differing perspectives through the refractive properties of the twin lenses of time and experience.

Have geoscience societies tried sufficiently to understand the magnitude of this generation gap within our geosciences profession? All geoscience societies are grappling with the question of how to attract and retain your active participation. There is no question that the near term future of the societies depends upon you.

You, today's students, are the ones who will soon lead the professional societies and more. We, the current generation, will defer to you. Yet, in order for this to take place, two elements are necessary. You must see a value in geoscience society membership and then become actively involved. (If you don't see the value, become active in any case and then work to effect positive changes in the society.)

The amount of help you may be willing to give is related to value perceived and your active engagement in geoscience society missions. Is there a generation gap between you, today's students, and the current generation of practitioners which prevents society leaders and administrators from understanding your expectations? Knowing how you perceive professional society membership is imperative if societies are to provide benefits and services which address your requirements.

Often we take your presence for granted. Certain momentum builds within each society to accomplish goals, and student input is not always sought or taken into consideration, yet it must be considered. However you perceive society membership, it's your prerogative to make your opinions known to society leadership. Assuming society leadership automatically knows what you expect as an active member is usually a mistake; it's only if you make the effort to deliver your message convincingly that each society can take steps to meet your expectations. Make an effort to become engaged in two or three associations, it will benefit your career.

Membership, of course, is a two-way street. At the one end, you receive benefits and services which enhance your professional life. Taken from the other direction, the society is able to continue its mission to support you and your professional colleagues through your interest and support.

Keeping the value of society membership in mind, motivate yourself to take an active role in your favorite society. Obligation to your own professional career strongly commends the value of active society membership! If there is a generation gap within the geoscience ranks, help narrow it!

AIPG Section Websites

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

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"Green" Liability

Marty Andrejko's, CPG-08512, "Green" Liability column in the September/October 2008 issue of the *TPG* addressed recent changes to the Codes of Ethics of the National Society of Professional Engineers and the American Institute of Architects that added statements encouraging sustainable development practices and environmental protection. Andrejko suggests that environmental activists may attempt to use these statements to charge those NSPE or AIA members whose work the activists object to with violations of the respective Code of Ethics. Andrejko's concern may not be misplaced. I recently learned of licensing complaints made against a CPG that may have been brought by environmental activists seeking to stop proposed mining ventures. Because the identity of those making the licensing complaints has not been revealed, the possible role of environmental activists remains a currently un-testable hypothesis.[1]

I read the added ethics statements quoted by Andrejko as aspirational rather than mandatory statements. "Encouraged to adhere to," "should promote," and "should advocate" urge practitioners in a desired direction but do not state specifically what should be done in a specific situation. These statements are similar to those geoscience ethics statements encouraging us to increase our professional knowledge and skills, that is engage in continuing professional development. These aspirational CPD statements only become ethical rules when a mandatory CPD program must be followed.

I hope that if and when Andrejko's liability fears are first realized and some engineer or architect is alleged to have violated one of these new ethics code provisions, that those charged with enforcement of these ethics codes recognize the difference between ethical aspirations and ethical rules.

Can One Keep a Client's Asset as Insurance that a Bill Will Be Paid?

An AIPG member called me with the following question, "Is it ethical to retain custody of a client's asset, for example, a geophysical tool, in order to ensure that a client pays its bill?" Although the AIPG member who called me had returned the client's asset, he was wondering if he should have kept it until he was paid.

I had to tell him that I didn't know and hadn't previously considered the question. I also said that this sort of issue is the type customarily handled by civil litigation. It was clear that the client had intended to pay when the contract for work was entered into but the client had been unable to obtain expected funding. I said I'd include the question in this column and request the opinions of this column's readers.

Note this situation differs from withholding one's report from a client until one is paid. For example, see Fred Fox's discussion of Ethics Question #1, Switching Sides, in column 118 in the September/October 2008 *TPG*. What do you think? Can you retain a client's asset in order to ensure payment?

Additional Discussion of Ethics Question #1: Switching Sides

The question in the May/June 2008 issue was: an engineering geologist bid for a job to assist a developer in obtaining the permits needed for proposed development. When the geologist lost the bid, he approached and was retained by those opposing the proposed development. Is this a violation of professional ethics? If so, which part(s) of the AIPG Ethics Code are involved? What are the ethically critical elements of this example?

Fred Fox, CPG-01273, responded to the discussion of this topic in the September/October *TPG*, "'Switching sides' is not the issue. The geologist in question did not take a side until he was hired. An ethical geologist will come to the same conclusions no matter what side he is on, so it really doesn't matter which side hires him. He will of course report to his client what the situation is, and advise him how to handle it. My contract always states that what I find may not be to the client's liking—he has to live with that. It still benefits him if results are negative because he is prepared to deal with the problem. I also give him advice regarding how to deal with it. This is a valuable service. When everything is on the table going in, there is no chance for conflict of interest. I have done a few projects like this, and you won't find a more ethical person than me, and I would never risk losing my excellent reputation. I resent John Howard's response—selling out to the highest bidder. That's not the case at all. Nor did the geologist 'switch sides.' After **what** fact? I have no truck with details of various 'codes of ethics, including ours. Codes can in fact be very simple. The more words there are, the greater the chance of cheating on 'technicalities.' I think it's time for people to examine just what ethics is. It has **nothing** to do with the law."

1. I'm aware that there are those who maintain that a hypothesis must be testable to be valid. While I recognize the importance of testability, I don't think that a possible explanation, particularly one whose testability may be possible in the future, should be ignored. Such hypotheses may generate inquiry into a means of developing a means of testing the hypothesis. Remember that Einstein's theory of relativity was put forward long before many of its tenets could be tested.

Fox's comments also address the subject of Ethics Question #4, below even though Fox did not know about Question #4.

Ethics Question #2: An underperforming and/or unethical junior staff member

The following question was provided by **John T. Howard**, CPG-02536, was first printed in column 117, July/August 2008.

A senior geologist is employed by a consulting firm as a project manager. Parts of the project manager's duties include mentoring junior-level staff and providing supervision to them during field activities. One junior-level staff member in particular has been having trouble adjusting to the demands of consulting work and is consistently behind in completing work on time and of the quality that is expected. When confronted with these concerns by the project manager, the junior-level staff member routinely dismisses the advice and counsel of the more senior staff member, which has caused a large amount of animosity among the office personnel and between the project manager and the junior-level staff member. The project manager suspects the junior-level staff member of unethical behavior regarding completion of work, falsification of documentation, and bad-mouthing other employees to bolster his own prestige and position. The project manager does not have direct proof of the accusations against the staff member.

At what point should the project manager take his concerns to senior management and/or confront the junior level staff member directly? Could it be perceived as a witch-hunt by the project manager, given the history with the junior level staff member?

Fred Fox, CPG-01273, commented, "Regarding an underperforming unethical junior staff member, **fire him!** Obviously he is not up to the job. There seems to be more than enough reason to can him. If it seems a 'witch hunt,' it's not being handled in the proper way. I have had direct experience with this situation as well. The disgruntled employee took me to court, where the judge threw him (and his wife) out of the courtroom. Is **everybody** into political correctness? Let's see some fortitude every once in a while. Stop being slave to details. **Do the right thing!"**

Ethics Question #4: Providing the Report the Client Wants?

John Ward's final comments on Question #1, Switching Sides, including column 118, addressed the issue of clients who shop for a consultant who will provide the answer that they want regardless of whether the desired answer is adequately supported by all the available data and orthodox interpretation of that data. This reminded me of a situation I encountered a number of years ago.

A consultant felt that he had an obligation to a prospector. While the nature of the obligation was not stated, we'll assume it was legitimate and otherwise irrelevant to what transpired. The prospector held the rights to a property that he believed contained a buried placer gold deposit. The deposit had been penetrated by an unsuccessful water well bore and the prospector asked the consultant to sample the well cuttings and report on his findings. The consultant collected a sample and then extracted a heavy mineral concentrate of the sample, which he observed with a binocular microscope prior to sending the entire sample off for analysis. The consultant's report noted the presence of buckshot in the sample along with gold flakes. The consultant explained to me that he believed that his noting the presence of buckshot in the sample would be sufficient to warn anyone who read his report to take any statements made by the prospector regarding the property with a very healthy dose of skepticism.

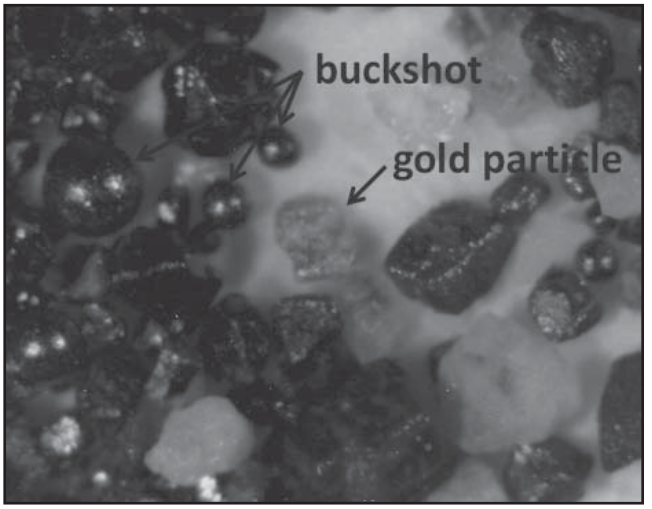
Here we have a case of a consultant providing a client, the prospector, with what he wanted, a report by a geologist verifying that there was indeed placer gold underneath the prospector's claims. However the geologist also believed that he had added a sufficiently large red flag about his findings to anyone who read the report. Ethics question #4 is: in providing the report his client wanted, did the consulting geologist provide a sufficient red flag warning for the general public in his report?

Please re-read Fred Fox's comments on Ethics Question #1 above as one way of dealing with this question.

I realize that most AIPG members and others who read this column are not mining geologists. Did you catch the red flag? Think about it before continuing on. The proverbial method of salting gold in a prospect is by shooting a shotgun charged with gold dust at the "rich" area of the prospect. This is one of those bits of lore that mining geologists tend to pick up fairly early in their training. Indeed, it is a common enough bit of lore that when I told an audience of oil geologists and engineers about this, most of them immediately got the red flag. But did you? Would the general public get it? I'm not so sure. Some would, but many probably wouldn't.

The prospector himself missed the red flag. He didn't think anything of the mention of buckshot in the sample. I also collected a sample of the drill cuttings along with a heavy mineral concentrate of the sample. I still have the heavy mineral concentrate in my desk drawer. There are a couple of small gold flakes along with a good deal of buckshot of various sizes and varying degrees of oxidation, as shown in the figure below. The well casing stands about 4 feet above the Nevada sage brush and is in a popular bird hunting area. No wonder the area, including the cuttings, is full of buckshot. So while I have a gold sample containing buckshot, I can't really say it was a salted sample, as that term is generally understood.

Gold and buckshot in a heavy minerals concentrate of drill cuttings. The gold



Color Photo on Page 1

particle is the roughly square shape in the center of the picture. The buckshot appears as shiny black balls in various sizes in different parts of the picture, three of which are labeled.

Finding a few flakes of gold in a Nevada alluvial fan is not unusual. But is it worth mining? The well bore whose cuttings I sampled was several hundred feet deep and there was no telling where in the bore the gold flakes came from. The prospector thought the gold was 50 to 100 feet down. Even assuming the prospector was right about the depth, that should have given anyone thinking about the profitability of mining to that depth a very long pause. The prospector was not one who thought about profitability. All he seemed interested in was finding gold. But he didn't make a living at it.

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

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

Attention Students

There is a publication on the AIPG website, *Reflections on a geologic career,* that you should considering reading.

This fourth electronic edition of Reflections on a Geological Career expands on the original edition prepared after the Colorado Section's Student Day in 1996, the second edition prepared jointly with the Arizona Section in 1998, and the third edition of 2000. It includes papers in the handouts distributed during the Student Day hosted by the Colorado Sections on October 5, 2002 at the University of Northern Colorado. Some of the papers have been updated from the 2000 edition, others have not. The oral origin of the papers is obvious and generally makes them easier to read.

Responses to an inquiry to AIPG student members sent out in early 2002 suggested that students generally find the contained information useful. We hope it continues to be so.

Steal Their Lunch Money

Duane A. Carey, CPG-10305

There are only two types of companies in the midst of a recession. The weak ones wither and die. The strong ones gobble up market share. Which one are you, and what will you do about it? If the history of the last 10 recessions since World War II is any guide, then around half a million business will fail in the next year or two as this recession develops. You'll have to work hard and smart to avoid being one of those statistics.

Technically, a recession is defined as two consecutive quarters of negative growth in GDP (gross domestic product). The first two quarters of 2008 showed positive growth in GDP, and the third quarter showed a very small decline at 0.3%. So at the time of this writing (late November 2008), after two years of the media carping about our economy being in recession, we're still not there. But I think we will be by the time you read this in early 2009 and the fourth-quarter numbers are released. How do I know? It's not because of severe declines in the housing market, massive bank failures, or cash-hemorrhaging in the American auto industry. No, the surest determinant of a recession is when Kraft Foods starts aggressively advertising Velveeta on the Food Network as a viable alternative to cheddar cheese, at half the price.

Velveeta has been around since the early 1900s and has been successful because of its nutritional value, cheddar-like taste, creaminess, and meltability. Indeed, there are few among us who haven't had a Velveeta-based dip with chips at a Super Bowl party. My mom used it for mac-and-cheese when I was growing up, and I liked eating it on Saltines. It has always made sense to see Kraft advertising it in the coupon inserts in the Sunday newspaper or in an ad in Women's Day, but on the Food Network? No, this channel is for true "foodies", people who know words such as ragout and confit, and make dishes that require more than a quick nuking in the microwave. So if a giant like Kraft Foods decides to spend millions on targeting this demographic with Velveeta because it's a couple of bucks cheaper than real cheese, you know that a period of extreme penny-pinching is upon us.

There's a lesson in this for all of us. Do you sell a product or service that is less costly and can serve as a substitute for more expensive products or services? If so, now is the time to move them to the forefront of your offerings and aggressively point out their value proposition.

Opportunities Abound

As with all down markets, this one is a buying opportunity. Just as depressed real-estate markets provide an opportunity to buy land at low prices, this recession will provide many buying opportunities for you. *Employers:* if you've had your eye on a competitor's top employee, now may be the time to entice him with the promise of stability if you see the other firm faltering. *Growth:* similarly, if you've considered expansion through acquisition, now is the time to pick up another firm on the cheap. *Market share:* as other firms struggle to meet client and customer demands because of diminished staff or other resources, now is the time to swoop in, better serve those clients, and win their business. *Equipment:* all equipment will be more affordable and suppliers will be more willing to negotiate terms. *Office space:* landlords will be sweating over the next couple of years as office space becomes increasingly hard to fill; take the opportunity to renegotiate your lease, upgrade to larger space for the same amount of rent, or redesign the interior.

Above all, the economic downturn is an opportunity to take a closer look at your business. It's a chance to innovate; it forces you to find better ways to do every aspect of your business. What break-through approach will you identify – because you have to, because your survival depends on it?

Which of your product/service offerings are low-profit, or worse yet, no-profit? Identify them now and either eliminate or minimize them. Economic downturns are no time to engage in activities that do not support the bottom line. Similarly, which employees are not cutting it? Now is the perfect time for them to go. No one likes to fire or lay-off employees, but now is the time that you must if they're not contributing more than their cost. Jack Welch, the famous ex-CEO of General Electric, had a policy of periodically removing the bottom 5% of performers, regardless of business conditions, to keep the workforce lean. That's probably a bit hardcore for most of us, but it highlights the importance of not letting a small group of employees drag down the company.

Have you thought about reducing your price to be more competitive? Don't do it. If anything, maintain the price, but add value. Once you start dropping the price, it's often the beginning of the end.

Finally, whatever you do, don't stop marketing your business. If you do a lot of advertising, don't stop. Just evaluate it to determine where you get the best bang for your buck. If the bulk of your marketing is public relations or client and referral-source relations, keep up or increase those approaches.

McGraw-Hill Research analyzed 600 companies from 1980-1985, including the recession years of 1981-1982. The results showed that business-to-business companies who maintained or increased their advertising during the recession averaged significantly higher sales growth than those who eliminated or decreased advertising. These results applied both during the recession and for the following three years. By 1985, sales at those companies who were aggressive with their recession advertising had increased 256%. The companies who cut their advertising during the recession were up just 19% by 1985. In other words, the former significantly gained market share, while the latter withered

and probably died. These results are a stark demonstration of the importance of being aggressive during a downturn.

You don't have to steal anyone's lunch money, of course, that was just my gratuitous attempt to get your attention. But you do have to understand that the strong will survive and competitors will be coming after you, your clients, and even your employees. You'd better be ready. It's going to be a rough ride.

Duane Carey is President of IMPACT Marketing & Public Relations in Columbia, Maryland. He was a consulting hydrogeologist for 11 years prior to launching a marketing consulting firm in 2003. He earned his MBA at Johns Hopkins University (JHU), and is a Certified Professional Geologist (#10305) and past President of the Capitol Section of AIPG. In late 2005, he took over the helm of IMPACT, which was founded in 1990 by one of his professors at JHU. He can be reached at 410-312-0081 or duane@MilkYourMarketing.com

Advice to Students

EFFECTIVE COMMUNICATION

L. A. Cerrillo, CPG 02763

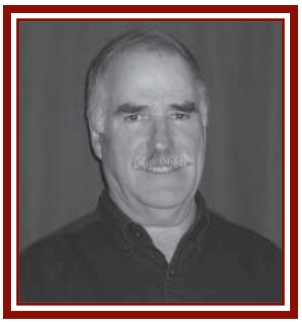
As you advance in your career you will increasingly come into contact with a greater variety of people; not only within your own organization, but with those of other cultures. It therefore behooves you to take advantage of every opportunity, both while in school and out, to learn good communication skills. Whether you are meeting one-on-one or doing a presentation to a large audience, how you come across may be the difference in a successful project or not.

