AIPG 43RD ANNUAL MEETING
"SUSTAINABILITY"
Saint Paul Minnesota
September 23-28, 2006
www.aipg2006.org

2ND CALL FOR PAPERS

We cordially invite geologists/geoscientists from all walks to share your research, experiences, and inspirations related to our theme of “Sustainability.” We will gladly consider abstracts for presentations on the following topics related to sustainability:

- Theme Sessions - Energy, Minerals, Water, Toxics, Policy & International Aspects;
- Geologic resources as a foundation for society & regional economies;
- Effects of redistributing geologic materials in the environment;
- Interactions of natural hazards with the human population;
- Sustaining the profession and science in general; and
- Education and public policy; or other related topics.

We seek a breadth of material related to the topic, whether it is rooted in completed research or informed speculation. This is an opportunity to explore together the different meanings that “sustainability” can hold for professional geology and those who practice it. A closing Roundtable Session is planned to collectively assess how AIPG can incorporate the theme and your contributions into our future endeavors.

Abstract Submission: ~250 words, plus title, presenter, address, and E-mail address; Word format preferred with standard fonts; E-mail to ctiller@amengtest.com (or contact for alternative delivery arrangements). Our target deadline is July 15, 2006.

To submit or discuss abstracts, contact
Charlie Tiller, PG, CPG - Technical Program Chair
651-659-1302 OR ctiller@amengtest.com
FEATURES

OPINIONS FROM OUR MEMBERSHIP
Can We Reach Energy Independence?...
YES, WE MUST! 44

Jump-Start Your Career
BEFORE
You Leave School 46

PEER REVIEWED ARTICLE
Dakota County Ambient GROUNDWATER
Quality Study 48

REQUEST FOR NOMINATIONS 13

AIPG 2006 ANNUAL MEETING INFORMATION 39

AIPG STORE ITEMS 53

DEPARTMENTS

EDITOR’S CORNER 2
SECTION NEWS 3
LETTERS TO THE EDITOR 6
MEMBERS IN THE NEWS 8
TEST YOUR KNOWLEDGE 11
IN MEMORY 12
PRESIDENT’S MESSAGE 15
EXECUTIVE DIRECTOR’S COLUMN 17
PROFESSIONAL ETHICS AND PRACTICES 18
MEASURING THE PROFESSION 22
PROFESSIONAL LIABILITY AND RISK MGMT. 26
MARKETING 28
STUDENT’S VOICE 30
NEW APPLICATIONS AND MEMBERS 32
AIPG STUDENT CHAPTERS 33
PROFESSIONAL SERVICES DIRECTORY 35

ON THE COVER — Sea stacks of the northern Oregon coast. The term “sea stacks” refers to isolated, pillar-like islands or masses near a clifffy shore that are formed by wave erosion of headlands. The northern coast of Oregon is famous for them. Photo credit: David M. Abbott, Jr., CPG-04570.
I am sitting here at AIPG Headquarters having just flown in from Manchester, NH. The flights were fine, no delays, but those 5:30 am flights are torture. One positive thing, the horizon was getting bright before 4 am!

I am at Headquarters for the yearly June ExComm Meeting. I have never been to Headquarters, so this is a real treat. This issue of TPG contains some new information from the membership and a tremendous amount of information from the Sections and Student Chapters. It has a look at all of this wonderful information and keep it coming.

Just a reminder, we need articles, photographs, and information from you! Wendy Davidson sent out a request for articles a short while ago. The response (or promises) was great. Now, you just have to follow up and send in the article, photograph, or information.

As you have read in the past few issues of TPG, do not forget that all new CPG applicants who start their application process on or after July 1, 2006 must participate in the continuing professional development (CPD) program. I encourage all CPG members to visit the CPD information and tracking form on the AIPG web page and fill it in with your continuing education information. You do not know how to log in or forgot your login and password — call AIPG Headquarters at (303) 412-6205 and speak to Wendy Davidson or Cathy Duran. Try this out and send me any comments of suggestions.

The Annual Meeting in St. Paul, Minnesota is almost here. You should have received an e-mail from Headquarters for registration. If not, check out the AIPG web page or this issue of TPG for further details. This should be a great meeting in a great state — see you there.

I leave you with a request — please vote. There is a tremendous slate of candidates for office, including Editor. This is your organization. Keep it strong, up to date, and out front setting the pace.

Please send any questions, comments, or suggestions to Wendy Davidson (wdj@aipg.org) or me (rtalkington@geospherenh.com).

I hope you enjoy this issue.
California Section

AIPG and CCGO Present Geoscience Awards at the 2006 California State Science Fair

The American Institute of Professional Geologists (AIPG) California Section and the California Council of Geoscience Organizations (CCGO) presented geoscience awards at this year’s California State Science Fair held on May 23, 2006. This marks the sixth consecutive year that the AIPG California Section in collaboration with the CCGO has presented geoscience awards at the California State Science Fair. A nice spring day greeted judges Dave Sadoff and Paul Enriquez upon arrival at the California Science Center, which is located within Exposition Park adjacent to the University of Southern California campus in Los Angeles.