This leads us to another aspect of communication, and that is one resulting in conflict. We are well aware that when two or more people get together in the work place, there is potential for conflict. Not all conflict is bad. Projects can be improved by constructive conflict. Unfortunately, too much of the time what starts out as conflict that may improve a project, ends up being detrimental. This occurs because our communication skills are not what they could be to prevent such outcomes.

Now is the time early in your career to take speech courses, negotiation training, and conflict management training. Practice on a daily basis within your circle of friends, and within your respective professional organizations constructive communication. Learn to avoid conflict provoking words, such as you, never, always, whatever, and similar expressions. Learn to be a good listener. Truly attune to understand what the other person is saying and do not be shy to query for clarification when you do not. Remember the old adage that the only dumb question is the one not asked.

A final thought from a chap "down under", Australia, "What other people do or say is their stuff, how you respond or not is your stuff." Phil Evans.

Make it a great day!



First, Characterize the Setting

William J. Stone

After a forest fire swept across a large research facility, the ground surface in many watersheds was baked and runoff was enhanced. For example, the estimated post-fire discharge of one event in one stream was 840 cfs, dwarfing the pre-fire maximum of 0.3 cfs. Some of the watercourses contained contaminants from historic dumping practices at the facility. In most cases, contaminants were bound to sediments in the alluvium and not water-soluble. But there was concern that such high runoff would flush the contaminant-laden sediment itself off the property and onto adjacent Indian land.

In response to this concern, government engineers built a porous cobble-and-mesh dam across one of the more contaminated streams just upstream of where it flowed across the facility boundary. The idea was that this gabion would reduce the stream's flow velocity and permit settling of sediment upstream of the structure. Ponding would only be temporary since the dam was porous. Sediment would eventually build up, but it could be periodically harvested for appropriate disposal.

For this to work, the settling pond had to be fairly large and its floor had to be relatively flat. So alluvium was scraped away along the narrow channel floor to level the pond area. However, during this process, the dozer struck several mounds of basalt. It was decided that these could be drilled and blasted to facilitate leveling. But when the neighboring Indian village learned of these plans, they pointed out that there were sacred sites in the adjacent bluffs and they strongly objected to any use of explosives. So, the blast holes had to be filled with cement and the final size of the flat portion of the settling pond was reduced considerably.

All this could have been avoided if they had simply first considered the setting. The presence of basalt should not have been a surprise. For one thing, it crops out everywhere. Ignoring that, there were nearby water-supply and monitoring wells. The logs of these wells would have been instructive. The geology of the area has been extensively studied and numerous reports exist. There was apparently no literature search and neither these reports nor the well logs were reviewed. Furthermore, facility geologists would have been glad to discuss probable conditions at the site. No one was consulted. Tip: ignorance is not always bliss; don't fail to do your "homework."

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). He may be contacted at wstone04@gmail.com.

Students....

Watch for Part II of the AIPG Student Issue in the March/April 2008 *TPG*

Send AIPG an article for the next student issue.

Email your article to aipg@aipg.org

Answers:

1. The answer is "a" or "pyrolusite" (MnO_2) and the element is Mn or manganese. This element gives amethyst its color.

   Pitchblende (U_3O_8) is an ore of uranium. Asides from constituting a potentially important energy source and its utilization in military applications, uranium ore can be used as a colorant in uranium glass producing lemon-yellow and red-orange hues.

   Cinnabar (HgS) is a sulfide of mercury. This important element is used in barometers and thermometers, as a liquid contact material in electrical switches, in certain electrical batteries, as an electrode in the production of chlorine and in the development of "amalgam" for uses in dentistry. Medical uses include the manufacturing of purgatives and disinfectants. Mercury is also used in the development of insecticides and rat poison.

2. The answer is choice "c" or "Caucasus Mountains".

   The axis of the "Greater Caucasus" extends along the border of Russia with Georgia and Azerbaijan. The "Lesser Caucasus" mountains are largely volcanic in origin and run parallel to the "Greater Caucasus" at a distance of about 100 kilometers to the south.

   The Carpathian Mountains consist of an arcuate range extending from the Czech Republic eastward along the Polish-Slovakian border into southwestern Ukraine and Romania. These mountains are the result of the Alpine orogenic episode and are structurally complex consisting of a series of ranges (the outer flysch, central crystalline and inner volcanic). The outer range is characterized by folds, overthrusts and nappes, with the inner range being composed of young, Tertiary, volcanic rocks.

   The Grampian Mountains are one of the major ranges in Scotland and occupy a large portion of the Scottish Highlands.

3. The answer is choice "b" or "rudistids". These pelecypods became quite prolific in the Cretaceous Period, after which they became extinct.

   "Turritella" is a genus of marine gastropods ranging from Cretaceous to recent periods.

   "Globotruncana" is a foraminifera.

4. The answer is choice "b" or Ph = 49 kN/m^2 and Pah = 172.18 kN/m of wall. The proof follows:

Ka = Ph/Pv
Ph = Ka Pv
Pv =γZ
Ph = Ka γ Z
Ph = (0.406)(17.31)(7) = 49.195 kN/m^2.

To calculate the horizontal component of the active thrust (Pah) acting along the entire wall, we must integrate:
Pah = $\int$ Ka γ Z dz (from 0 to H)
Pah = Ka γ $\int$ Z dz (from 0 to H)
Pah = ½ Ka γ H^2
Pah = ½ (0.406) (17.31 kN/m^3) (7 m)^2
Pah = 172.18 kN/m of wall.

The Market... is YOURS!

Joseph J. Fiore, Jr., SA-01164

Just four short months from now, roughly one fourth of the population in undergraduate higher education will be donning their caps and gowns to take that long walk into the real world. This is a daunting thought for most, including myself; we really have to be grown-ups for the first time. But we as geoscience students have one huge advantage over our peers. Many of our classmates from other disciplines will be having an especially tough time getting that first job with this economy, and maybe even having to accept employment in another field altogether. We geoscientists, on the other hand, can end up with great jobs, doing what we want, and with great starting salaries; if we play our cards right. In short, the market for graduates entering the geosciences right now is one of the best it has ever been.

The equation is very simple: demand is up, supply is down. If you're a geosciences student and you're reading this, you are a commodity my friend. We could go on and on here about how good of a situation it is for us, but to avoid beating a dead horse we won't. Go on the AIPG website and track down the contact info for any of our organization's leadership, regional or national. Shoot them an e-mail, and nearly any one of them will tell you how their companies have difficulty finding grads, and they have to fight over the ones there are. So the bottom line is that you're going into a great situation, whether you know it or not, and whether you are graduating this year or not.

Going into such a great job market, there are luxuries available to us that there aren't in other disciplines, and haven't been around historically for us either. Even so, you can do well to guarantee that you end up in the best employment situation for yourself by looking at the big picture and believing in the value you bring to the companies you are looking to work for. So rather than going for the first job available, take some of these things into consideration when you are pondering the future. All are suggestions from our fellow members, all much wiser individuals than me. It's really all up to you in what you find most important for your work situation, but if you consider these things in your decision it may help you out!

As you know by now, there are many disciplines and industries within geoscience in which you may find yourself employed before too long. For those underclassmen that may not be aware of the options available, the most common industries for new graduates in the geosciences are: petroleum, mining and mineral resources, water supply, environmental consulting, or with any of the many government agencies dealing in our discipline. In many of these fields, you'll be using the same skills you've been learning in school, for instance you'll be doing a lot of hydro dealing with water but also in consulting. Then depending on where you work, you'll also develop an individual skill set unique to your profession. So, there are different things to do and learn in each field. Contact AIPG and ask around if you'd like to know more or get in touch with somebody who works in each field. But again, obviously you want to work in a field which interests you the most and that you most enjoy, so be looking at what you enjoyed most in class.

Another important consideration is location. Are you happy where you are now? Are you planning to move? What do you ideally want in a home base? These are the same questions you asked yourself a few years ago when you applied to school in the first place, but now it's the real deal. There's no definite cutoff point like that at the end of your studies, so unless you have a long term plan you're probably looking at where you will reside for at least a few years. Keep in mind that different regions support their own industries. For instance, they don't do much drilling for oil here in Beantown, but there's plenty of consulting work. Likewise the middle of New Mexico lacks the volume of work from cleaning up old industrial revolution sites, but supports plenty of work in mining operations. So where you'd like to be located is inherently a big piece of what you're job search shapes up like.

Every company operates differently. I recently had a conversation with one of AIPG's leaders about the culture of his company, being drastically different than that of another. The work environment is another huge part of a job search. Some companies are more laid back than others, some are more rigid, every one has its' own culture. So ideally you'll find one that matches with your vision of a workplace. The last of the big things is the most obvious that you should consider, your salary. The same as with regional distribution, different industries carry different starting salaries, as do different regions. But in general, you should be able to do well just based on the simple supply and demand issue today. Some geologists had even mentioned their companies having to dock pay for senior employees to afford recent graduates. That's obviously not a good thing, but the point is that starting pay is solid right now compared to where it has been, and in large part compared to many of the disciplines our classmates are going into.

For many of us, this is going to be our first real experience as a professional geologist. So everything that this organization stands for, and everything it has to offer, applies to us now as members more than ever before. Keep in mind that this organization exists to foster a strong professional association between geoscientists, and to act as a resource. As you begin your job search, check out the options and resources that AIPG offers specifically for this: job postings, reflections on geoscience careers, and guides to some of the projects you may be working on very soon in your new

job. Beyond that, almost any member is happy to help out with whatever they can for a young geoscientist, so take advantage of the human resources you have available to you. Get in touch with your local chapter and ask around to find somebody you can speak with. Probably any questions you have about the professional world, the various industries we work in, or anything really, can be answered easily and happily by one of our members. Don't be afraid to ask; all the experiences I've had in this organization tell me that everybody is really happy and eager to help.

Any way you cut it, the factors are the same in approaching a job hunt, and they're all related; so look at them any way you want. Whatever combination of these big things works best for you, that is the right job for you. The whole point of going through this is to say, we have the luxury of being a little picky! Not too crazy, but the jobs are out there. So if we do our homework and research the scene, we should be able to wind up in really good shape come graduation. Good luck to everybody graduating this year, and remember to utilize what AIPG can do for you to help this along.

Joey is a Senior at Northeastern University and the former Student Body President.

START AN AIPG STUDENT CHAPTER TODAY!

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

Earth Science Education

Anna Duzs-Moore, CPG-10990

It is a bit late, but I finally decided to answer your call for papers. I would like to write about a topic dear to my heart: Earth Science Education. Although I am gainfully employed, in my spare time I am pursuing an Ed. D. degree, finally in Earth Science Education.

There is never a better time to discuss earth science education than during Earth Science Week. I am working part-time on a Doctor of Education degree in earth science education. I am a mineralogist by training, and employed as a cement chemist in the transportation industry. However, it is becoming my mission to enhance earth science in Baltimore's K-12 education system, so that students are exposed to thinking about the Earth around and beneath them.

Earth science education has become a widely discussed topic of late. More and more university departments are changing their names, and hence the focus of their curriculum, from geology to earth science. This mirrors the fact that geology has expanded its scope, and we are looking at the Earth as a system, not just the rocks themselves, but their interaction with the atmosphere, hydrosphere and the biota. We are now talking about earth systems science, and no longer just geology.

Our youngsters should get a broad exposure to earth science, and a practical one. The more we let them interact with nature, the more they will like to learn about it. Children are exposed to "dirt" at a young age, when they scratch or build castles in the sand. We need to emphasize earth science education into the K-12 curriculum in Baltimore city schools in order to familiarize pupils with their natural environment. It is very important to introduce Earth Science early, because it exposes kids to nature, and allows them the opportunity to observe, and learn to come to meaningful conclusions. It teaches them how to work with groups, and how to work independently, to evaluate what they observed, and to communicate their observations. Moreover, it allows them to experience nature as a system.

Geology is taught at Morgan State University in the Department of Physics, and recently a revival is taking place under a NASA grant. An NAFP (NASA's Administrator Fellowship Program) fellow, a Morgan graduate who is now a NASA employee, is assisting in the establishment of a Geo-space science area of concentration.

My involvement in this program will be to help develop a K-12 Earth Science outreach program for the Baltimore City School System and to establish a mineral museum at Morgan State University, which will be a first for a historically black university. We are looking forward to getting the museum up and running. It will greatly facilitate learning for students not just in geology, but also in every discipline related to material sciences. The deep understanding of material structure that originates from mineralogy will permeate their thinking process and facilitate critical thinking from the mineral shapes to the view of minerals under the electron microscope. It is pertinent for future generations of scientists to be familiar with earth materials at the structural level.

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Anna has a masters degree in geology, and is working as a cement chemist for the State of Maryland. She attends Morgan State University. She is part of the K-12 outreach sponsored by the Physics Department in Earth Science education.

Students and Recent Graduates – How to become a Valuable Employee!

Robert Carvalho, CPG-10588
Heather Martin

Students, recent graduates, and those new to the workplace are often surprised at how little school prepares them for the actual tasks associated with the office and field environments.

While this article cannot cover everything, it will provide general advice for those new to the workplace, or just back from receiving a new degree. It will give you input from both a young professional, and a professional who has also been a business owner for many years. The article will highlight what an employer looks for in an ideal employee, and also things the authors have learned in their careers.

First Things First

Showing up on time, dressing appropriately and being willing to support the team are characteristics that most employers hope for in an employee.

For recent graduates who are new to the workplace, and in particular the environmental industry and construction fields, the concept of "appropriate dress" is very different than that of a banker.

It is always important to dress for the role you are playing. If you are going to a seminar, networking event, or other professional environmental, a suit is recommended, or at least business-casual attire.

Young EAI employees dressed appropriately for a trade show.

When new hires are asked to go to a jobsite, they have to wear the appropriate attire for that condition as well. Hard hats, long pants, and steel-toed boots are critical. Ideally, if the company provides shirts with their logo, one should wear a company shirt or jacket in the field in order to identify you on site. These are the minimum criteria for both safety and professionalism on a construction or remediation site.

EAI employees dressed appropriately for construction work at a former chemical manufacturing site.

In addition, some sites will require the appropriate picture I.D. to be worn at all times, in addition to a safety vest and goggles. Hazardous sites will require a more stringent level of Personal Protective Equipment (PPE), which should be reviewed in your company safety manual and by your supervisor.

Work Ethic

Showing up diligently and on time is a simple way to make a big impact, but this will probably not be enough to please your employer or help you move up in the company.

To become very valuable to the company, and grow personally and professionally, one must also have a solid work ethic. This includes an attentive approach to deadlines, especially when they involve not just your boss, but also his boss – the client. It is not acceptable to constantly miss deadlines when clients are expecting reports or other items from you. Managing your workload and deadlines without having to be micromanaged will make you a favorite.

This will require you to keep track of your deliverables and "to-do" items. Keeping a daily or weekly list of priorities and deadlines can help you organize your thoughts and focus on items that are critical. Good time management will make your boss happy, and will keep you organized and focused.

Basic ethics are also very important. If you are in a consulting field where you are required to keep track of your billable hours, it is important that this become a serious part of your work week. It is not appropriate to bill the client or the employer excessively, or for hours where you were doing something personal, such as shopping or running an errand. Being fair to your employer and honest about how you use your time will definitely pay off in the long run. Your honesty in one area of your work will naturally make your character seem more desirable than someone who will take a lunch on company time. In the short run it may seem okay, but in the long run you will lose your good reputation. Whether business owner or employee, your reputation is all you have.

Willingness to Learn

Oftentimes, one is hired to provide a certain service such as asbestos surveys. You become comfortable with the

company culture and procedure, the clients, and the deliverables. But then, the company finds that site investigations are a potentially profitable arena, and they ask you to attend a seminar, and then go to a site to learn first hand about the work.

What do you do? Well, to grow professionally and personally, you should be grateful for the opportunity to learn diverse skills. They make you more valuable to your current employer, and they make you more valuable, period. When you extend beyond your comfort zone, you are pushing yourself personally. But when done in the context of work, you create a new work history that will travel with you wherever you go. Employers appreciate those who are willing to do whatever it takes to help make a company successful. And the more diverse, successful projects you work on, the more valuable you will be to any employer.

The key is to always be willing to learn, grow and push beyond your comfort zone. It probably won't feel easy, but in the long run it will be rewarding and will make you more marketable.

Anticipate Needs & Communicate Clearly, Focus on what is Relevant & Deliver Results

Once you are comfortable in a new workplace on a basic level, it is important that your time is focused on the most critical tasks and relevant work. Your priorities should be your bosses' priorities. Always be responsive to their requests and treat them with a sense of urgency. Use your daily "to-do" list in order to prioritize your bosses' requests with other things that need to get accomplished that day and week.

Update your boss or Manager by telling concisely about the status of critical items, including relevant information. Make your discussions concise by focusing on what is critical information to your boss, not just all the information about one topic that you can think of.

If you are speaking of a particular project, name the project, the name and company of the client you are working for, and what the critical issue is. Are you updating your bosses or do you need input from them? Make that clear. Enunciate your words, speak boldly and clearly, and more than anything, decide to become a great communicator that makes your bosses' life easier.

It will always help you to do more than is expected of you by your pay or job title. Always think ahead and anticipate needs of your Manager and clients. By staying ahead of them, you make their life easier, and yourself more important to business operations.

Basic Knowledge

When you are knew to a workplace or profession, it is understandable that it will take you a certain amount of time to understand protocol and have the basic knowledge to speak to clients about technical issues.

But once you have been with a company a while, there is an expectation that you have a basic, fundamental understanding of the work you are asked to do. Knowing how to prepare a Phase I Report is critical if that is one of the things you are expected to do, for example. Paying attention to detail and getting the report to the client on time or ahead of schedule is also very valuable and adds on to your basic knowledge of the task.

Always look to expand your knowledge of your field and industry, and ask questions to increase your ability with tasks you are already comfortable with. The more you know, the more you can try knew things, and again, become a valuable asset to your company (and yourself).

In addition, new graduates should come to an employer with certain fundamental skills such as basic math, reading, writing and communication skills. Don't underestimate the value of these skills. And if you know you are weak in one area, take it upon yourself to sharpen your skills.

Enthusiasm

Never underestimate the value of enthusiasm. While having basic knowledge in your field is important, enthusiasm is even more infectious. Clients enjoy working with someone who loves their work and is excited to help them. Co-workers enjoy being around someone who is upbeat. And your boss will appreciate enthusiasm for what it brings to the office and to the clients.

Keep in mind that it is up to you to decide that you want to be great at what you do. Be enthusiastic, push yourself to learn knew things and become better, and you will be surprised at how far you and your career will grow.

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

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

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

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

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

Applicants for Certified Professional Geologist

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	As of 12/11/07	As of 12/12/08
CPG / Active	3,658	3,634
CPG/Non-Practicing	440	426
Member	830	945
Associate Mem.	24	21
Student Adjunct	489	400
Honorary	23	21
Corporate Member	3	3
TOTALS	5,467	5,450

AIPG 2008 Annual Meeting Flagstaff, Arizona

Barbara H. Murphy RG, CPG-06203
AIPG Arizona Section President 2008
General Chairperson AIPG/AHS/3rd IPGC Conference

The 2008 annual meeting was a great success. We had nearly 400 geologists and hydrologists from throughout the United States, Canada, and Europe. AIPG's 45th Annual Meeting was held in Flagstaff, Arizona from September 18th through 24th in conjunction with the Arizona Hydrological Society's (AHS) 21st Annual Symposium and the 3rd International Professional Geology Conference (3rdIPGC). The AIPG/AHS/3rdIPGC Symposium was organized by a committee of members from AIPG's Arizona Section and AIPG headquarters, AHS, and 3rdIPGC. Barbara Murphy (CPG-6203), was the general chairperson. The organizing committee was co-chaired by Dr. David Best (AIPG MEM-0883), Professor of Geology at Northern Arizona University (NAU), for AIPG, and Dr. Aregai Tecle, Professor of Hydrology at NAU, for AHS. Dr. Robert Font (CPG-3953), Geoscience Data Management, for AIPG, was the chairperson of the 3rdIPGC.

The many roles of geoscientists led to the development of the theme for this conference: *Changing Waterscapes and Water Ethics for the 21st Century and the 3rdIPGC theme of Global Geoscience Practice, Standards, Ethics, and Accountability.* The conference included a broad range of topics for the presentations of technical talks and poster sessions such as: artificial recharge and restoration, forest watershed management, GIS resources, groundwater issues and ethics, human vs. ecosystem needs, land subsidence, professional ethics, Southwest water policy issues, surface water – groundwater issues, urban and rural water policies and practices, water law, water quality, water supply vs. public policy, and water ethics in a changing global climate. The concurrent 3rdIPGC technical sessions included: Training, Credentials, and Continuing Professional Development of the Global Professional Geoscientist, Professional Ethics and the Global Geoscientist and Expanding International Influence and Reach; Overcoming Challenges and Mapping Successful Strategies.

We had two days of technical sessions, six pre- and post- conference informative and instructional workshops on topics such as technical writing, GIS, water education for teachers, and water law and 12 field trip opportunities to explore the geology and enjoy the scenery of northern Arizona. The field trips included several to the Grand Canyon, the San Francisco volcanic field, Fossil Creek, the red rocks of Sedona, Jerome mining district, Montezuma's Castle and Montezuma's Well, Meteor Crater, Sunset Crater and Wupatki, and Flagstaff water resources.

The welcoming reception and technical sessions were held at the new High Country Conference Center on the NAU campus. This state-of-the-art facility offered spacious meeting rooms and reception areas with spectacular views of the San Francisco Peaks with the fall colors just turning on the mountain slopes.

The conference officially started with a Welcome Reception on Sunday evening at the High Country Conference Center. It was a great opportunity to see old friends and meet other geologists and hydrologists from throughout the US, Canada, and Europe. The food at the conference center was delicious and everyone had a great time visiting with other professionals and the various exhibitors at the conference.

Monday morning's technical sessions were opened with welcoming remarks and acknowledgements from Barbara Murphy and Robert Font. The mayor of Flagstaff, Sara Presler, offered a gracious welcome to the city and spoke of the importance of geologists and water resources in the Flagstaff area. The plenary talk was given by Dr. Soroosh Sorooshian (University of California – Irvine) on water resources engineering, hydrometeorology and hydroclimate modeling. His very timely talk How Predictable is the Climate System: Droughts, Floods, and Extreme Events? was related to the recently-published Intergovernmental Panel on Climate Change report.

After a full day of technical sessions on Monday, we enjoyed an evening of Hopi hoop dance and flute music followed by a delicious dinner at the Radisson Hotel. Derrick Suwaima Davis, four time world champion Indian hoop dancer, treated us to his spectacular dancing, native stories, and costumes.

Tuesday was another full day of technical sessions. Our featured speaker at Tuesday's luncheon was renowned Grand Canyon artist, Bruce Aiken. Bruce and his wife and family lived in the canyon at the Roaring Springs residence on Bright Angel Creek for more than thirty years, tending the park's water supply at Roaring Springs, and also capturing the grandeur of the area in paintings. His presentation included photos, videos, and stories of his home and work in the Grand Canyon and his recently published book of Grand Canyon paintings.

The end of the conference was celebrated by Tuesday evening festivities at the Museum of Northern Arizona. The evening included a tour of the museum's paleontological exhibits and Indian cultural art and artifacts. The reception included AIPG's annual awards and recognitions. There was also a lively silent auction to support The AIPG Foundation with minerals, a brass Brunton compass, and other geologic items of interest.

The Flagstaff meeting was a great success. It was a lot of work but the AIPG Arizona section, AIPG headquarters staff, AHS Flagstaff Chapter members, and 3rd IPGC members organized a truly memorable meeting. We also are appreciative of the financial support of our major sponsors, in particular – Clear Creek Associates, Geotemps, and Malcolm Pirnie – and other sponsors and exhibitors whose support helped to make the meeting such a success.

The Third International Professional Geology Conference (3rdIPGC) – A Summary

Robert Font, General Chairman, 3rdIPGC, CPG-03953

The 3rdIPGC was held in Flagstaff, Arizona, on September 21-25, 2008. The AIPG was delighted to have the opportunity to organize and sponsor this important meeting and honored to host a series of distinguished dignitaries from various countries and foreign and domestic organizations. We did our best to give all a taste of our American West and to showcase some of our breathtaking geological features.

The IPGC forums provide us with an opportunity to outline issues affecting the geological profession and professional practice across domestic and international boundaries. The IPGC meetings are also opportunities to exchange ideas on how to solve geoscience-related problems at both regional and global scales.

In regards to the 3rdIPGC, it was our challenge to follow in the tradition of excellence set forth during our previous two meetings, in Spain (2000) and the UK (2004), where our local hosts (El Ilustre Colegio Oficial de Geólogos de Espaňa and The Geological Society of London) performed so admirably.

We selected a truly outstanding geological location to hold this convention and worked hard to make the 3rdIPGC an up-to-the-minute professional gathering with expanded international and domestic participation. A special effort was made to have representatives from as many different disciplines as possible within the field of the geosciences in order to address a variety of professional issues of importance to all.

The American Institute of Professional Geologists (AIPG), The European Federation of Geologists (EFG) and The Canadian Council of Professional Geoscientists (CCPG) continued the tradition to act as perennial co-hosts of the IPGCs. At the 3rdIPGC we were honored to have additional prominent co-hosts, including the following groups:

The National Association of State Boards of Geology (ASBOG), The Division of Professional Affairs of the American Association of Petroleum Geologists (DPA-AAPG), The Association of Women Geoscientists (AWG), The Arizona Hydrological Society (AHS), Northern Arizona University (NAU), International Year of Planet Earth (IYPE), The Association of Environmental and Engineering Geologists (AEG), The Geological Society of America (GSA), The United States Geological Survey (USGS), The Association of Earth Science Editors (AESE) and The American Geological Institute (AGI)

Three basic themes provided the structure for the papers that were presented. These included:

- Training, Credentials and Continuing Professional Development of the Global Professional Geoscientist
- Professional Ethics and the Global Geoscientist; New Horizons in Geology
- Expanding International Influence and Reach; Overcoming Challenges and Mapping Successful Strategies

The discussions were excellent and involved recognized professionals and renowned participants from around the globe.

The subject of "training and continuing professional development of the global professional geoscientist" was addressed specifically in four significant papers, by Dr. Robert Font, Dr. Detlev Doherr, Mr. Bill Siok and Mr. Dave Abbott.

»AIPG's System of Online Instruction - A Portal to Global Geoscience by Robert Font, AIPG, Geoscience Data Management, Plano, TX.

»Interactive Modules of E-Learning - An Example with Google Earth by Detlev Doherr, EFG-Germany.

»The Significance of Continuing Professional Development and Credentials upon Career Opportunities by William Siok, AIPG, Westminster, CO.

»A Review of the CPD Programs Used by Different Professional Groups by David Abbott, AIPG, Denver, CO.

Issues concerning "credentials and the global professional geoscientist" were particularly discussed in six important papers by Mr. Gareth Jones, Dr. Tom Ewing, Mr. Robert Tepel, Mr. Rick Ericksen, Dr. Woody Herrod and Dr. Richard Spruill.

»International Recognition and Cooperation, Professional Qualifications as Passports by Gareth Jones, EFG-Ireland, John Clifford, EFG-Ireland, Christer Åkerman, EFG-Sweden.

»Five Points of Professionalism - Professionalism, Certification and Continuing Development in Energy Resource Geoscience: the AAPG Experience by Thomas Ewing, DPA-AAPG.

»The Practicability and Impracticability of Certification by Robert Tepel, AEG-CSMGB.

»Professional Registration/Licensure in the United States - A Summary by Rick Ericksen, DPA-AAPG.

»The Association of State Boards of Geology (ASBOG) and Geoscience Licensure in the United States by Wilson Herrod, ASBOG.

»The ASBOG Fundamentals of Geology and Practice of Geology Examinations: The Development and Administration of a National Examination by Richard Spruill, ASBOG.

Global and regional issues affecting geoscience practice were highlighted in thirteen key presentations by Dr. Christopher Keane, Mr. Oliver Bonham, Mr. Derek Doyle, Mr. Manuel Regueiro, Ms. Laurie Scheuing, Ms. Isabel Gomez, Mr. Shane McDonald, Mr. Gareth Jones, Mr. Larry Woodfork, Mr. Luis Suarez, Ms. Ruth Allington, Dr. Aydyn Aras and Ms. Dawn Garcia.

»Attitudinal and Economic Realities in a Global Geoscience Workforce by Christopher Keane, AGI.

»The Profession in Canada - A Review and Update by Oliver Bonham, CCPG, Canada.

»Ten Characteristics of Self Regulation Professions by Derek Doyle, APEGBC.

»A World Federation of Professional Geologists: Why the World Needs One by Manuel Regueiro, EFG-ICOG, Spain.

»Strategies to Successfully Recruit and Retain Women Geoscientists by Laurie Scheuing, Mary Anne Holmes, AWG.

»Women in Geology in Spain by Isabel Gomez, ICOG-Spain.

»The Geologist and Cognitive Diversity as a Key to Problem Solving by Shane McDonald, AIPG.

»The GEOTRAINET Programme by Isabel Fernandez, EFG-Spain, Herald Ligtenberg, EFG-The Netherlands, Gareth Jones, EFG-Ireland.

»Information Age, Globalization and Geoscience Enterprise: Opportunities, Challenges and the IYPE Beyond 2009 by Larry Woodfork, AIPG/IYPE.

»Natural Hazards in Land Use Planning: The Spanish Perspective by Luis Suarez, ICOG-Spain.

»The Terrafirma Project by David Norbury, EFG-GeolSoc-UK, presented by Ruth Allington, EFG-GeolSoc-UK.

»The 17 August 1999 Turkey Earthquake, What happened and what have we learned? by Aydyn Aras, GDMRE – Turkey.

»Overview of International Mine Closure Guidelines by Dawn Garcia, AIPG, Tucson, AZ.

Matters concerning "professional ethics and the global geoscientist" were covered in three critical papers by Dr. John Williams, Dr. Chris Mathewson and Mr. Dave Abbott.

»The Association of State Boards of Geology (ASBOG) and Professional Ethics by John Williams, ASBOG.

»Professional Geologist in the Protection of the Public -- Licensure - Ethics - Society by Chris Mathewson, ASBOG.

»Review of International Professional Disciplinary Proceedings: Procedures and Actions Taken by David Abbott, AIPG, Oliver Bonham, CCPG, Don Larking, AusIMM-Australia, John Gustavson, AIPG.

"Energy issues" of great importance to our global needs were reviewed in three noteworthy presentations by Dr. M. B. Kumar, Mr. Doug Kenaley and Mr. Gareth Jones.

»Geology-Based Unitization of Reservoirs in the Petroleum Fields of Louisiana: An Overview by M. B. Kumar, AIPG, Baton Rouge, LA.

»Unconventional Gas Resources - Are We Prepared for the Journey or Have We Already Arrived? by Douglas Kenaley, ExxonMobil.

»Geothermal Energy in Europe: Past, Present and Future by Gareth Jones, EFG-Ireland and Harold Ligtenberg, EFG-The Netherlands.

Geoscience and climate-related themes and student topics regarding the future of the geoscience profession were presented in three vital presentations by Dr. Bruce Broster, Ms. Ashley Coles and Mr. Bob Tepel.

» Climate Change and the Salinization of Potable Water Supplies: A Growing Threat Facing Development in Coastal Areas by Bruce Broster, CCPG.

» Information Flows and Policy: Use of Climate Diagnostics and Cyclone Prediction for Adaptive Water-Resources Management Under Climatic Uncertainty in Western North America by Ashley Coles, University of Arizona, Tucson, AZ.

» An Internet Survey of Scholarships Offered by US Geoscience Professional Organizations and Foundations: Totals, Ranges, Means, Medians, Modes, Models, Motivations, and Disappointment by Robert Tepel, AEG-California State Mining and Geology Board.

Countries represented by authors, speakers and/or delegates included the USA, Canada, Germany, Ireland, The Netherlands, Australia, Spain, UK, Botswana, Nepal, Belgium, Switzerland and Turkey.

The importance of establishing a potential global federation of professional geoscientists was introduced and discussed by Mr. Manuel Reguerio, President of the EFG. A declaration to establish a global framework to address crucial professional matters was signed by President Regueiro (EFG), Mr. Daniel St. Germain, AIPG President, Dr. Bruce Broster, CCPG President, Mr. Luis Suarez, ICOG President (Spain), Mr. Gareth Jones (representing the IGI, Ireland) and Mr. Edmund Nickless (representing the GeolSoc, UK).

Abstracts and papers submitted by the authors as well as condensed vitae of all speakers were published in electronic format as part of the proceedings of the 3rdIPGC.

In addition to the technical sessions, a series of outstanding field trips and social events made the conference a very special venue for all attendees. And yes, we can attest that the Grand Canyon is still there and as beautiful as ever!

At the AIPG we are quite pleased with the results of the 3rdIPGC. We believe that we succeeded in making it a truly memorable experience for all who attended and honored us with their presence. An invitation was extended to our colleagues from the CCPG to host the 4thIPGC in magnificent Canada in 2012.

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Quantitative Geology

C. Victor Chevillon, CPG-11054

As with every other science, the advent of computers is revolutionizing geology, whether we like it or not. Geology, particularly mineral exploration, is a semi-quantitative and descriptive branch of science, often confused with sometimes brilliant art. If you encounter an old, old-school explorationist, and compare the approach, observations, conversation and sketches with what you see and what you are thinking, the source of the confusion will be clear. I'm old and I'm still blown away by what they see and do.

The quantification of geology in my opinion goes far beyond geochemistry, isotopes, radiometric age dates and the like, and into the realm of what we now consider descriptive and observational geology, including cross cutting relationships. An experienced field geologist in the field is considering n+1 variables observed from an experience bank perspective. Not just geologic observations tallied against past observations and outcomes, but applying a systematic pattern-recognition approach of observation and questioning that leads to key outcrops, cross-cutting relationships, ideas and valid hypotheses that stand tests. Like a good fisherman who brings home big fish, a good field geologist is clever with the rocks in their natural settings and brings home geologic controls represented on maps, cross-sections, paragenetic field diagrams, model sketches and the like. These accurate and precise, descriptive documents are the big fish of field geology, particularly if they are reproducible by others on subsequent visits. This routine makes for more predictable geology in the area, so that more accurate geologic projections can be made, and when tested, confirmed.

Pattern recognition is at play big time in excellent field geology. And where there are patterns, there are certainly quantification possibilities.

Before computers, there were just so many variables a human could handle. Geologic maps were constructed on paper, perhaps with at most, several overlays, to capture: the protoliths, the alteration, the key mineralized and mineralizing rocks types, a structural overlay. Together the assemblage of maps document the field relationships and display maximum geologic control on say, a mineralized, fossil hydrothermal system.