A total of 21 Junior Division (grades 6, 7, and 8) and 6 Senior Division (grades 9 through 12) geoscience projects were evaluated. Each of the projects previously won a top award at their affiliated county or regional science fair. As in years past, the task of presenting the best geoscience project proved extremely difficult due to the high degree of accomplishment presented by numerous exhibits. Abstracts may be accessed via the web at: http://www.usc.edu/CSSF/Current/Panels/J06.html (junior division) and at http://www.usc.edu/CSSF/Current/Panels/S06.html (senior division).

The Junior Division winner was Nikki Tachiki, an eighth grader from Orange County. Her project, entitled “Ground Substances at Different Locations Affect the Flow Rate of Water” encompassed soil sample collection from 18 locations during a family trip to Las Vegas. She categorized the soil types, oven-dried the samples, and then constructed a tube stand apparatus to measure the amount of water flowing through different soil media versus time. Nikki determined that differing soil types did affect the flow rate of water.

The Senior Division winner was Sunil Bodapati, a ninth grader from Santa Clara County. Sunil’s project, “Using Biofilms to Reduce Liquefaction” tested liquefaction potential and compressive strength of sand after inoculation with bacteria (using Flavobacterium johnsoniae) versus a non-inoculated wet sand control. He used an orbital shaker to agitate inoculated sand and added water, then measured the amount of water that had risen to the top of the column after 24 hours of shaking. This was repeated daily for five consecutive days for both the inoculated and non-inoculated samples. Sunil found that the sample with the biofilm matrix had water rise to the top only on the first day; the subsequent four days produced no free water. In contrast, the control sand shed free water each of the five days. Sunil also determined that compressive strength of the biofilm matrix sand was more than double the control sand.

An Honorable Mention award was given to Terik Daly for his project, “Investigating the Chemical Signatures of Meteorite Impacts”. This eleventh grader from Santa Clara County researched chemical anomalies of impact cratering utilizing x-ray fluorescence, inductively-coupled plasma mass spectrometry, and variable pressure SEM/EDX.

The junior and senior division winners each received a certificate, a check for $250, and a one-year subscription to TPG. The honorable mention awardee received a one-year subscription to TPG.

Once again, it was a pleasure to observe the many young budding scientists and their enthusiasm for geology. We eagerly look forward to next year’s California State Science Fair.

Dave Sadoff, CPG 09933, and Paul Enriquez

Capitol Section

The Capitol Section (including Maryland, Delaware and Washington D.C.) met for a membership/dinner meeting on Thursday, February 16, 2006. The guest speaker was Dr. Alan Cutler, geologist and author of the book, The Seashell on the Mountaintop. Topics of discussion included membership development, ideas for future events/field trips and Professional Geologist (PG) licensure in Maryland. PG licensure in Maryland is definitely a hot topic in the Capitol Section, and there was excellent round table discussion on the matter during the meeting. We plan to establish a PG Licensure Committee and explore the possibilities of making this a reality.

We certainly welcome any advice from our fellow Sections. Also, please keep an eye out in upcoming TPGs for Capitol Section Past President Duane Carey’s column on marketing - the business side of being a geologist.

Jake Wilburn, MEM-0122, Capitol Section President

Georgia Section

Presidents Message

I have just finished delivering the student membership plaques to four of the universities for the departments to present to the students. Our four students for 2006 are:

• Dawit Yifr – University of Georgia
• Brian Woodall – Columbus State University
• Patrick Gilliland – University of West Georgia
• Beth Lavoie – Georgia State University

We wish these four students the very best and will be glad to help them or any of our student members in their new geology career.

During the summer months we have a number of ongoing projects. We are going to try to complete the Biochlor class.

JULY/AUGUST 2006 • TPG 3
This is a top priority. Sam Pickering is looking into having a fall field trip in the recharge zone south of the Fall Line. I have been in communication with the Savannah Area Geological Society. I have gone to their meetings in the past and hope we can work with them on meetings and field trips. There were three proposed legislative bills that will probably come up again during the next session. These included license for soil scientists, continuing education for geologists, and licensing for environmental professionals. In August, the PG Board meets and I am going to ask if I can say a few words to the Board about AIPG and our support for the Board and overall support for ASBOG. I would like to discuss their position on these bills if they can. We plan to get in touch with the new State Geologist once the EPD makes the announcement. We want to offer our support in whatever area we can help.

The profession of geology is very small and it is important that the different professional societies work together and know each other. A few years ago South Carolina had to battle against elimination of their PG Board. I do not think that will happen to us, but we need to be in a better position than they were and know and work with each other in case there is some threat to our profession.