With the advent of computers, now n+1 variables can be handled, routinely by the geologist. This is possible with the powerful, cheap personal computers, with reasonably uniform operating systems that have spawned spreadsheets, databases, GIS, GIS field mapping systems and 3D software. This technological capability offers new impetus for the possibility of quantifying descriptive geology.

After all, descriptive field geology in the form of recording geologic properties, including cross cutting relationships, at one point in space at a time, gets the map done. Rocks at each point can also be characterized by a number of other techniques: geophysics, geochemistry, isotope geology, physical properties, spectral reflectance, and so on. Each technique encompasses its own array of variables for the same point. Add up the number of rock properties (variables) that are possible now, and the variable list can quickly get into the hundreds for any one point.

I worked on one data-rich mine exploration program that in the most dense part of the data set included about 374 variables at any one point in space. Each variable is a proxy for the rock at one point. With computers and the right 3D software all the points with all their variables can now be assembled into a "Common Earth Model" in digital space to integrate, query and explore for maximum information control and optimized projections. The Common Earth Model integrates three dimensional (space) and four dimensional (time) information into a single three-dimensional framework that can be queried on the computer. With subset theory, all the variables together, across the virtual Common Earth Model, quantify the rocks, or at most, what is quantified by the data. An early summary of the Common Earth Model approach is provided at *http://www.pdac.ca/pdac/publications/papers/2003/Marquis-paper.pdf* .

Some of today's 3D software can handle n+1 variables and is hungry for more. And query results, can be represented as spatial volumes of positive and negative data correlations for maximum pattern recognition on the screen.

To do such things I use Gocad (formally gOcad) pattern recognition software, developed in the petroleum industry *(http://www.pdgm.com/gocad-base-module/products.aspx)*, and adapted to mining and mineral exploration by Mira Geoscience. The Mira Geoscience website provides additional insight and articles on Common Earth Modeling, an explanation of how the software works, real world examples *(http://www.mira-geoscience.com/)* Gocad enables quantitative consideration and conclusions to be drawn from huge spatial Common Earth datasets. And it is a boon to exploration and the human mind. Gocad runs many of the 3D virtual rooms of the petroleum industry and now, increasingly, the mining industry. And since this powerful software runs on the lowly laptop, which generally is in the truck and out in the field, the possibility of real time 3D data collection and synthesis is getting closer.

But the main point here is the possibility of quantifying field geology to take its rightful place among quantitative earth property data. The science of Geology includes for example, eloquent and proven, rock classification systems to quantify the description and petrogenesis of rocks, in exquisite detail. Yet far too often in practice only very generalized generic terms like quartzite, limestone, rhyolite are used to characterize the rocks. If the applicable, rigorous rock classifications schemes are used, or better yet, quantifided along with the other rock property data in the Common Earth Model approach, descriptive field geology would become much more valuable in the dataset. And the computers and software that lend themselves to

tracking explicit geologic variables could do their work for much better geologic control like never before..

The challenge may lie in converting past geologic knowledge (rock classification schemes in the example) into digital forms that can be recorded with high precision and accuracy, imported into the Common Earth Model and used. There is nothing more frustrating than seeing dramatic variations in multi-element geochemical results and geophysical data down a drill hole logged only as limestone, when the variability of the quantitative data is certainly telling a tale of something else other than limestone in the hole. In this picture, "descriptive geology" is letting the rest of the dataset down .

The ability to now handle n+1 variables in a 3D Common Earth Model computer environment places new demands on geology and responsibilities on the geologist. If these demands are met, descriptive and observational geology will again take their rightful places at the head of the database line, to place the rest of the data in its proper geologic context. Realistic multiple working hypotheses can then be formulated sooner, rather than later. Geology will become a more useful and valuable science, particularly now that we are beginning to rely on it more that ever before on Earth and elsewhere.

From the modern geology student's perspective, to make the quantitative transition that is inevitable, a thorough understanding of basic and fundamental geology is essential; otherwise much will be lost in the digital translation. This is a challenge that will take perhaps a generation, or more likely a compressed generation with the increasing speeds of the processors, cheap memory and improving software. At any rate, these are exciting times with more discovery left ahead of us, than is behind. It won't be easy, but it will be rewarding and open new frontiers. N+1 variables and wanting more to spatially integrate and synthesize in digital 3D space….now that is an amazing world, particularly for geologists and for those who want to find out what geologists know

C. Victor Chevillon, CPG-11054, has 39 field seasons in mineral exploration, mostly in the American West for major companies and some North American experience. He has a B.S.in Geology from Colorado State, and an M.A. in Geology from SUNY at Buffalo. Participated in several major deposit discoveries, one of which was developed into a large scale gold mine. Attracted to the rock/human interface, fundamental geology, new ideas and technology and combining fieldwork with state of the art computer synthesis and integration of exploration data. He has been in the consulting business over the last three years. .

A Stromatolite find in Virginia

Mary Loose DeViney, SA-1226

I was eagerly anticipating a scheduled field trip with the Lynchburg Gem and Mineral Society on Saturday, June 28, 2008 to the Boxley Materials Company Blue Ridge Quarry near Roanoke, Virginia. This trip is always a special one because we are usually treated to light blue selenite and dogtooth calcite in the limestone quarried by Boxley. This quarry is within the folds and faults of the Blue Ridge Thrust Sheet Structure, in the Valley and Ridge Province. The outcrop is most probably the result of carbonate deposition on the passive margin, Cambrian (505-544 Million).

Prior to collecting, we were given the obligatory safety training, after which we were told that on the previous day, an employee moving loose stone had discovered a curiously-shaped rock. Upon calling Boxley's professional geologist, Tom Roller, he suspected it was a stromatolite. He confirmed this with the scientists at the Virginia Museum of Natural History, who also noted that this specimen was the first-ever intact stromatolite head found in Virginia and one of the largest in the world, weighing more than 400 pounds and over five feet in diameter. VMNH dated the fossil at 500 million years old. Boxley, a company that has been a community partner since 1906, donated the fossil to VMNH. As a group, we were given the opportunity to see, touch and photograph the rare stromatolite.

Needless to say, this piqued my interest. This was not a quarry known for many fossils, more for the calcite veins in the limestone, and for purple fluorite.

I asked the quarry foreman where the stromatolite had been uncovered, and he showed me the general location. There was a north facing wall, and because of the recent shot, there was a lot of broken rock that had been moved to the west of that wall.

Remembering the top of the stromatolite to look like the tops of golf balls, I looked down at the base of the north wall, and noticed an approximate 4" area that seemed to fit this description. Using my small chisel to pick at the outside, I continued to remove pieces of limestone, and the top became larger and larger. I finally reached a point where I had exposed about a 36" circle. Once I realized that I had an intact stromatolite head, my heart began to beat with excitement. I was concerned that I might break or crack it while trying to remove it. It was positioned at about 45 degrees, so I could see slightly beneath it. Gently, I removed the piece of limestone capping the head of the stromatolite as a negative cast, and used my Estwing hammer, and a pick to remove it from the darker limestone material beneath it. The darker material may be indicative of more organic matter which would be in keeping with the growth of stromatolites.

When I finally loosened the stromatolite head from the mother rock, it was completely intact with no breaks or cracks. It weighs approximately 125 pounds.

Stromatolites are among the first life forms found, most notably in Precambrian and Cambrian rocks. They are still found today in salty environments, particularly Australia. It seems they develop as blue green algae creates a mat of mucilage to which sediment sticks, and as the algae recolonize the outer surface, the process is repeated, a mound accretes upward, forming the typical stromatolite shape, which is eventually fossilized in limestone.

Because of its completeness of this specimen, the Radford University Museum of Earth Science has expressed interest in obtaining it for its collection.

I am currently a student with the Gemological Institute of America pursuing my Graduate Gemologist Credentials, and concurrently a Graduate Student with Bircham University pursuing my Masters in Mineralology. I am a member of the Gem and Mineral Society of Lynchburg, Virigina.

This stromatolite was found one day after the largest complete head (5 feet in diameter) was found in the same quarry. The largest and first found in Virginia weighed over a ton, and this one was found in the same general location. According to the Virginia Museum for Natural History in Martinsville, VA where the large stromatolite was donated, the fossil dates to 500 million years old.

Stromatolites are among the first life forms found most notably in the Pre-Cambrian and in the Cambrian. They are still found today in salty environments, in Australia. It seems they develop by cyanobacteria, blue green algae that created a mat of mucilage that surrounds the cynobacteria. The head looks like many golf balls forming a 1 meter oval fossil. The dimpling on the golf ball is very close to the dimpling on the stromatolite. Over time, the calcium carbonate precipitated and the fossil was trapped in the limestone.

When I uncovered the fossil it was still in its limestone casing which provided a negative mold. The material beneath the fossil was darker in color than the head of the stromatolite, possibly indicating that the material beneath was more organic in nature.

Sub-Slab Depressurization – A Necessary Part of the Final Remedy

Eric A. Weinstock, CPG-07391

Key words: Soil Vapor, Soil Vapor Extraction, Sub-Slab Depressurization, Perchloroethene, Petroleum, Dry Cleaner, Gas Station, Remediation, Site Redevelopment

Introduction

Soil vapor monitoring and abatement have become a hot topic in the environmental field during the past few years. As a result, Sub-Slab Depressurization or "SSD" systems are now playing a key role in site closure activities. This article presents two case histories where SSD systems were implemented as the Final Remedy. The first case history is a dry cleaner remediation site and the second is a former gas station redevelopment site – both located in Brooklyn, New York.

At the dry cleaner site, an Air Sparging /Soil Vapor Extraction (AS/SVE) system operated until its termination criteria were achieved. To address remnant, low-level Perchloroethene (a.k.a. PCE or "Perc") vapors, the SVE wells (located in the basement of the dry cleaner) were converted into SSD wells by employing the use of high-flow, low-vacuum fans. This process was formalized in a Site Management Plan for the property.

The former gas station property is being converted into a mixed use residential/commercial building. The new development will consist of: a subsurface parking garage; ground level commercial units; and nine floors of residential units. Due to the presence of petroleum vapors in the subsurface soil, an SSD system was

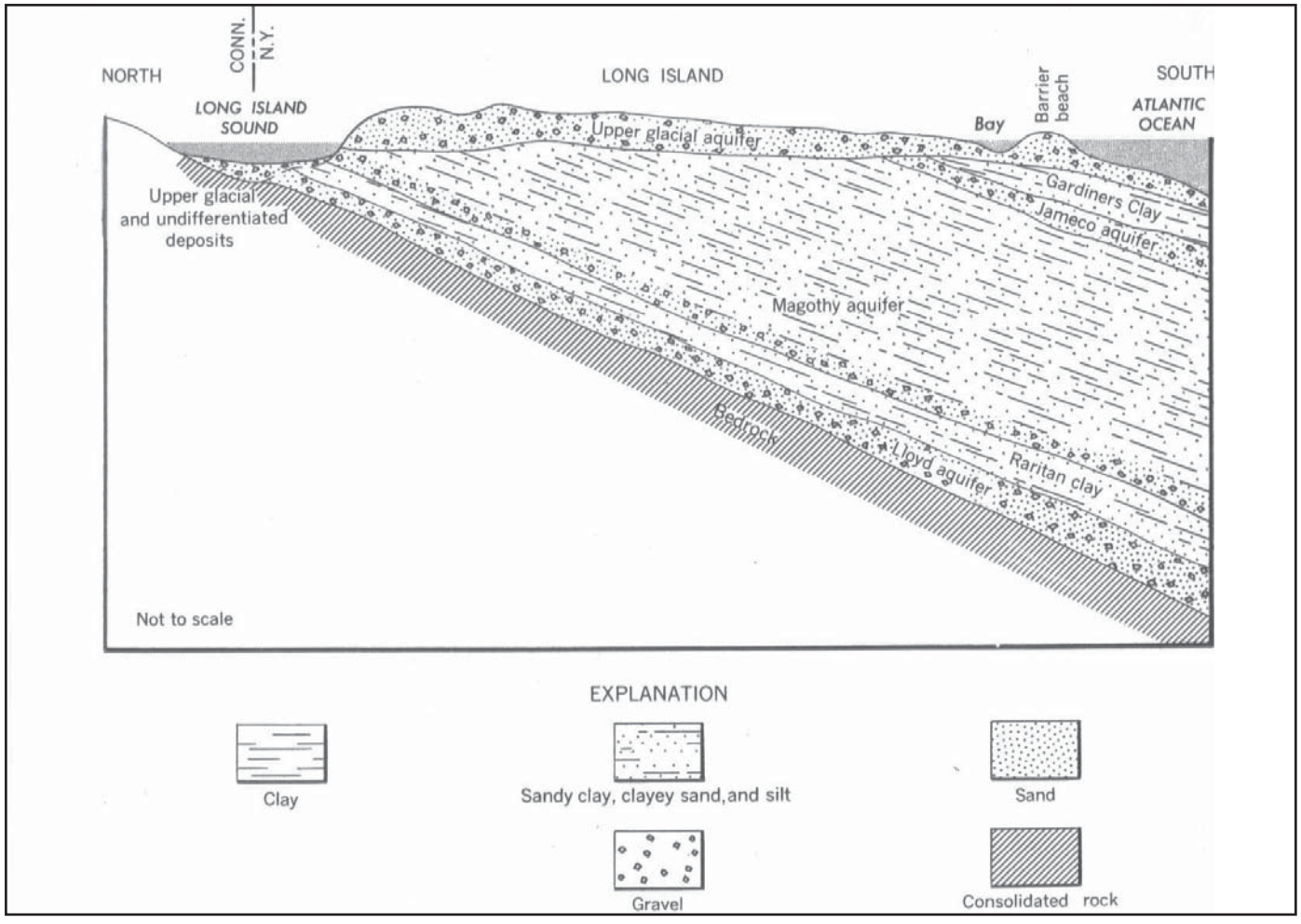

Figure 1. Generalized Geologic Cross-Section of Long Island, New York. McClymonds and Franke, 1972.

incorporated into the design of the new structure's foundation.

Hydrogeology of Long Island

The Borough of Brooklyn comprises the western most portion of Long Island, the majority of which is covered by the highly permeable sands and gravels of the Pleistocene Age Upper Glacial Formation. This Formation varies in thickness, and is generally not used for water supply purposes (except for areas in eastern Suffolk County). A generalized geologic cross-section of Long Island, New York is included as Figure 1. The Upper Glacial Formation unconformably overlies the Cretaceous Magothy Formation, the principal water supply aquifer for the southeastern portion of the Borough of Queens, most of Nassau County, and Suffolk County, with many wells on the order of 400 to 600 feet in depth. The aquifers below the Borough of Brooklyn are no longer used as a source of potable water. The upper portion of the Magothy Formation is generally of low to moderate permeability and overlies highly permeable sands and gravels in the basal section of this geologic unit. The Magothy Formation is, in turn, underlain by the Cretaceous Raritan Formation. The Raritan Formation is composed of the upper Raritan Clay, a regional confining layer that overlies the more permeable Lloyd Sand. The Lloyd Sand was deposited directly upon Precambrian crystalline bedrock (McClymonds and Franke, 1972).

Case History Number One

The dry cleaning property is an active facility situated in a multi-use shopping center located in the Flatlands section of Brooklyn. The shopping center was the subject of a Phase I and Phase II Environmental Site Assessment for refinancing purposes during the summer of 2001. During the course of the Phase II subsurface investigation, a release of Perchloroethene was detected in the soils underlying the boiler room section of the basement.

Based on the results of the Phase II investigation, the owner of the shopping center entered into a Voluntary Cleanup Program (VCP) agreement with the New York State Department of Environmental Conservation (NYSDEC). A Site Investigation including soil, soil vapor and groundwater sampling was performed to define the nature and extent of contamination at the property. This was followed by the development and implementation of a Remediation Work Plan.

Case History One Remedial Action Plan

The approved cleanup program for the site included the installation and operation of:

- a 4-point Soil Vapor Extraction (SVE) system;
- a 3-point Air Sparging (AS) system; and,
- localized chemical oxidation treatments using permanganate.

The combined AS/SVE system was installed, and the system was placed into operation in March 2005. The AS portion of the system remained in operation for one year as the groundwater quality below the property improved. In addition to the AS system, localized "hot spots" of PCE in the groundwater (located outside the sparge radius of the AS system) were treated with permanganate injections applied using a Geoprobe™. The groundwater standard for PCE in New York State is 5 ug/L. While the AS portion of the system was turned off, the SVE system remained in operation to control the migration of the remnant, low-level PCE vapors.

While the operation of the AS system was terminated, the SVE system -- which included carbon units and the operation of an energy-consuming 4½ - horsepower blower -- was modified. A SSD pilot test was performed following the New York State Department of Health's (NYSDOH) October 2006 guidance document (NYSDOH, October 2006). A vacuum radius of approximately 50 feet was measured during the pilot test. Based on the results of the pilot test, the blower and carbon units were disconnected in the fall of 2006. The four existing vapor extraction wells were then equipped with individual energy-efficient vapor abatement fans. The fans selected create negative pressure below the basement floor and prevent sub-slab vapors from migrating into the building -- at a much lower operating expense than the initial SVE blower. This network of fans comprises the current SSD system and prevents remnant, low-level PCE vapors from entering the inhabited areas of the shopping center. A photograph of one of the fans is included as Figure 2.

Figure 2. Typical Sub-Slab Depressurization Fan and Vacuum Gauge, Case History Number 1.

A Site Management Plan or "SMP" was then prepared for the project. The SMP described the configuration of the SSD fan network and listed it as an engineering control for the property. To assure the proper operation of the fans in the future, the SMP requires annual indoor air testing in the basement and an annual inspection of the fans by a Professional Engineer or Qualified Environmental Professional.

The SSD fans must remain in operation until their termination criteria, as described in the SMP, are achieved. The termination criteria for the SSD fans comply with Indoor Air Matrix 2 of the NYSDOH's Guidance document. In summary, the following conditions must be demonstrated:

- The indoor air concentrations of PCE in the basement of the cleaners and the two adjoining units are less than 3 ug/m^3; and,
- The sub-slab soil vapor concentration of PCE below the cleaners is less than 100 ug/m^3.

This must be demonstrated during the winter heating season, to represent the worse case scenario, and after the SSD system has been turned off for a period of 30 days.

By converting the SVE system to an SSD system, the property owner was able to greatly reduce the long-term operating expense at the site. More importantly, the Site Management Plan also includes a mechanism to allow for the future termination or shut down of the SSD fans.

Case History Number Two

The gas station property is a 0.35-acre rectangular-shaped lot located in the Borough of Brooklyn, and is part of

the Atlantic Terminal Urban Renewal Area. The proposed new construction consists of a subsurface parking garage; ground level commercial units; and nine floors of residential units. A second-floor courtyard will provide 3,000 square feet of open space.

This site is currently vacant. However, historical records indicate that it was utilized for automotive fuel storage and dispensing purposes since as early as 1938. The historical presence of underground storage tanks (USTs) has lead to various environmental investigations. A total of seven former USTs were removed in 2001. The work performed to date indicated that subsurface soils in the vicinity of seven USTs contained elevated levels of Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs). Investigation and remediation of the remaining petroleum is being addressed under the review and regulatory oversight of the New York State Department of Environmental Conservation (NYSDEC) Region 2 Spills Group.

A site Investigation that included test pits, soil sampling, soil vapor sampling, monitoring well installation and groundwater sampling was performed during the fall and winter of 2006 with the following results. During that investigation, it was determined that the upper 20 feet of the site consisted of a mixture of native soils and imported fill materials. Soil in the tests pits was described as brown to gray medium sand containing domestic debris. In addition, six additional out-of-service tanks were identified and removed. The soil in the tank excavations exhibited a petroleum odor and elevated Photo Ionization Detector (PID) readings; this material is classified as a mixture of both "urban fill" and soil contaminated by petroleum from the operation of former gasoline filling stations.

The VOCs ethyl benzene and xylenes were detected in test pits along with varying levels of methyl benzene and cyclohexane compounds, all of which are related to petroleum. Four SVOCs -- benzo(a)anthracene, chrysene, benzo(b) fluroanthene, and benzo(a)pyrene -- were also detected above the State Cleanup Objectives in the soil samples

Soil vapor probes were installed in the test pit locations with a six-inch long screen set at 20 feet below grade. This depth was selected because it is just below the anticipated elevation of the proposed subsurface parking garage floor. Each of these points was sampled and the collected vapor was analyzed for VOCs. Concentrations of numerous petroleum compounds related to motor fuels including: propene (propylene); heptene; trimethylpentane; and hexane were detected in these soil vapor points.

Groundwater was encountered at the site at a depth of approximately 50 feet below grade flowing towards the southwest. The groundwater below the property has been contaminated by petroleum-related compounds, most likely from the site's historical use as a motor fuel filling station. Ethyl benzene, xylenes, and trimethylbenzenes, the same compounds detected in the test pits, were detected above State groundwater standards in all four of the site monitoring wells. The concentrations were higher in the on-site and downgradient wells than in the upgradient wells indicating that a historical release of petroleum occurred at this property.

Case History Two Remedial Action Plan

The following Remedial Action Plan (RAP) was developed for the redevelopment of this site. To date, the only elements of the RAP that have been completed are the UST removal and the soil excavation.

UST Removal – The six additional USTs uncovered during the excavation program were properly removed. The tanks were pumped dry; cut open and cleaned; and then disposed of as scrap metal. Any petroleum-contaminated soil encountered around the buried tanks was excavated and removed during the construction of the building foundation.

Excavation – As part of the construction of the basement and foundation of the new building, approximately 15 feet of soil was excavated from across the property using a track-mounted excavator. This soil was tested and then properly disposed of at a permitted facility in accordance with the results of the tests. The bulk of the contaminated soil at the site was removed by this process.

Design and Installation of a Vapor Barrier System - Based on the site's historical use as a gasoline filling station, installation of an engineered plastic vapor barrier will be included in the construction of the building's foundation. The purpose of the vapor barrier is to ensure that any petroleum vapors that remain below the ground cannot migrate into the structure. A membrane that meets or exceeds the American Society for Testing and Materials (ASTM) International standard as a vapor barrier was selected. The membrane will be installed by a knowledgeable contractor under the supervision of a New York State-licensed Professional Engineer in accordance with the manufacturer's installation procedures.

Design and Installation of a Sub-Slab Venting System - A sub-slab venting system will be incorporated into the building's foundation and structure with an intended purpose of venting any vapors trapped below the foundation to the atmosphere. The venting system will consist of four-inch diameter slotted pipe laid horizontal below the vapor barrier across the western, central and eastern portions of the foundation. The layout of the venting system is illustrated on Figure 3. These slotted pipes will be connected to a high-vacuum, high-flow mechanical blower. The blower will initially draw the hydrocarbon vapors out of the ground and through vapor-phase carbon filters to remove the hydrocarbons, and then pump the treated air through vertical pipes within the structure that vent above the roof line. As the levels of VOCs in the extracted soil vapor decrease, the sub-slab venting system will be modified by converting the initial blower to a high-flow, low-vacuum SSD blower. At this time, the VOC concentration should be low enough that carbon treatment of the exhaust will not be required. This will allow for a savings in both energy consumption and system maintenance. A site management plan will be prepared to ensure the proper long term maintenance and monitoring of the system as well as a procedure for terminating the system in the future.

Post Remedial Monitoring - After the construction of the building is completed, a separate Post-Remediation Monitoring Program will be implemented. This will include operation and maintenance of the venting system and semi-annual monitoring of the remaining groundwater monitoring wells for two years. At the conclusion of the two year groundwater monitoring portion of the program the data will be evaluated. If the levels of VOCs continue to decrease, a "No Further Action Letter" will be requested from NYSDEC for closure of the spill.

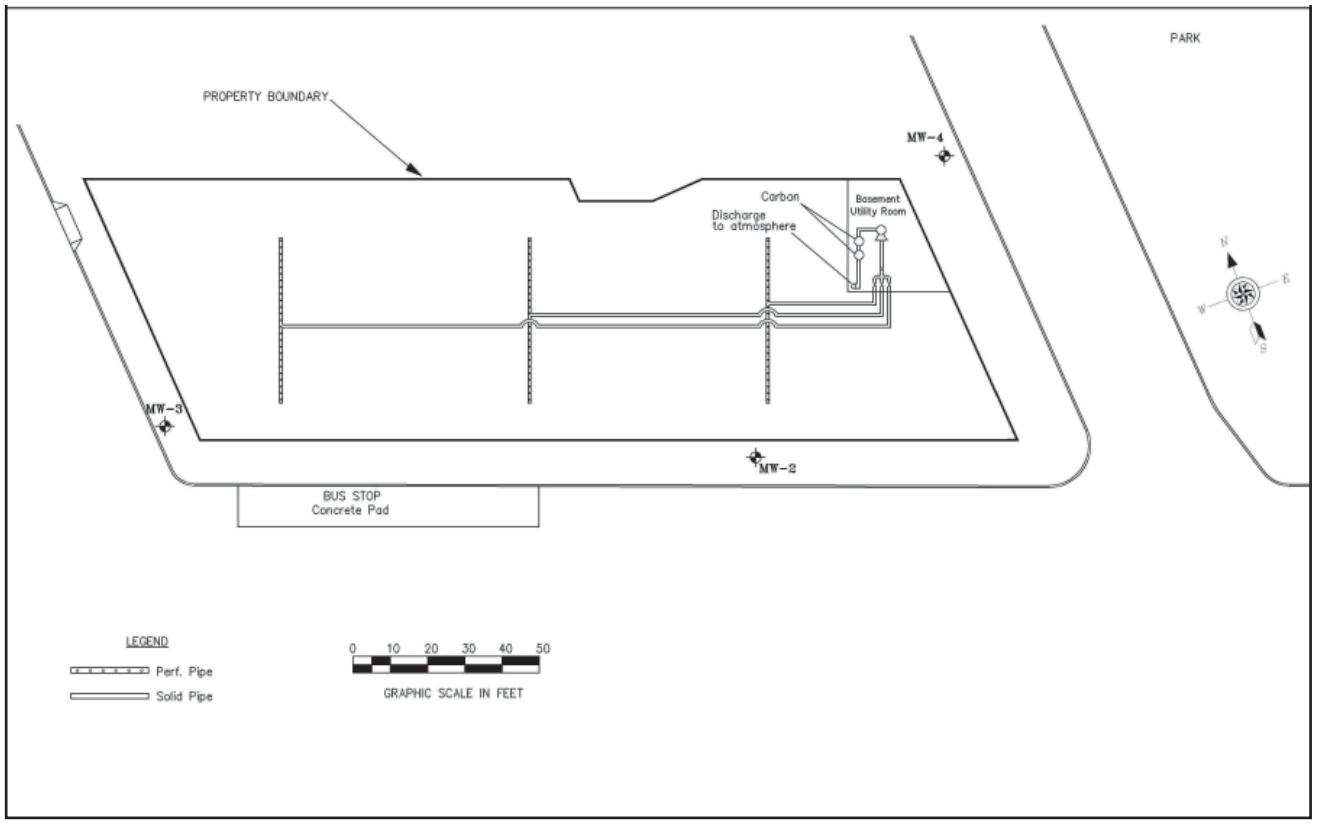

Figure 3. Layout of the Sub-Slab Venting System, Case History Number 2.

Summary

The two case histories presented in this paper include different contaminants of concern and different land uses. However, both include SSD systems as part of the Final Remedy. Soil vapor issues have become a significant factor in today's site investigations. Hand-in-hand with that, soil vapor abatement and remediation are common components of site clean ups.

Traditional methods of soil vapor remediation have typically included SVE systems that employ the use of regenerative blowers and carbon filtration. These systems consume large quantities of energy and have high operation and maintenance costs. By including SSDs as part of the Final Remedy, the energy consumption and operation & maintenance costs can be greatly reduced. At the same time, maintaining negative pressure below the building slab will ensure that subsurface vapors do not enter the structure. The SSD systems should be incorporated into a site management plan that provides for an annual check of the system and a methodology for terminating the system.

References

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Acknowledgments

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Reviewed by AIPG Associate Editors: Bob Stewart, CPG-08332, Dale Rezabek, CPG-09285 and John White, CPG-04632.

Eric A. Weinstock is Vice President of CA RICH Consultants, Inc., 17 Dupont Street, Plainview, New York 11803. He has a B.S. in Geology from SUNY at Oneonta and an M.S. in Engineering Geology from Georgia Tech. Mr. Weinstock has more than 25 years of experience in the characterization and remediation of petroleum and chlorinated solvent releases and has worked at dozens of dry cleaning facilities in the New York, New Jersey, Connecticut area. He is also very active in the investigation, clean up and redevelopment of Brownfield sites in urban areas, such as the five Boroughs of New York City.

STATEMAP and AIPG – MAPPING FOR THE FUTURE

Kerry L. Nikolaisen, CPG-10454

Missouri Department of Natural Resources (MDNR) - Division of Geology and Land Survey/Geologic Survey Program Geologist Chris Vierrether stood on the banks of the Auxvasse Creek looking upstream, and then down. "You have Chouteau Group here overlain by Osagean Series, but just upstream, the bluff is Snyder Creek (Devonian). So something structural is going on between here and there - maybe a fault." Chris looks a bit perplexed as he gazes up and down the stream, but one gathers that it is not so much about his mapping results, as it is about how the geological setting was created. At numerous stops throughout the day, Chris takes a group of six fellow geologists to various locations, illustrating representative formations and typical stratigraphic sequences. Some stops end with similar questions begging for more answers to geologic question marks. We drive as a caravan to these stops, waving at landowners who graciously allow the group access to their properties. I am along for the ride, so to speak, as I have been invited to this final field mapping pre-publication review of the bedrock geologic map of the Calwood, Missouri 7.5 Minute USGS Topographic Quadrangle, representing Missouri's Geologic Mapping Advisory Committee (GMAC). The GMAC is tasked with coordinating the State's geologic mapping priorities as part of the STATEMAP component of the National Cooperative Geological Mapping Program (NCGMP), which is administered by the United States Geological Survey (USGS). The GMAC comprises 10 members representing a wide spectrum of interest groups, including academia, the mining industry, geologic consultants, professional geological societies, planning organizations, energy interests, and geologic hazards. My role on the GMAC is to represent AIPG - Missouri Section.

MDNR geologic mappers Chris Vierrether (left) and Edie Starbuck (right; MEM-1313) discuss the geologic setting of one particular area of the Calwood 7.5-Minute Quadrangle before heading out with the group. Pat Mulvany (MEM-658), Unit Chief – Industrial Minerals Section (center) looks on with interest.

The NCGMP receives federal funding on an annual basis to support the STATEMAP component (there are other components that receive funding as well, such as FEDMAP, USGS regional projects developing geologic frameworks, and EDMAP, projects training the next generation of geologic mappers). Every State goes through the grant application process, and funds are awarded based on a competitive review process. The program requires matching funds from the States receiving Federal funding. MDNR has participated in the STATEMAP program since 1993, and since that time, has received $2 million dollars in Federal funds. The State has provided $1.81 million dollars from their own budget. This funding mechanism has allowed MDNR's Geological Survey Program to complete 90 bedrock and 83 surficial material maps at a scale of 1:24,000. The Calwood mapping project is one of four bedrock maps and three surficial materials maps completed with grants from the STATEMAP 2007 application process.

You would think that trying to plan a Department's mapping goals and corresponding budget would be somewhat straightforward, but that is not always the case. Most States, including Missouri, don't always get funding for the mapping projects they want to undertake. Since 1993, Missouri's STATEMAP annual awards have ranged from less than $50,000 to as much as $250,000. Try planning your mapping budgets based on those financial swings. For 2008, MDNR asked for $140,000 and received $104,000 - roughly 75% of what was requested. That percentage is slightly higher than the national average of 70%. Ultimately, it's a balancing act between project planning and fiscal requests, because States don't want to ask for more than they can handle, both from a

labor standpoint and a fiscal standpoint, but they know they are not going to get everything they ask for. States also have to be mindful knowing they must match what the Feds have available for distribution. The varying degrees of financial awards, coupled with the uncertain economic climate, indicate that future growth of Missouri's geologic mapping program may depend on locating additional sources of funding.

What are the reasons the USGS review panel rejects portions of the grant applications, awarding only a portion of what was asked for? According to Randall Orndorff, USGS, and a member of the STATEMAP review panel, there really aren't any common concerns the panel sees on a routine basis. For Missouri's 2008 grant application, the review panel was critical of the lack of a long-range plan for geologic mapping and a lack of supporting documentation for issues driving the geologic mapping program. On the plus side, the review panel was complimentary about how the application combined mapping for surficial and bedrock geology, and the strategy of using new drilling data from Missouri Department of Transportation (MODOT) projects to support the mapping. This coordinated effort between two State departments was ideal in that it allowed MDNR to use MODOT personnel and equipment to acquire information for the mapping product. In return, the mapping product was of value to MODOT for future road work. This type of symbiotic relationship is a win-win situation for both the public and private sectors.

While MDNR has been fortunate in their relationship with Departments like MODOT that allow shared resources for a common goal, States face a unique set of challenges that include equipment, staff, technology and infrastructure capabilities. These challenges involve both State resources as well as available USGS base map data. One item that was a bit perplexing, at least from my standpoint, was the review panel's critique of a finished 2006 geologic map product, as noted on their application review correspondence. Specifically, their concern was that the base map layer used for a particular bedrock geologic map was hard to read. One can understand the review panel's concern. The finished product should be of a certain quality and resolution to enable the end users to extract the data needed, despite "stock" scanned images of the USGS topographic map having evolved through the years, with not all maps having the same scanned image quality. This also highlights the role that technology plays in the STATEMAP process. Does the State program have the hardware and infrastructure to produce their STATEMAP products? Do the base maps used require rescanning, acquisition of higher resolution data or manipulation to provide a better finished product? Besides the mapping component of yearly grant applications, States may find that they need to include funds for upgrading their previous STATEMAP inventory.

So how do the State geological surveys prioritize their potential STATEMAP projects? MDNR - GSP looks at things such as rapid population growth areas, transportation corridors, areas with a lack of geologic mapping, areas with environmental problems or geologic hazards, and mapping for mineral/energy resources. But, is this what the public and the geologic community want? How would the States know what types of mapping projects are demanded by the public? This is where GMAC comes in - they help guide MDNR - GSP in their mapping priorities. And in my role within GMAC, this is how AIPG members get their voice. AIPG represents the interests of a broad spectrum of geologic professions, and AIPG can solicit the mapping needs from its membership. Are you interested in a map that shows high-calcium limestone reserves in the State, or how about bedrock geologic maps along major transportation corridors? Is your company thinking about identifying that next area for a new aggregate quarry? Are you interested in a surficial materials map for ranking earthquake hazards or possibly for siting a sand and gravel operation?

Are you interested in serving on your STATEMAP's oversight committee? Contact your State geologic survey and find out what it takes to serve on the committee. If you need to sell them on the idea, tell them that as a local AIPG representative, you would be interacting with a professional membership that represents a wide spectrum of the geologic community and its diverse mapping needs. Once on the committee, keep in touch with your AIPG Section membership and ask them to give you feedback on their mapping needs. Likewise, even if you aren't part of the STATEMAP oversight committee, let them know what type of mapping projects you would like to see in the future.