Georgia Section Meetings

We had 18 people attend our March 31, 2006, field trip to the Texaco Station on Collier Road. Our National President Larry Weber came to the meeting and addressed the membership on a number of issues. The weather turned out once again to be great for a Friday afternoon. I would like to thank Mike Coughlan from the EPD and Dean McCartney with Pangean – CMD for their discussion and showing us the installation of the new remediation system.

Former Greyhound Facility or “The Big Dig”

On May 18, 2006 the section speakers were Doug Birkbeek, Willmer Engineering, Inc. and Ron Wallace, GA EPD. This facility has had a long history of diesel releases and remediation. Within the last year the facility has been torn down and the property owners are in the process of remediating the site by soil removal and will be building another high-rise. The site will be dewatered and dug down to approximately 30 feet below ground surface to remove the contaminated soils. We discussed the site history along with past and present remediation and some of the engineering challenges. This is the type of site that does not come along very often.

Georgia State University AIPG Student Chapter

The GSU AIPG student chapter in conjunction with the Geology Club and SGE held our annual GSU Geology Career Night. Professional geologists from the public and private sectors made brief presentations on their careers and companies/agencies with time for networking and refreshments afterwards. We would like to thank the following:

- Debbie Warner Gordon - USGS
- Susan Kihler – Bradburne, Briller & Johnson
- Stephen Lathrop – Jordan, Jones & Goulding
- Kristin Sanford – Georgia EPD
- Nils Thompson – MACTEC
- Ron Wallace – Georgia EPD

A number of students had resumes, which they gave out to the speakers and other guests.

On April 26, 2006, we had our semester ending get together with plenty of food. We want to give a great big Thank You to Tom for all the incredible catering he did for all our meetings.

A number of us will be attending field camp this summer. We are planning to write an article for TPG on our experiences and add a few great photographs. Have a great summer and we plan to have new officers in the Fall.

Beth Lavoie, SA-0729, GSU AIPG Student Chapter President
bethlavoie@yahoo.com

Michigan Section

The Michigan Section held a meeting on June 8, 2006 in Lansing, Michigan. The talk given was “Miners Castle and the Glacial Sea Stacks of the Eastern UP” by David A. Baxter, Geological Consultant.

Ty Black lead a one day Karst Field Trip on Saturday, June 17, 2006. The trip included visiting Shoepac Lake Sinkholes, lunch in Rogers City, and Mystery Valley (a collapse valley with a sink hole and earth cracks).

Northeast Section

The Northeast Section recently attended the GSA Meeting in Camp Hill, Pennsylvania. The section agreed to fund new student memberships and signed up 65 new students. Great job!

Bob Blauvelt, CPG-06508 Northeast Section Past President

Oklahoma Section

Saturday Afternoon Field Trip Presented by Dr. Ken Luza
Oklahoma Geological Survey
Tar Creek Superfund Site and its Many Challenges

The Tar Creek Superfund Site is located in northeastern Oklahoma near the Oklahoma/Kansas border in Ottawa County. The site consists of approximately 41 square miles (26,000 acres) and is part of the Tri-State Mining District (OK, KS, and MO). The Mississippian rock units, principally the Boone Formation, are the host for most of the ore deposits. Zinc and lead ores (principally sphalerite and galena) were mined in the Picher Field in northeastern Oklahoma and southeastern Kansas for more than 60 years. The Superfund site contains over 2,500 acres that are underlain by underground lead-zinc mines and 1,150 mine shafts. Significant quantities of mill-waste material were generated by milling of the lead-zinc ores. Approximately 5,000 acres in Oklahoma were overlain by mine and/or mill byproducts. The field trip will visit mine and mill-waste...
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Advice to Students

I read through most of the articles in January/February's issue of *The Professional Geologist* concerning the focus topic of “Advice to Students”. One topic that was indirectly eluded to, but not specifically discussed, is the issue of courtesy and respect. Students entering any profession need to learn to be courteous and respectful. There are many interdisciplinary relationships within our profession that require an understanding of courtesy and respect.

For the purpose of discussion let us consider the geologist—driller relationship. In my current position I have the unique opportunity to manage a drilling rig, work directly with other drilling companies and observe consultants working with drillers used by my company. Most consultant companies’ operational plan puts an inexperienced geologist in the field with the driller to log wells and “manage” the field activities (which is a topic for another discussion). What does the project manager tell the geologist? Watch the driller like a hawk and do not let them pull anything. The geologist typically feels the necessity to put on the “know it all” façade and will not ask questions for the fear of looking incompetent. As soon as the driller questions a geologist’s field decision or makes a suggestion the “I am the geologist with the four-year degree and you are the driller without a high school diploma” attitude inevitably rears its ugly head. This results in instant tension which ultimately, whether the geologist knows it or not, is going to cost time and money. A seasoned driller takes a certain amount of enjoyment in letting the “know it all” geologist make mistakes and tremendous enjoyment if they can profit from said mistakes. However, if you treat that driller with respect they are typically willing to share their years of experience and reciprocate that respect. If a driller says its not a good idea to put powdered bentonite down the auger in a heaving formation, the geologist may want to consider their suggestion and question what the company well construction protocol mandates.

If you treat a person with respect they typically are willing to share their knowledge. I have learned more about hydrogeology from the various drillers I have worked with than from any textbook or college professor. Do not get me wrong, certainly educational institutions are the corner stone of any professional discipline. Having the capability to treat people in a way that they are willing to share their knowledge with you is an invaluable personal trait. A lot of the time it just comes down to being courteous and treating people with respect.

Incidentally it is amazing how much a “crusty old geologist” can learn from the “wet behind the ears geologist” if they just treat them with a little courtesy and respect.

Todd G. France, CPG-09824

Water-Resources Development Trends

There are several old, now back-again, trends in water-resources development to bring to your attention. These are: mudless water-well drilling; megawatershed exploration; brackish aquifer recharge; solar desalination; solar groundwater pumps; PlayPumps; and recognition by hydrogeologists of the groundwater/surfacewater interference.

Long advocated by Hank Baski, mudless or clear-water water-well drilling has the advantage of producing a cleaner borehole yielding higher pumping rates.
and lower drawdowns (higher specific capacities).

Promoted by Jay H. Lehr and Robert A. Bisson in their 2004 Modern Groundwater Exploration: Discovering New Water Resources in Consolidated Rocks Using Innovative Hydrogeologic Concepts, Exploration, Drilling, Aquifer Testing and Management Methods, and others, megawatersheds are assumed deep, fractured-rock, fresh-water aquifers associated with tectonic activities where there is evidence from downstream streams otherwise unaccounted for from shallow-water water balance studies.

Demonstrated by Ajay K. Vashisht and, SK Shakya (India Experiments with brackish aquifer recharge, World Water and Environmental Engineering, March/April 2006), and other Indian hydrogeologists, brackish aquifer recharge is a shallow-recharge mechanism to reverse the salinity of shallow brackish aquifers through recharge followed by distributing discharge through tapping by shallow multiple piezometers or well points rather than high-capacity wells which would generate dewatering and lowering shallow water tables. I would think that French drains would work as well, perhaps better, if feasible to install, as one might do to skim off floating hydrocarbons from a service station release.

Solar desalination, being researched by Aqua Dyne and the Australian Commonwealth Scientific and Industry Research Organization (CSIRO) per Australia tests solar desalination (World Water and Environmental Engineering, March/April 2006), and no doubt others, use solar energy to desalt brackish springs and mining wastewaters through thermal desalination.

Solar pumps, led primarily by the Italians, use photovoltaic collectors to run groundwater pumps through direct current by pumping to overhead cisterns while the sun is out, skipping the high cost and inefficiencies of DC/AC inverters and batteries.

PlayPumps (www.playpumps.org), of South Africa, are being used to harvest the playground energy of kids to pump shallow groundwater to overhead cisterns with great success.

And finally, University of Arizona Law and Public Policy Professor Robert Glennon noted in his 2002 landmark Water Follies: Groundwater Pumping and the Fate of America’s Fresh Waters that dewatering the shallow aquifer would eliminate base river flow and threaten riparian habitats, and that the profession should take notice and design accordingly, leading to the renewed interest in shallow, areally distributed tapping of shallow aquifers. My last conversation with groundwater guru, Dr. David Keith Todd of blessed memory, was about this very topic, at a Groundwater Resources Association of California meeting.

Barney P. Popkin, CPG-06547, EuroGeo #494, Cal/PG 5585
John D. Haun credits liberal arts education for his successful geology career

The University of Wyoming College of Arts and Sciences honored its outstanding alumni and former faculty during a banquet on May 19, 2006.

Sponsored by the College of Arts and Sciences Board of Visitors, these awards recognize alumni who have excelled in their fields and shown a strong commitment to the liberal arts and sciences. Former faculty members who powerfully influenced students, Arts and Sciences programs and their academic disciplines also are honored.

College of Arts and Sciences 2006 Outstanding Alumni are: David J. Burman, partner in Perkins Coie LLP Law Firm in Seattle, Wash.; John D. Haun, professor of petroleum geology and co-founder of Casper-based oil and gas consulting firm Barlow and Haun, Inc.; and Edward A. Wise, psychotherapist who expanded his group practice into one of the nation’s largest medical-surgical hospitals.

John D. Haun, CPG-00136 (AIPG 1976 National President), born in Old Hickory, Tennessee, received the first Ph.D. in geology from the University of Wyoming in 1953. He notes, “The period of my graduate education was an exciting time for students in the Geology Department. Most of the students were veterans of World War II and came to the university with self-discipline and a single-minded determination not seen in earlier or later generations of student.”