MDNR surficial mapper Mike Siemens (foreground) at an outcrop along a creek during the field review.

Kerry Nikolaisen is a Senior Hydrogeologist in the St. Louis office of Leggette, Brashears & Graham, Inc. He has been on Missouri's Geologic Mapping Advisory Committee for two years, and served twice as President for the Missouri Section of AIPG.

Energy Myths and Realities

Scott Tinker, CPG-10564

Because of who you are and what you do, no doubt you've been asked about oil prices and the current energy situation.

And no doubt, the conversations will continue.

Interestingly, recent Gallup polls show 57 percent of Americans want increased domestic drilling and only 20 percent believe 'big oil' is the major problem. That is quite a turnaround from years past.

But there are a lot of questions still to be answered – and erroneous conclusions abound.

AAPG 2008 President Scott Tinker has been answering a lot of these questions in his position as director of Bureau of Economic Geology at the University of Texas at Austin, and has been giving talks and writing op-ed pieces on "Energy Myths and Realities."

The following is a "Top 10 List" of the myths and realities he has presented as talking points as the conversations come up. Some "myths" and the "realities" are offered below.

Reprinted with permission from the American Association of Petroleum Geologists EXPLORER, August 2008, and Scott Tinker, 2008 President of AAPG.

Myth	Reality
1. The United States can be energy independent in the next 25 years.	• The world is "flattening;" commodity interdependence is becoming the norm. • Energy infrastructure transitions take time and are very expensive ($ trillions). • The United States imports over 30 percent of its energy, mostly as oil, and the trend is increasing. • Independence requires realistic, scalable alternatives, which do not currently exist but can be developed over several decades.
2."Renewable energy" can reduce dependence on fossil fuels significantly in the next 25 years.	• Energy is not renewable –some sources of motion (wind & water), light (solar) and fuel (crops) seem "continuous" on human time scales. • Intermittent sources (solar, wind) are cleaner, less reliable, more expensive, and represent less than 1 percent of the energy mix. • Base load fuels (coal, natural gas, nuclear) are dirtier, more reliable, and cheaper. • Decarbonization of the energy mix has been happening for over 150 years, but increased demand for coal in China and elsewhere is beginning to change that. • The consumer bases his/her energy choice largely on price; alternatives need to be affordable.
3. The economy will adapt easily to a rapid, federally imposed energy transition.	• Concerns about climate have placed the public sights squarely on combustion of fossil energy. • Economies are inextricably linked to energy; affordability and availability of energy are key to a transition. healthy economy. • A healthy environment requires a healthy economy.
4. Energy efficiency and savings alone will solve the problem.	• Efficiency and energy savings are vital parts of the solution, but we cannot "save" our way out of a crisis. • Improved efficiency often increases demand for number of "units" (cars, refrigerators, microwaves, and computers). • Global industrialization, population growth, and modernization are increasing energy demand.

Myth	Reality
5. There is abundant low-cost, conventional oil remaining to be discovered.	• Much of the easy to produce (hard to find) conventional oil has been discovered and will plateau and then decline in production; i.e. conventional oil "peak" in the coming decades. • Much of the easy to find (hard to produce) unconventional oil will be developed in the next hundred years. • Biofuels require a tremendous amount of energy, water and soil. • Coal to liquids, gas to liquids, heavy oil and shale oil also require energy and water to produce.
6. "Big Oil" controls the price of oil and gasoline and makes obscene profits.	• Big Oil companies control less than 10 percent of global reserves. i.e., limited access to their primary product, and thus don't control price. • Supply and demand are the major drivers of oil price, but price is also related to the value of the dollar, speculation, weather, government policy, and supply disruptions, among other things. • Lack of access is pushing Big Oil towards "unconventional" oil and natural gas. • Unconventional oil and natural gas are more expensive to develop (today). • Oil industry profits are volatile; it is an expensive and risky business.
7. Cutting oil imports will stabilize and lower gasoline prices.	• Oil is a fungible commodity; global demand is increasing and the price of oil is likely to remain high, but volatile. • Cutting U.S. oil imports will reduce U.S. supplies and drive gasoline price up. • Increased (carefully considered) access to U.S. resources would help reduce oil import demand as we transition to other fuels; it takes up to a decade to bring new production online. • Nationalization is popular in certain countries, but a poor idea overall. Global trade and access are vital for a healthy global economy.
8. Global production of oil and natural gas are peaking and we are running out of fossil energy.	• Fossil fuel resources (oil, natural gas and coal) can provide over 200 years at current consumption rates. Issues: emissions and long-term resource life. • Uranium and nuclear energy potential are vast. Issues: waste disposal and accident impact. • Dams, hydrothermal, wind, biomass, tides, and other emerging forms provide long-term regional supplements. Issues: cost, technology, and environment. • Solar energy is vast and electricity storage and transmission technologies should be pursued aggressively Issues: technology and infrastructure.
9. All coal is dirty.	• Coal reserves are substantial. • Coal can be made reasonably clean with carbon sequestration. • The power will cost more; a lot more initially. • There is a choice: store CO_2 in the atmosphere (today) or sequester it in subsurface brine reservoirs.
10. The cost of energy is increasing.	• The cost of electricity in the U.S. has been decreasing in real dollars; clean power will cost more. • The cost of liquid fuels has decreased overall, until recently. Security of liquid supplies will cost more. • U.S. Energy use per GDP (energy intensity) continues to decline. Per capita use is relatively flat.

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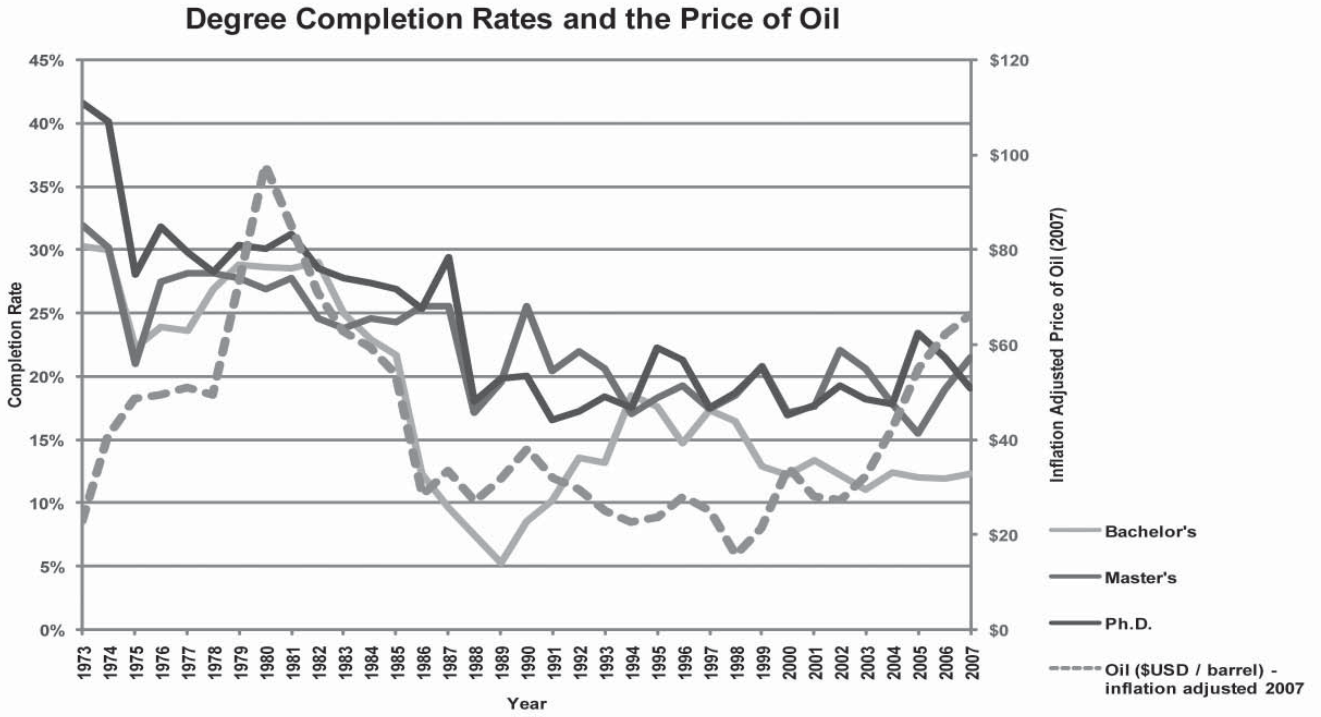
Geoscience Degree Completion Rates, 1973-2007

A common assertion is that the number of geoscience degrees granted is dependent on the price of oil. However, this metric requires a response lag greater than oil price change velocity. A more responsive mechanism would likely be the rate of degree completion – that students would be incentivized to complete their geoscience degree by improved economic prospects.

Degree completion rates do show sensitivity to current events. The end of conscription in the US corresponds with a sharp decrease in completion rates and bachelor's degree completion rates were sensitive to the stabilizing and eventual decline in oil prices in the 1980's. The more recent rise in oil prices is not reflected in current completion rates, and likely corresponds to a decoupling of aggregate geoscience enrollments and oil price.



Of note is how geoscience completion rates vary from other STEM fields. According to NSF, 59.4% of STEM bachelor's candidates complete their degree, compared to 13% of geoscience bachelor's candidates. Yet at the graduate level, STEM master's candidates complete their degree within 10 years at a rate of 19%, and Ph.D.s at 9%, compared to the geoscience rates of nearly 20%. The geosciences see much lower completion rates than STEM fields at large at the undergraduate level, but are equal to superior in completion rates at the graduate level. Understanding the drivers for these differences require longitudinal analysis of degree recipients.

- Leila Gonzales and Christopher Keane

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Martin Inducted into 2008 South Dakota Hall of Fame

Dr. James E. Martin, CPG-07367, serves as a professor of Geology and Geological Engineering, the executive curator of vertebrate paleontology at the Museum of Geology, and the paleontology program coordinator at the South Dakota School of Mines and Technology. And recently, Martin was one of 13 individuals inducted into the 2008 South Dakota Hall of Fame.

Martin was nominated for this award because of his contributions to education and science. Living in a tent most of the summers of his life, he has undertaken graduate education and research to understand the past in order to predict the future for humankind, and he has brought leadership to all ages in the world of research.

Jim was born in Rock Springs, Wyoming, in 1949, and following the uranium boom, he moved with his family to Edgemont, South Dakota, in 1953. While in the third grade, Jim became enthralled with fossils and vowed to become a paleontologist. Another family move found Jim in Igloo, South Dakota, where he graduated from Provo High School in 1967. During his senior year, Jim was elated to meet a real paleontologist, Mr. Harold Martin, fossil preparator of the Museum of Geology at the School of Mines. Harold invited Jim to visit the museum, and during that visit, Jim met Dr. Robert W. Wilson, who would be his mentor through his undergraduate and master's degrees. Dr. Wilson hired Jim as a field assistant for the museum, starting a career that would result in over 40 years conducting paleontological field investigations.

Jim's love for the geology of the earth and its fossils became his major study at the School of Mines. He earned his bachelor's degree in geology in 1971 and his master's degree in geology/paleontology in 1973. He was then awarded research assistantships at the University of Washington, Seattle, where he was influenced greatly by Dr. V. Standish Mallory, and in 1979, Jim received his Ph.D. in geology. His dissertation concentrated on mammalian fossils from Oregon, where he continued field work and research throughout his life.

In 1979, Jim received job offers from both the School of Mines and Shell Oil Company; he could not resist the opportunity to return to the fossil beds of South Dakota and has remained at the university for over 30 years. When Martin arrived at the museum, 19,000 catalogued specimens were in the systematic fossil collections; today, over 300,000 specimens are housed in the museum. He has also mentored over 30 graduate students, has been an editor of five books, and has authored nearly 100 scientific publications.

During his academic career, Martin has had wide scientific interests and published manuscripts on many diverse areas. In 1986, he partnered with David Parris from the New Jersey State Museum to conduct summer field paleontology courses for over 20 years. The collections they discovered have been the focus of research and manuscripts of graduate students as well as publications authored by Martin and Parris including a paper published by the Geological Society of America in 2007. Martin has also collaborated with Judd Case, Eastern Washington University, and the two collected fossils in Antarctica, Argentina, and Australia. This research earned Martin the International Discovery of the Year Award in 1999 for Antarctic discoveries sponsored by the Royal Geographical Society of London/Discovery Channel Europe.

Martin has received certification as a Professional Geologist in Wyoming and Washington and by the American Institute of Professional Geologists. He was elected president of the South Dakota Academy of Science and was invited twice to the National Press Club in Washington, D.C., by the National Science Foundation for news conferences concerning Antarctic fossil discoveries. In 2004, Martin received the Distinguished Alumnus Award from the School of Mines for his research and mentoring.

In addition to university duties, Martin has assumed consulting and lecturing duties for many public and private entities concerning the geology and paleontology of South Dakota and the Pacific Northwest. He has also undertaken public television programs in four countries, has been the subject of numerous television documentaries, and has been chosen by the South Dakota Geological Survey to head the production of the Geological Map for the State of South Dakota that was published in 2004.

Reprinted by permission from South Dakota School of Mines and Technology, October 2008, *Foundation Update*.

U.S. Lags In Providing College Access, Study Finds

SCIENCE IN THE NEWS from Sigma Xi, The Scientific Research Society

Other countries are outpacing the United States in providing access to college, eroding an educational advantage the nation has enjoyed for decades, according to a study released today by the National Center for Public Policy and Higher Education.

The nonprofit research group contends that if left unaddressed, the development will harm U.S. competitiveness in the near future.

"I don't know what it's going to take to get our nation to wake up to what's happening with regard to the education deficit we're building," said William E. Kirwan, chancellor of the University System of Maryland, who will present a similar study by the College Board on improving access to higher education next week.

"We're standing pat while the rest of the world is passing us by. If we continue on this path, our chances of being the leader in the knowledge economy in the decades to come are between slim and none."

During the past two decades, some other nations have made the kind of effort to improve access to higher education that the United States undertook in the 1950s, '60s and '70s, said Patrick Callan, president of the research group.

In the United States, by contrast, college costs keep rising; more students are dropping out of high school; and large gaps remain in the success rates of students of different races, incomes and states. "We're one of the few countries where our older population is better educated than the younger population," Callan said.

The study gives a failing grade for college affordability to every state but California, which received a C because of the relatively low cost of its community colleges. Researchers said the percentage of an average family's income needed to pay for a public four-year college has risen from 20 to 28 percent, after financial aid. For community colleges, the burden has risen from nearly 20 percent to nearly 25 percent.

"That's a great deal of money for institutions that once served as a safety net for American higher education," said Joni Finney, the center's vice president.

In the past decade, student borrowing has more than doubled, and as the economy worsens, the researchers warned, many states have predicted cuts in higher education funding.

Since the early 1980s, college tuition and fees have jumped nearly 440 percent, far more than health-care, food, housing and transportation costs. The median family income rose less than 150 percent.

Looking at various measures, including academic preparation in high school, high school graduation rates, college enrollment and cost, researchers concluded that although the United States has made modest gains in some areas, many other countries have been far more aggressive about increasing the proportion of students finishing two- and four-year schools.

At nearly 40 percent, the United States is second only to Canada in the percentage of adults 35 to 64 with an associate's degree or higher, a result of efforts that include the G.I. Bill enacted after World War II. But the United States is 10th in the world in the percentage of adults 25 to 34 who have such degrees.

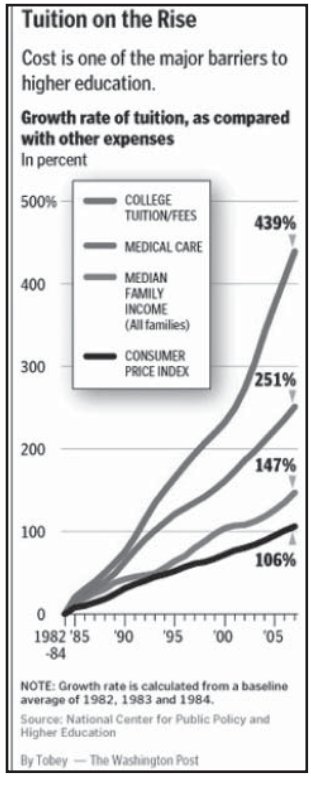
The study does not include the District of Columbia. Maryland and Virginia score better, in general, than most other states, particularly in how well they prepare students for college. But both need to do "dramatically better" in the amount of need-based financial aid they provide, Callan said.

Some schools, including the University of Virginia, have made dramatic efforts in recent years to help lower- and middle-income students. One of the top three reasons that students turned down U-Va. was cost, said Yvonne Hubbard, director of student financial services.

Six years ago, Hubbard had a $9.5 million budget that was parceled out to students, based on need, until the money ran out. But for five years, U-Va. has guaranteed that students from poor families will not have to borrow to pay for school. It capped the amount that middle-income students have to borrow, with the school providing grants to cover the rest. This year, Hubbard had a $22 million budget, and U-Va. will spend about $62 million on financial aid overall.

The Maryland university system used to have the sixth-highest public college tuition in the country. But tuition has been frozen for three years, and the state system has grown by 15,000 students in that time.

Virginia and Maryland have made it much easier for students at community colleges to transfer into four-year state colleges.