Following graduate school, Haun was employed at Stanolind Oil and Gas Company, which later became Amoco. He was vice president at Petroleum Research Corporation from 1952 to 1957. In 1955, John became a faculty member of the Colorado School of Mines (CSM). Recognized as an outstanding educator, he received teaching awards throughout his 30-year academic career, including the CSM Outstanding Professor Award in 1973.

“The foundation for my career in petroleum geology at Colorado School of Mines was based on an undergraduate liberal arts education at Berea College and graduate school at UW,” Haun says. “I am especially indebted to those who shaped my UW education—Professors Knight, Thomas, Blackstone, McGrew, and Shaw. They gave me an appreciation for the science of geology and a desire to contribute to its advancement.”

During the early part of his career, Haun was extensively involved in oil and gas exploration throughout the Rocky Mountain Region, and in 1957 he and James A. Barlow formed the oil and gas consulting firm Barlow and Haun, Inc., based in Casper, Wyoming. Robert J. Weimer, CPG-00098, (B.A. 1948; M.A. 1949 geology) notes: “Dr. Haun’s early and continued investigations into the occurrence of an exploration for petroleum in the Rocky Mountain Basins, especially Wyoming, have provided a standard for other exploration geologists. His influence has been felt as an author, editor, educator, independent consultant, and advisor in both the public and private arenas.”

An active member in professional and scientific organizations, Haun served on the Colorado Oil and Gas Conservation Commission for ten years and was president of the American Association of Petroleum Geologists (AAPG). He was an active member of the American Petroleum Institute, the National Petroleum Council, the Interstate Oil Compact Commission, the National Research Council, and the United States National Committee on Geology. He has received numerous awards for his achievement, including the University of Wyoming alumni Association Distinguished Alumnus Award in 1986 and the AAPG Sidney Powers Memorial Award in 1995.

Haun’s wife Lois also majored in geology at Berea College and together they have traveled extensively. An avid trout fisherman, Haun has fished most of the major streams in the Rocky Mountain Region.

Mark Myers Nomination as Director of the U.S. Geological Survey

WASHINGTON DC—Acting Interior Secretary Lynn Scarlett today praised President Bush’s intention to nominate Mark D. Myers, CPG-09697, as director of the U.S. Geological Survey. The announcement is subject to confirmation by the U.S. Senate, once the official nomination is made by the President. Current acting director Dr. P. Patrick Leahy will continue to serve in the acting capacity until Senate confirmation.

Myers is an internationally recognized geologist and former State Geologist and head of Alaska’s Geological Survey.

“Mark is known not only for his accomplishments as a geologist and state survey manager but also for the consensus building approach he has emphasized throughout his career,” Acting Secretary Lynn Scarlett said. “He brings more than 22 years of wide ranging experience in geological science and strong leadership skills to the U.S. Geological Survey.”

As State Geologist and Director of the State of Alaska Division of Geological and Geophysical Survey, Myers managed a research organization that included 38 scientists and support staff. The state survey generates analyses and interprets data on geologic resources and natural conditions and maps and inventories mineral and energy resources on state land. That information is used by the government, private industry, scientists, educators and the public.

As Director of the State of Alaska Division of Oil and Gas, Myers oversaw a professional staff of nearly 100 employees, including geoscientists, engineers, land managers, accountants, commercial analysts, and auditors.

Myers, an expert on North Slope sedimentary and petroleum geology, served as survey chief for field programs in the MacKenzie Delta (ARCO, 1985), Cook Inlet (State of Alaska/U.S. Geological Survey, 1997), and North Slope (ARCO,
1999). He also served as sedimentologist for 13 other North Slope field programs.

Myers is a past president and board member of the Alaska Geological Society; a certified professional geologist with the American Institute of Professional Geologists; a certified petroleum geologist with the American Association of Petroleum Geologists; and a licensed geologist with the State of Alaska.

He served as an officer in the U.S. Air Force Reserve from 1977 to 2003, retiring as a Lt. Colonel.

He received his doctorate in geology from the University of Alaska-Fairbanks in 1994, specializing in sedimentology, clastic depositional environments, surface and subsurface sequence analysis and sandstone petrography. Myers earned his B.S. and M.S. degrees in geology from the University of Wisconsin-Madison.

The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect America’s quality of life. The USGS is organized with a Headquarters and Eastern Region facility in Reston, Va. Central Region and Western Region offices are located in Denver, Colo., and Menlo Park, Calif., respectively.

The 10,000 scientists, technicians and support staff of the USGS are located in nearly 400 offices in every state and in several foreign countries. With a budget of more than $1 billion a year, the USGS leverages its resources and expertise in partnership with more than 2,000 agencies of state, local and tribal government, the academic community, other federal allies, non-governmental organizations, and the private sector. Field investigations, direct observations of natural science processes and phenomena, and monitoring and data collection at the local scale are the scientific hallmarks of the USGS.