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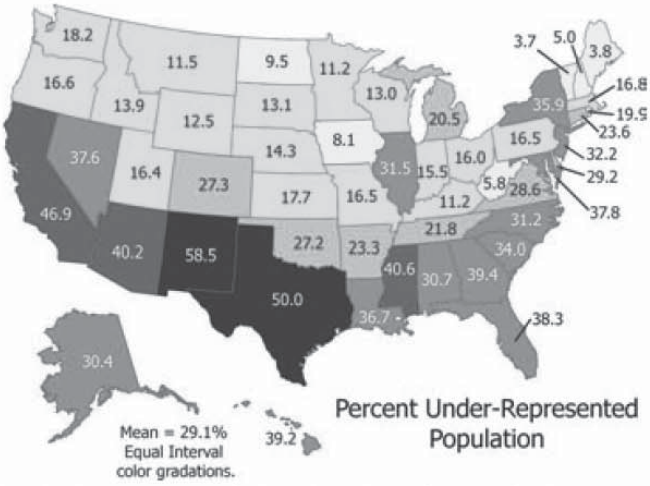
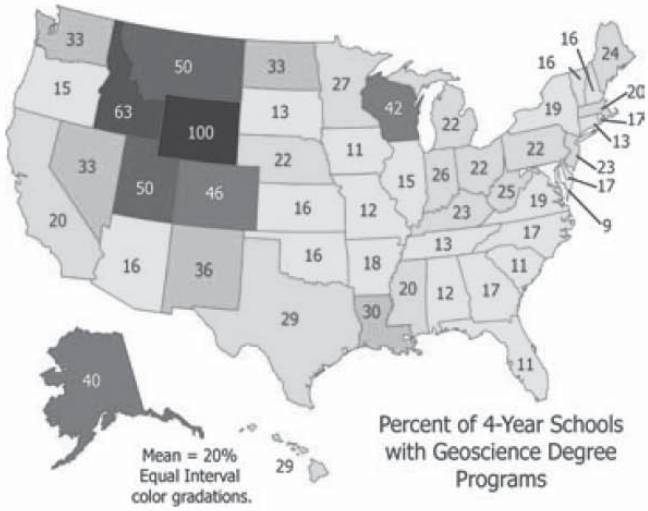
Under-Represented Minorities and Geoscience Departments

The states with the lowest percentage of under-represented minorites have relatively small populations with more than 50% of the people living in rural areas. The under-represented population includes Black and African American, American Indian and Alaska Natives, Native Hawaiian and other Pacific Islanders, Hispanics, and people identified with "Two or More Races".



Source: Table 4: Estimates of the Population by Race and Hispanic Origin for the United States: July 1, 2007 (SC-EST2007-04); Population Division, U.S. Census Bureau, May 1, 2008

States with the highest percentage of colleges and universities offering degrees in the geosciences are largely rural and (with the exception of Wisconsin) have relatively few institutions of higher education. Wyoming is the only state with 100% of schools offering a degree in the geosciences, but it has only one university granting baccalaureate degrees. States where under-represented minorities make up more than 35% of the population typically have a larger number of 4-year degree-granting institutions. However, less than half of those schools offer geoscience degrees.



Sources: AGI Directory of Geoscience Departments, 2006; Solutions for Our Future (http://tsp.convio.net/site/PageServer?pagename=homepage)

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AIPG's 2008 Honors and Awards Program

The American Institute of Professional Geologists (AIPG) has a history of effective and outstanding service to the profession of geology. From its beginning in 1963, the Institute has emphasized the role that professional geologists play in this fascinating, changing, and highly complex world in which we live.

In an Institute such as this, there are so many highly motivated geologists contributing to the profession, the Institute, the public, and the nations in which we live and work that the identification of a select few for particular awards is a monumental task. The continued success of the Honors and Awards Program is dependent on an accessible nominating process and a diligent screening of those nominated. This is done by the Honors and Awards Committee.

Currently, there are six honors bestowed by the Institute: Ben H. Parker Memorial Medal, Martin Van Couvering Memorial Award, John T. Galey, Sr., Memorial Public Service Award, Award of Honorary Membership, Outstanding Achievement Award, and Presidential Certificate of Merit.

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AIPG MISSION STATEMENT

The mission of the American Institute of Professional Geologists (AIPG) is to be the superior advocate for geology and geologists, to promote high standards of ethical conduct, and to support geologists in their continuing professional development.

January 20, 2001

Barbara H. Murphy, CPG-06203 2008 Recipient of the Award of AIPG Honorary Membership

Barbara's interest in geology began in 9th grade with an earth science class in Wilmington, Delaware. She also loved being outside and so it was a natural to pursue geology in college. Barbara went to Mount Holyoke College in Massachusetts and also had the opportunity to take geology classes at nearby Amherst College, Hampshire College, and U. of Massachusetts. She enjoyed field camp in Canon City, Colorado in the summer following her sophomore year. Then she spent the following summer working as a field and research assistant on the Nain Anorthosite Project in Labrador, Canada. She lived in a tent and ate dehydrated food and sardines for about 6 weeks. She learned to sing or talk to herself when doing field work so the caribou and bear would know someone was coming.

After graduating from college in 1975, she spent part of the summer traveling around the western US before working as a research assistant with John Reid from Hampshire College, as part of the volcanology group at Los Alamos labs in New Mexico. From there, she moved to Phoenix and worked at the Bureau of Land Management. She spent many days in the field researching current and historic mining activity in central and western Arizona. When the assignment ended, she went to work at a large consulting firm, Dames & Moore. The Phoenix office was fairly small at that time she started in 1977, but it grew to be one of the largest offices. Barbara was fortunate to work on a broad variety of projects ranging from coal resource evaluations in New Mexico, to major dam siting/design and flood control projects in central Arizona, to highway projects, transmission lines, landfills, mining projects, military projects, resource management plans, and major Superfund and other remediation projects.

While at Dames & Moore, Bill Greenslade introduced her to AIPG and the importance of being active in the professional organizations. So, after attending a few meetings and learning more about AIPG, she applied for and received her CPG in 1984. Then she began working with the Arizona Section of AIPG and eventually at the national level. Barbara is a registered geologist in Arizona.

Barbara worked at Dames & Moore until 1999 when she had the opportunity to work at a newly-formed consulting firm, Clear Creek Associates, founded by Doug Bartlett and Marvin Glotfelty. It has been a wonderful experience to work in a small consulting firm with dedicated professionals.

In her spare time Barbara enjoys travel, hiking, camping, photography, and horseback riding. Barbara and her husband, Casey, have two daughters, Erin and Kelly. They love the out of doors and they have had many wonderful times traveling across the US and to foreign countries. For several years she was the leader for their girl scout troop. Barbara feels fortunate to be associated with many wonderful people, professionally, through volunteer organizations, and socially, and to have had opportunities through AIPG to make other friends throughout the country.

Response

I want to thank AIPG for awarding me the Honorary Membership Award. What an honor to be recognized for service to AIPG and the geology profession. AIPG has been an important part of my professional geology career for many years. I have enjoyed serving AIPG and feel it is a real pleasure to be involved with AIPG. It truly is a great organization and I have many friendships with fellow AIPG members and AIPG headquarters staff.

As I completed the biographical information form with career and volunteer highlights, it gave me a chance to reflect on my various activities. Over the years, I have been involved at the Arizona Section and National levels and have made many geology friends and acquaintances from all over the United States, Canada, and some of the European countries through my service with AIPG. My AIPG involvement also led to other professional opportunities.

I first became involved with AIPG very early in my professional career when my supervisors at a major environmental/engineering consulting firm encouraged me to attend some of the local meetings. It proved to be a strong professional group, providing contacts and professional development, as well as long lasting friendships (and some great field trips, too). Over the years, I became more involved with the Arizona Section and was fortunate to attend several AIPG National annual meetings. From the national meetings and serving on the Advisory Board and the Executive Committee, and working on various committees, I gained a much better understanding of what AIPG is and I developed an appreciation for AIPG's role in the geologic profession and its support of geologists. I also felt honored when AIPG approached me to be general chairperson of the 2008 annual meeting in Flagstaff. I felt that my past service to AIPG must have demonstrated my organization skills and ability to lead and it was nice to have that vote of confidence in heading up such a prominent event. Thank you so much for this award. It really is very meaningful to me and I appreciate the recognition.

Barbara H. Murphy

Congratulations to All

M. Lee Allison, MEM-0328 2008 Recipient of the AIPG John T. Galey, Sr. Memorial Public Service Award

Lee Allison was appointed State Geologist and Director of the Arizona Geological Survey by Gov. Janet Napolitano in December, 2005. Previously, he served as State Geologist in Utah (1989-1999) and Kansas (1999-2004), making him only the second person ever to have served as State Geologist in three states.

During 2004-2005, he was Policy Director for Science and Energy for Gov. Kathleen Sebelius of Kansas, as well as chairing the Kansas Energy Council from 2002 to 2005.

He holds BA (University of California, Riverside), MS (San Diego State University), and PhD (University of Massachusetts, Amherst) degrees in geology. He is active in science policy and public policy, especially related to natural resources, geologic hazards, and public engagement. He has extensive experience in petroleum and geothermal exploration throughout the U.S. He is currently designing and deploying a global digital geosciences data network among the state geological surveys and the USGS, and in partnership with a coalition of 79 national geological surveys.

He is co-founder of the Coalition on the Public Understanding of Science (COPUS – *www.copusproject.org)*, which is organizing hundreds of organizations across the country to celebrate 2009 as the Year of Science. He is active in promoting and defending teaching credible science in the public schools. He previously organized the eight-state High Plains Aquifer Coalition to pursue a coordinated approach to monitoring and evaluating the nation's largest aquifer.

He received the Public Service Award of the American Association of Petroleum Geologists in 2002, and the Tanya Atwater "Encourage" Award from the Association for Women Geoscientists for promoting the role of women in the profession.

He blogs at "Arizona Geology" *(www.arizonageology.blogspot.com).* The murder mystery "Fault Line" by Sarah Andrews is loosely based on his experiences in Salt Lake City leading up to the 2002 Olympics.

Lee is active with a number of professional organizations, currently serving as President of the Arizona Geological Society and on the editorial advisory board for EOS. He served as general chair for back to back national meetings of GSA and AAPG in 1997-98. The Hutchinson (KS) News hailed Lee as a "Shining Light" for his role in helping restore the city to safety after deadly natural gas explosions, which is featured in an episode of the History Channel's "Modern Marvels" documentary series.

Response

I am tremendously honored to receive the prestigious John T. Galey Public Service Award. It's particularly humbling to be included with such a distinguished coterie of previous awardees, many of whom I have been fortunate enough to know or work with and respect so much.

Too often we scientists complete our studies by publishing the results and moving on to the next project. We, as members of the community, have a broader obligation to take those studies and make sure the people who may be affected by them, know they exist, know where to find them and have guidance in understanding what they mean and how to act in response to the results. Overall, we have to invest as much in translating science and working with users and decision-makers, as we do in creating the scientific work in the first place.

When I was first appointed State Geologist of Utah in 1989, I differentiated the duties of that title from those of being director of the state geological survey. It's a distinction that I continue to make. As director of a survey, I am responsible for the administrative and technical functioning of a scientific agency. But as State Geologist, I interpret an obligation contributing to the vitality, role, and influence of the

geologic profession and what I term the 'earth science enterprise' across the state. It's the reason I joined AIPG as well. Academia, business, government, and professional/NGO groups all have functions in the earth science enterprise that create a dynamic and complex interplay of ideas and actions. One reason I like being State Geologist is defining the job to allow me to stand back and see how the trees comprise the forest. The earth sciences are in the center of some of the biggest challenges affecting society: energy, water, resources, natural hazards, climate change, and sustainability.

Geology is also in the center of the fight over teaching evolution in public schools which, as I came to learn during my six years in Kansas, is symptomatic of a wider anti-intellectualism that has contributed to America's slipping S&T leadership. In the past few years, America's scientific enterprise of industry, government, and academia, has mobilized to restore the nation's scientific and technical infrastructure to reinvigorate our sagging global leadership for economic and national security. I've been excited that earth science groups, including AIPG, are among the most prominent in building our Coalition on the Public Understanding of Science (COPUS) as a national grass roots effort to help scientists and educators work more effectively to engage with the larger public on the role and contributions of science in society.

The John T. Galey Public Service Award is evidence of the importance that AIPG places on scientific involvement outside the workplace. I accept it as an encouragement to all geologists and all scientists to invest in explaining what it is we do and why it's important, even if it's to your neighbors, families, and friends. Together, we can have an impact. Thank you very much

M. Lee Allison

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Part II

Student Issue

TPG March/April

2009

Robert G. Font, CPG-03953 2008 Recipient of the AIPG Martin Van Couvering Memorial Award

Robert Font was born in La Habana (Havana), Cuba, May 5, 1946. Family roots hail from the Toulouse area of France and the Cataluña area of Spain (around the Pyrenees). As a young teenager, Font attended Loyola Military Academy. He achieved the ranks of cadet lieutenant and cadet captain and became the school's valedictorian in 1960. He immigrated to the USA in 1961, escaping the communist dictatorship in Cuba, and becoming an American Citizen. After finishing High School in Miami, Florida in 1964, Font moved to "God's country", Texas. He attended Baylor University in Waco and graduated with a B.S. degree in geology with a minor in math in 1967. In 1969 he earned his M.S. degree in geology from Baylor University with an engineering geology emphasis. From 1969-70, Font worked as an exploration geologist for Conoco. He then enrolled at Texas A&M University in College Station, Texas and graduated with a Ph.D. degree in geology (with emphasis in engineering geology, soil and rock mechanics and tectonophysics) in 1973.

Font worked as a university professor at Baylor University from 1973-81. In 1980 he earned the "Professor of the Year Award in Geophysics" as issued by Conoco, Inc. In 1981 he rejoined Conoco and worked as a Senior Staff Geologist, Project Supervisor and Area Geologist through 1987. That year Font moved to Dallas and became a partner and Executive Vice President at Strategic Petroleum Corp., where he worked through 1989. In 1990-91 Font worked as a Consultant and Project Director for Oryx Energy Company. In 1991 Font formed his own company, Geoscience Data Management, Inc. Font has also taught graduate and undergraduate courses.

Font became a CPG member of AIPG in 1977, inspired by his former dissertation director, Dr. Bob Berg. Font is also a "Fellow" of the GSA and member of SIPES, AAPG, and AEG. Font served as President of the Dallas Geological Society from 1993-94 and received the "Professional Service Award" in 1998 from the society.

Font is a "Certified Professional Geologist", "Certified Petroleum Geologist" and a "registered Professional Geologist in Texas, Kentucky, Wyoming and Alaska. He also holds the titles of "Chartered Geologist" (The Geological Society in the UK) and "European Geologist" (European Federation of Geologists).

Font is married to Hilma Johansen Font and has a daughter (Ingrid) and a son (John-Paul). He is proud of his five grandchildren, Jonathan, Madeleine, Luke, Naomi and Noelle. Font is multilingual and his hobbies include physical fitness, scuba diving, motorcycling, target shooting, boating, fishing and playing the guitar.

Response

I am truly humbled and most thankful to be selected the recipient of the AIPG's Martin Van Couvering Memorial Award in 2008. It is a great honor to be recognized by such a prestigious organization where "competence", "integrity" and "ethics" are the foundation of its constituency.

I have had the great fortune of being a member of AIPG for 31 years. Joining during my days as a young university professor, I was inspired to become active by my former and greatly-esteemed dissertation director, Dr. Robert R. Berg. In retrospect, I consider joining the AIPG one of the highlights of my professional career. Working within this organization and throughout the years, I have been able to interact and exchange ideas with some of the most distinguished geological scientists on the face of our planet. I have worked with prominent professionals and with an unparalleled organizational staff to bring opportunities and advancement to the profession that we all love. I have also had the honor of representing the organization domestically and internationally, establishing cherished friendships with respected and eminent colleagues around the world.

Indeed, AIPG has been good for me and I try my very best to reciprocate.

I am deeply grateful for this great honor! It is with humility and delight that I receive this valued award.

God bless!

Robert Font

Larry R. Rhodes, CPG-02250 2008 Recipient of the AIPG Martin Van Couvering Memorial Award

Larry received his B.S. in Geology from the University of Kentucky in 1969. He began his professional career doing engineering geology at Stokley and Associates. After several years of employment there he started Rhodes and Associates in 1971, a geotechnical, environmental and drilling firm. In 2004 he sold his company after 34 years as its owner and president to Central Associated Engineers becoming their vice president until 2006. After a short retirement of six months he began a new career working for FRA Engineers, a T.Y. Lin International company, where he is presently employed as their chief geologist.

Larry is a registered professional geologist in Indiana, Virginia, Tennessee, Kentucky, Missouri, and Illinois. He is also a registered monitoring well driller in Kentucky. Larry is Kentucky PG #0008 and was instrumental in obtaining registration for geologists in Kentucky in 1993 and for geologists in training in 2004.

Larry has served two terms as AIPG Kentucky Section president, been vice president, and has served as its secretary-treasurer, newsletter editor, awards chairman, nominating chairman, membership chairman and screening board chairman. Larry received an award for outstanding service to the section in 1987. In 2002, he received the Kentucky Section Lifetime Achievement Award. Larry has served as General chairman for the 1987 Annual Meeting in Lexington, Kentucky and Co-Chairman for the 2005 Annual Meeting also held in Lexington. In 1988, he received the Presidential Certificate of Merit. In 1989, he was a National Advisory Board Representative. Larry was elected as Secretary of the Institute during 1990 and 1991. He was Advisory Board Delegate for several years. Larry was a member of the AIPG Foundation from 2000 to 2007 and has also served on numerous committee on the national level.

He is a member of GSA, Kentucky Society of Professional Geologists, Society of Mining Engineers, Kentucky Geotechnical Engineering Group and Society of American Military Engineers. Larry was on the University of Kentucky Geoscience Department Advisory Board from 1995 to 2005. He has been on the Advisory Committee for the Bluegrass Community and Technical College for the Environmental Science Technology Program from 2003 to present.