Dear Mark:

On behalf of the AIPG Executive Committee, members, and headquarters staff we extend our sincere congratulations to you on your nomination to the Directorship of the USGS. All of us at AIPG are proud that one of our own colleagues will be appointed director of the most important and prestigious geologic survey in the world.

As you begin your new responsibilities please do not hesitate to call upon us and the AIPG community if we can be of service or support you in any way. We also look forward to meeting with you in Washington to discuss AIPG support for critical USGS initiatives, both ongoing and new.

Lawrence C. Weber, CPG
President

William J. Siok, CPG
Executive Director

Congratulations to Terry Swor on AET Named Firm of Year

American Engineering Testing has been named the 2006 Firm of the Year by the American Council of Engineering Companies of Minnesota (ACEC/MN). At its annual meeting on May 24, Scott Samuelson, PE, president of ACEC/MN, conferred the award on Terry Swor, CPG-04097, PG, president of AET.

The award is presented annually to one member firm in recognition of significant contributions to the consulting engineering profession and the advancement of ACEC/MN. Foremost among evaluation criteria is the level of...
of individual employee involvement in these efforts.

The award recognizes AET’s emphasis on staff professional development through participation in ACEC committees, attending educational programs, and seeking leadership roles within the organization and the industry. AET advocates young people pursuing interests in science and engineering through staff presentations at schools and colleges, by encouraging participation in state and national science competitions, and with an annual geotechnical scholarship program. The honor also acknowledges AET’s financial and policy support for the engineering profession.

AET received the ACEC/MN’s inaugural Firm of the Year honor in 1992 and is the first company to receive the recognition two times.

ACEC/MN is a professional association with more than 150 member firms representing all segments of engineering throughout Minnesota. It is part of a national federation of state associations. Since 1949, the organization has promoted elevating the quality and uniformity of engineering service.

AET is an employee-owned company with headquarters in St. Paul. The firm and its affiliate, American Petrographic Services, Inc. (together comprising American Consulting Services) specialize in geotechnical, environmental, materials, concrete petrography, and forensic services for public and private sector clients in the Upper Midwest.

Robert J. Weimer Presented Legendary Geoscientist Award In Sedimentary Geology

AGI honored an individual known for his numerous and significant contributions to applied research in sedimentary geology and for his longtime commitment to education and research. Dr. Robert J. Weimer is a consulting geologist and has been a member of the geology faculty of Colorado School of Mines since 1957.

Dr. Weimer was born in Glendo, Wyoming in 1926. He was part of the U.S. Navy war effort and took training in the Air Corps and ROTC Engineering Program. He met Ruth Carol Adams and married her in 1948. He received both his B.A. (1948) and his M.A. (1949), majoring in Geology, from the University of Wyoming. In 1953 he received his Ph.D. in Geology from Stanford University.

Professor Weimer began his career with Union Oil in Utah in 1949 and became a consulting geologist in 1954, which he remains. In 1957 he joined the faculty of Colorado School of Mines and has positions ranging from assistant professor to department head to his present position as professor emeritus. His renown extends even further due to the many students he has influenced who then went on to productive careers in the petroleum and other industries as well as because of his international lectures and courses.

His long and distinguished career includes many awards. Among them are Wyoming University’s Distinguished Alumnus (1982), the SEPM Twenhofel Medal (1995), AAPG’s Sidney Powers Medal (1983) and Distinguished Educator Award (1996), the Hollis D. Hedberg Award in Energy from the Institute for the Study of Earth and Man at Southern Methodist University (2001) and GSA’s Sloss Award (2003). He is also an Honorary Member of both AAPG and SEPM.

He has been actively involved in the geoscience community in a variety of ways. Among the societies he has served as officer for are the American Association of Petroleum Geologists, the Geological Society of America, the Rocky Mountain Association of Geologists, and the SEPM (Society for Sedimentary Geology). There are over 200 publications that he is either an author or co-author for.

He is truly deserving of this honor for his more than 56 years of exceptional service to the advancement of the geosciences, his legacy of knowledge that he freely communicates to students, and the many ways he has imparted his unique information to the petroleum industry.
WASHINGTON - Fabled equatorial icecaps will disappear within two decades, because of global warming, a study British and Ugandan scientists has found. In a paper to be published 17 May in Geophysical Research Letters, they report results from the first survey in a decade of glaciers in the Rwenzori Mountains of East Africa. An increase in air temperature over the last four decades has contributed to a substantial reduction in glacial cover, they say.

The Rwenzori Mountains—also known as the Mountains of the Moon—straddle the border between the Democratic Republic of Congo and the Republic of Uganda. They are home to one of four remaining tropical ice fields outside of the Andes and are renowned for their spectacular and rare flora and fauna. The mountains’ legendary status was set during the second century, when the Greek geographer Ptolemy made a seemingly preposterous but ultimately accurate statement about snow-capped mountains at the equator in Africa: “The Mountains of the Moon whose snows feed the lakes, sources of the Nile.”

The glaciers were first surveyed a century ago when glacial cover over the entire range was estimated to be 6.5 square kilometers [2.5 square miles]. Recent field surveys and satellite mapping of glaciers conducted by researchers from University College London, Uganda’s Makerere University, and the Ugandan Water Resources Management Department show that some glaciers are receding tens of metres [yards] each year and that the area covered by glaciers halved between 1987 and 2003. With less than one square kilometer [half a square mile] of glacier ice remaining, the researchers expect these glaciers to disappear within the next 20 years.

Richard Taylor of the University College London Department of Geography, who led the study, says: “Recession of these tropical glaciers sends an unambiguous message of a changing climate in this region of the tropics. Considerable scientific debate exists, however, as to whether changes in temperature or precipitation are responsible for the shrinking of glaciers in the East African Highlands that also include Kilimanjaro [in Tanzania] and Mount Kenya.” Taylor and his colleagues found that in the Rwenzori Mountains since the 1960s, there are clear trends toward increased air temperature without significant changes in precipitation.

A key focus of the research is the impact of climate change on water resources in Africa. Glacial recession in Rwenzori Mountains is not expected to affect alpine river flow, the scientists say, due to the small size of the remaining glaciers. It remains unclear, however, how the projected loss of the glaciers will affect tourism and local traditional belief systems that are based upon the snow and ice, known locally as “Nzururu.”

“Considering the continent’s negligible contribution to global greenhouse-gas emissions, it is a terrible irony that Africa, according to current predictions, will be most affected by climate change,” added Taylor. “Furthermore, the rise in air temperature is consistent with other regional studies that show how dramatic increases in malaria in the East African Highlands may arise, in part, from warmer temperatures, as mosquitoes are able to colonize previously inhospitable highland areas.”

The research was funded by The Royal Geographical Society and The Royal Society.
Donald W. Lindgren

Donald William Lindgren was born October 3, 1924, in Moline, the son of William R. and Elsie (Huth) Lindgren. He married Mary Kay Frieden in 1961. He received his Ph.D. from Dartmouth College in 1959 and his M.S. from St. Paul’s Mountain School in 1951 and St. Paul’s School in 1955. He earned his B.S. from Cardigan Mountain School in 1951 and St. Paul’s School in 1955. He earned his B.S. from Dartmouth College in 1959 and his M.S. in 1961. He received his Ph.D. from Harvard in 1968.

Samuel A. Adams

Our “Man for All Seasons,” Samuel “Sam” Sherman Adams, died Wednesday, May 3, 2006, at his home. His wife-partner-best friend of 50 years, Nancy Morris Adams, was with him.

Born in Lincoln, New Hampshire in 1937, he is the son of Sherman and Rachel Adams. Sam is the father of Melinda Adams McGregor of Del Ray Beach, Fla., Katrina Adams Moran of Empire, Nev., and Jonathan Sherman Adams of Thornton. He is the father-in-law of Daniel Moran and Angela Marie Adams, and the GranDad of Megan Tinker Adams Freese.

Sam was involved in many professional societies, was a Boy Scout leader, a 32nd Degree Mason, and a member of the American Legion. Donald became a CPG with AIPG in 1965. He enjoyed gardening, sailing, golf, traveling, and sports, both as a participant and a spectator, especially the Chicago Cubs.

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A Sam Adams Memorial Salute (SAM’S) will take place June 17 at 2 p.m. at South Congregational Church, 27 Pleasant St., Concord, NH followed by a tent celebration at the Adams’s small second home on the ocean.

Contributions in Sam’s honor may be made to NAMI NH, 15 Green St., Concord 03301; the Canterbury United Community Church, Canterbury Center, Canterbury 03224; Concord Regional Visiting Nurse Association, Hospice Program, P.O. Box 1797, Concord, NH 03302-1797; or to any organization in which Sam was involved.

We say: “Good-bye for now, our beloved ‘Man of the Year,’ from your wife, family and friends. We love you!”
REQUEST FOR NOMINATIONS

The AIPG Awards Committee is seeking nominations for future recipients of the Ben H. Parker Memorial Medal, the Martin Van Couvering Memorial Award, the John T. Galey, Sr. Memorial Public Service Award, Honorary Membership, and Outstanding Achievement Award. The qualifications for these awards can be found below. Nominations for these awards, accompanied by supporting statement, should be sent to AIPG Headquarters, c/o Honors and Awards Chr., 1400 W. 122nd Ave., Suite 250, Westminster, CO 80234.