Larry is active in his church Southern Hills United Methodist. He is a Kentucky Colonel, longtime member of the Bluegrass Sportsman League, was on God's Pantry Food Bank Board of Directors from 1986 to 1992. He has been on the Lexington Fayette County Environmental Commission since 1998. Larry is a lifetime member of the University of Kentucky Alumni Association and is a member of Phi Sigma Kappa National Social Fraternity.

Response

I would like to thank the Institute, Awards Committee and the members of the Institute for awarding me the Martin Van Couvering Memorial Award. I consider this award the crowing achievement of my 37 years as an AIPG member I was very pleased and surprised to learn that I had been given this prestigious award.

In 1971, I joined AIPG because I needed some standing in the geological community in my state as we did not even have a definition of geologist at that time. I wanted the number and the CPG behind my name for my consulting business. Since that time AIPG has become much more to me than that. AIPG has afforded me the opportunity to make like long friends and business associates and to guide me with its sound principals. I consider membership in the Institute to be one of my most important assets.

Standing up here and accepting this award will be one of my most cherished memories. I recommend all of our members to serve the Institute in any and all ways that you can. Not to receive an award, but to promote the profession of Geology. I assure you, it will be very rewarding in a multitude of ways. Martin Van Couvering, that first president of the Institute, for which this award was named, exemplified the characteristics that are needed to make the Institute grow and flourish in the future

I would again like to thank the Institute and all involved, both in the section and national level for the award and giving me the opportunity to serve AIPG. I would also like to thank my wife, Lois, for all of her understanding and support throughout my involvement with AIPG.

Larry R. Rhodes

Dennis Pennington, CPG-04401 2008 Recipient of the AIPG Ben H. Parker Memorial Medal

The professional career of Dennis Pennington can be characterized by a continual search for new technologies and service to the geological sciences. From an experience early in his career Dennis knew that helping and mentoring others were an important way to pay back others who mentored him. A strong believer in volunteerism he has always tried to advance the profession and protect it for future geologists.

He received his B.S. degree from the State University of New York at Potsdam where he met his future bride, Mary Lou. Their marriage was blessed with two sons, Devon and Bradley. He holds an M.S. in geochemistry from Penn State University.

Throughout most of Dennis's work history he has been involved with new technology and the transfer of technology to the groundwater and environmental fields. For example, he managed major programs in underground injection of wastes for the US EPA, including mechanical integrity and the improvement of annulus monitoring for the injection of hazardous wastes. Development of soil washing techniques, and application of bioremediation treatment, as well the investigation of techniques for conducting hazardous waste studies in cold and desert areas of the U.S. were part of his research in cleaning up groundwater and soils. As the US Bureau of Mines was dismantled by the government, Dennis was able to review and transfer mining technologies to the environmental industry. He also managed a remedial investigation and feasibility contract for the US Air Force in both the northwestern contiguous states and Alaska.

Dennis believes strongly in the mentoring of future geologists. The establishment of an AIPG student scholarship program 2000 was a personal highlight of his presidency of the Institute. Dennis also created a student AIPG chapter at Temple University and is proud of his role as a member of the Advisory Committee at Montgomery County Community College, Pennsylvania, where he helped develop certificate programs for hazardous wastes.

Dennis has served as either a member or an officer on several executive committees, and remains active in similar capacities since his presidency of AIPG in 2000. In the past he served national AIPG both as a member and officer of the national executive committee. Also, he has served in many positions for the Pennsylvania Section, including president at a time of turmoil caused by an outside organization as well as an advisor to the current AIPG section executive committee.

Through all of his work, Dennis is known for a great sense of humor, respectful treatment of associates, and the sensitivity and support he has shown others. Dennis is devoted to his family and particularly thankful to a supportive and tolerant spouse who helped him in his accomplishments.

Response

Words cannot describe what this award means to me. To be associated with so many distinguished geologists is not only humbling but also intimidating. I thank the Institute for this award and feel proud to follow in the foot steps of so many other awardees. It is with great appreciation that I accept it.

I have learned so much from my friends in AIPG and from my friends from overseas. It has made it easy for me to serve.

I thank the national staff and its leadership who have made my time enjoyable and who have helped me as well as supported me over the years. Also, I thank all of the members who have helped me in my service to the profession and especially those of you who helped my family in our medical crisis in 2000.

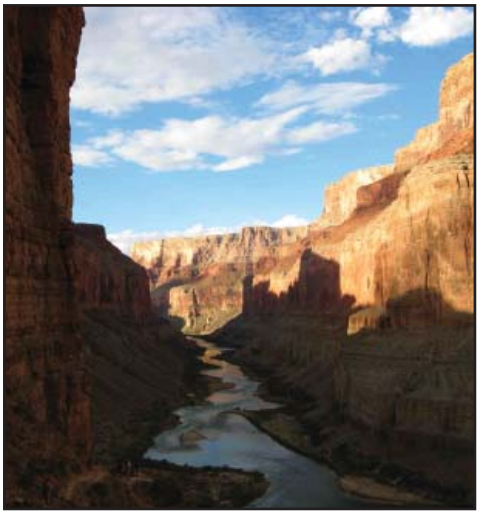
Learning a great deal through AIPG has given me many benefits. We all serve the profession and understand the sacrifices it takes to get ideas implemented and accomplished. But it is so easy to do so when you work with such good staff and other geologists, who have become close friends; and in a way family. I have been blessed by AIPG and the friendships with many of its members How can I not continue to serve? Again Thank you.

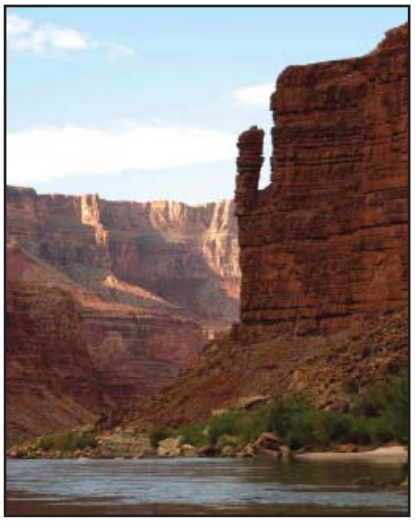
Also I particularly thank my wife, Mary Lou, who supported me and allowed me to be involved with AIPG. In addition, I'd like to recognize my sons, Devon and Bradley who I am very proud of as well as my sister, Judy, and her husband who joined my family tonight.

The nominating committee has made me feel special tonight and for that I never can thank them enough.

Dennis Pennington

Grand Canyon 2008





Presidential Certificate of Merit

Each year, the AIPG President may award one or more certificates of merit to individuals who, through dedicated and meritorious service, have made an outstanding contribution to the Institute.

Recipients of the AIPG Presidential Certificate of Merit

Presented by
Daniel J. St. Germain, 2008
President

Adam W. Heft
CPG-10265
Holt, Michigan

For his extraordinary commitment of time, resources, and energy in organizing a most successful AIPG Annual Meeting in 2007.

James F. Howard
CPG-02536
Owensboro, Kentucky

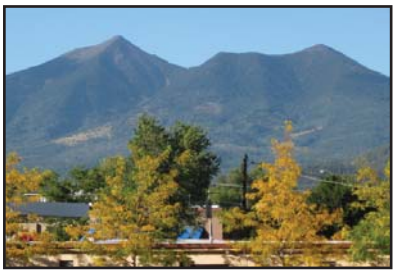
For his leadership and extraordinary investment of time, personal resources, and energy in AIPG outreach and educational efforts.

Samuel Gowan
CPG-07284
Ballston Lake, New York

For his leadership, commitment, and patience in his capacity of Chairman of the AIPG Climate Change Committee.

AIPG 2008 Annual Meeting Abstracts

All annual meeting abstracts can be viewed on the AIPG website at www.aipg.org. On the left hand side of the home page, select 'Meeting Proceedings'. All of the abstracts are listed.



AGI Geoscience & Public Policy Internships

AGI's Government Affairs Program offers summer and semester internship opportunities for geoscience students (undergraduates and Masters students) with an interest in public policy and in how Washington impacts the geoscience community. Interns gain a first-hand understanding of the legislative process and the operation of executive branch agencies. They also hone writing, research, and web publishing skills.

Each summer the AGI/AIPG interns write articles that are published in The Professional Geologist. The articles are available from the Government Affairs Articles website *(http://www.agiweb.org/gap/articles/progeologist.html)*.

AGI is planning to accept three interns for the summer at a fixed stipend of $4,500 apiece. Stipends for the interns are funded jointly by AGI and a generous grant from the American Institute of Professional Geologists (AIPG) Foundation. The internship lasts twelve weeks, and the starting date will be based on the schedule of the successful candidate.

2009 AGI/AIPG Summer Internships
Apply by March 15, 2009

2009 AGI/AAPG Fall Semester Internships
Apply by April 15, 2009

2010 AGI/AAPG Spring Semester Internships
Apply by October 15, 2009

For more information on applying go to the AGI website *(http://www.agiweb.org/gap/interns/internsu.html)*.

THANK YOU
Flagstaff 2008
Annual Meeting Organizing Committee
For A Great Meeting

I want to thank the AIPG members and others who volunteered so much of their time and expertise to make the 2008 annual meeting such a wonderful success. As many of you know, it takes a lot of work to organize an annual meeting. AIPG's 45th Annual Meeting was held in conjunction with the Arizona Hydrological Society's (AHS's) 21st Annual Symposium, and the 3rd International Professional Geology Conference (3rdIPGC) in Flagstaff, Arizona. This meeting was a collaborative effort between the professional organizations. I particularly want to thank the Arizona Section members, other AIPG members, AHS Flagstaff Chapter members, and AIPG headquarters staff for their dedication in helping to make this such a great meeting.

The organizing committee was co-chaired by David Best (MEM-883) for AIPG and Aregai Tecle for AHS. Robert Font (CPG-3953) was the chairman of the 3rdIPGC. Their efforts were greatly appreciated. I want to thank Margot Truini for heading up the technical sessions and overseeing the audio-visual aspects for the technical sessions; Erin Young (SA-1091) for her efforts in developing the workshops and coordinating student volunteers; David Palmer (CPG-9960) for heading up the field trips program and completion of the field trip guidebooks; Dana Downs-Heimes, Paul Lindberg (CPG-6344), Charles Schlinger (CPG-9554), Steve Maslansky (CPG-4431), and Erick Weiland (CPG-6892) for field trips and miscellaneous program assistance; Pam Palmer and Gail Siok for their efforts in planning a wonderful guest trip program; Virginia McLemore (CPG-7438) for editing and development of the Proceedings of the conference; Boris Poff for assisting in developing the technical sessions program; Kel Buchanan (CPG-6058), Bill Greenslade (CPG-2505), David Kirchner (CPG-7123), and Mike Hulst for their work on the sponsors/exhibitors committee; Larry Fellows (CPG-4447) for assistance with program development and photographs for marketing materials; and Bill Siok (CPG-4773), Alan Dulaney (MEM-1461) and Mike Geddis (MEM-925) for general oversight and marketing of the conference. I also want to particularly thank AIPG's headquarters staff Cathy Duran, Wendy Davidson, Cristie Valero, Emma Schlundt, and Vickie Hill who spent many hours with the day-to-day logistics of planning and organizing this conference. Thank you!

And, also, to those who attended the meeting – thank you for coming and supporting AIPG.

Barbara H. Murphy RG, CPG-6203
AIPG Arizona Section President 2008
General Chairperson AIPG/AHS/3rd IPGC Conference



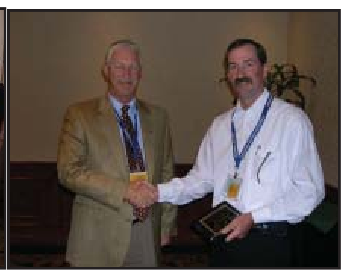
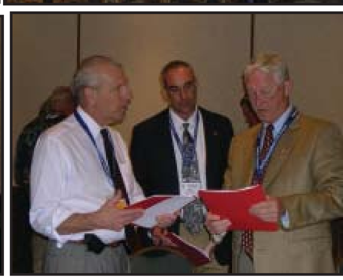








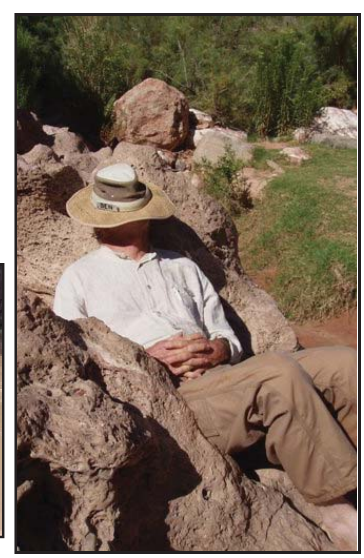


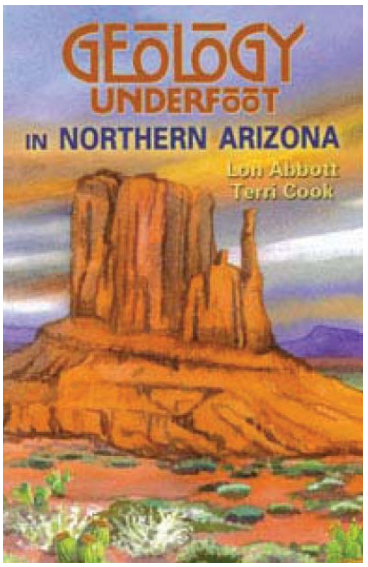





Welcome





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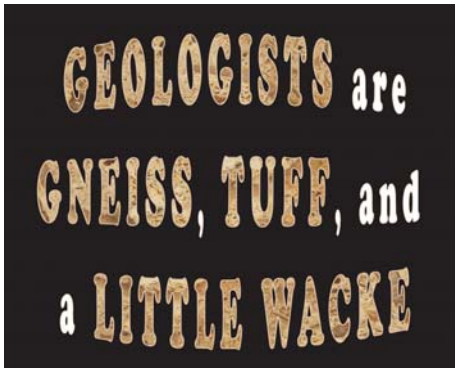
The AIPG Foundation generously contributes annually to the AGI Government Affairs Program to support the summer internship program. The AIPG Foundation's support is gratefully acknowledged.

AIPG STORE (also available online at www.aipg.org)

T-shirt



GNEISS T-SHIRT - Fruit of the Loom 100% Cotton, preshrunk. Front left breast has AIPG logo and back has text "Geologists are Gneiss, Tuff, and a Little Wacke". Colors: black or gray. Sizes: S - XL - $16.50 and Sizes: 2XL and 3XL - $18.00

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POLAR FLEECE VEST - Elastic waist, 2 zippered front pockets, embroidered AIPG lettering with pick and gavel. Choose from Black, Navy, Royal, Charcoal, Burgundy, Forest or Khaki. Sizes XS - 6X, Tall Sizes LT - 3XLT. Tall sizes available in black and navy. (If ordering size 2X and up, please call the National AIPG office for special ordering at (303) 412-6205. An additional $1.50 will be added to sizes 2X and up). Price: $25.50

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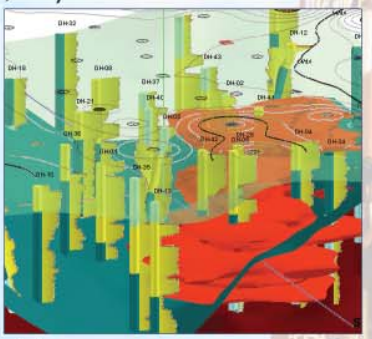

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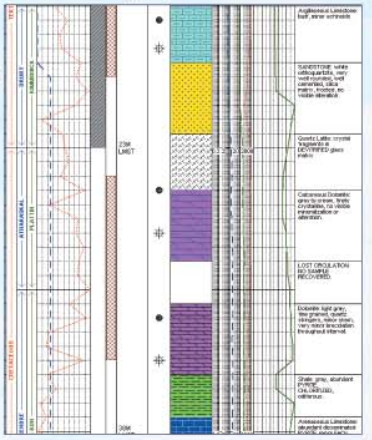

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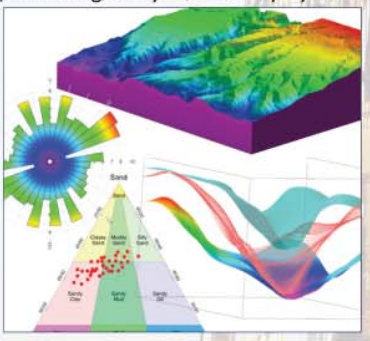
RockWorks Utilities™

An Indispensible Collection of Modeling, Analysis, and Display Tools



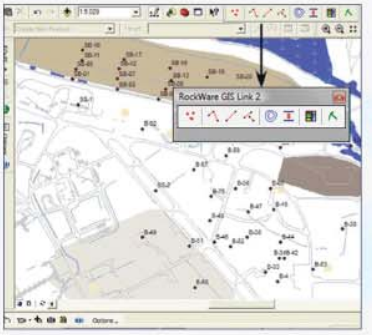
- Point maps
- Contour maps
- 3D surfaces
- Gridding tools
- Solid models
- Volumetrics
- Piper/Stiff plots
- Rose & Stereonet diagrams

Free trial available at www.rockware.com.

$599

RockWare GIS Link 2™

Connecting RockWorks 14 and ArcMap



- Load RockWorks well locations as an ArcMap layer
- Pick profile, section, and fence diagram locations in ArcMap, generate the diagrams automatically in RockWorks
- Create contour maps of formation tops and isopachs, surface elevation
- Generate strip logs

Free trial available at www.rockware.com.

$349

RockWare®

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