BEN H. PARKER MEMORIAL MEDAL

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

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

MARTIN VAN COUVERING MEMORIAL AWARD

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

The most important criterion for this award is service to the Institute. As in other awards, a wide variety of contributions to the Institute may be considered. By far the most important contribution a geologist can make to the Institute is a continual record of distinguished and outstanding service to the profession.

The Martin Van Couvering Memorial Award is service to the Institute. In other awards, a wide variety of contributions to the Institute may be considered. By far the most important contribution a geologist can make to the Institute is a continual record of distinguished and outstanding service to the profession.

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

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

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

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

AWARD OF HONORARY MEMBERSHIP

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

OUTSTANDING ACHIEVEMENT AWARD

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

American Institute of Professional Geologists
Nomination form for 2007 AIPG Awards

(Please check one)

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

NAME OF CANDIDATE:_____________________________ Telephone:_____________________________
Address:________________________________________ Fax:_____________________________
Address:________________________________________ E-Mail:___________________________

NAME OF PERSON MAKING THE NOMINATION:_____________________________
Telephone:_____________________________ E-Mail:___________________________
Address:________________________________________
Address:________________________________________
Signature:________________________________________ Date:___________________________

Supporting Statement (In brief here, please submit detailed letter of support):______________________________

RETURN TO: AIPG, Attn: Awards, 1400 W. 122nd Ave., #250, Westminster, CO 80234. Ph. 303-412-6205, Fax: 303-253-9220
DEADLINE: Completed nominations must be received by December 15, 2006.
NEW MAPS FROM THE USGS...


U.S. Department of the Interior,
U.S. Geological Survey, Reston, VA, USA
URL http://ngmdb.usgs.gov/ngmdb/ngm_catalog.ora.html

AIPG 2006 NATIONAL AWARDS

Ben H. Parker Memorial Award
Robert R. Jordan, CPG-01262
Yorklyn, Delaware

Martin Van Couvinger Award
Richard M. Powers, CPG-06765
Lakeland, Florida

John T. Galey, Sr. Memorial Public Service Award
Richard M. Lane, CPG-06091
Savoy, Michigan

Honorary Membership
David M. Abbott, Jr., CPG-04570
Denver, Colorado

Honorary Membership
Myrna M. Killey, CPG-06033
Savoy, Illinois

CONGRATULATIONS!

AIPG Annual Meeting “Sustainability” Saint Paul, Minnesota September 23-28, 2006
For more information contact: Mike Ruddy 1-800-588-0117 mikeruddy@aipg2006.org or Jane Willard 651-645-6330 janewillard@aipg2006.org www.aipg2006.org
Earlier this year, a few of us got together to review the AIPG’s strategic plan. That session revealed that while the Mission and Purpose of AIPG remains much the same as in earlier years, our organization and its members must recognize and embrace fundamental changes affecting our profession. A final version of an updated Strategic Plan is not yet available, but here are some thoughts concerning the reality of change and a vision for the future.

**A Need for Membership Growth**

We have beaten this horse so many times the poor ole nag is looking close to death. But, we must continue to work on building our membership. The unfortunate truth is that in the fast-paced world of today, fewer people have the time to join and become involved with professional groups. It is difficult to find potential members who are both interested and available to participate. The idea of doubling our numbers by asking every member to find another member is pretty simple, yet it has not worked so simply. Not many people, even from our own membership, appear to have much concern for finding new members; and so, membership growth remains a challenge and a continuing priority. In searching for new members I feel that we must also search for leaders, leaders who can convey a message and inspire others. I am convinced that it only takes a few leaders, to make a successful AIPG section grow. Therefore, the new challenge is to find more than just a member – find a leader.

**Shifting the base to the Member Category**

As years go by we will likely see a disproportionate rise in the number of new members relative to the number of new CPGs. We can debate whether licensing of geologists has eroded the value of the CPG; but, in the end, the value is what the individual perceives it to be, and for many the CPG is not in high demand. Therefore, while most of us who hold the CPG title will retain it and will always consider it to be a highly regarded credential, the fact of the matter is that we must prepare for a shifting of the membership base toward the member category. This means that bylaws may need to be revised to lessen any disparity in the general treatment of the interests, benefits and privileges accruable to Members compared to CPGs. Any need for us to emphasize the universal importance of the CPG above the importance of belonging to AIPG and adhering to its code of ethics, shall be diminished as the diversity of our professional members grows.

**Recognize the Broader Field of Geosciences**

It is good that geologists are finding new ways to contribute in the workplace. The growth of the environmental service industry, the heightened concerns for geologic hazard mitigation, and the role of geoscientists in new endeavors such as remote sensing and space exploration are just a few examples of how the field of geoscience is expanding beyond traditional roles and subject matter. Frequently, the executive committee of AIPG is faced with having to decide whether a person trained and practicing within a specialty field of “earth science” is educationally qualified to be a CPG. These candidates may not have all of the course work customarily considered part of the basic curriculum of a degree in Geology. However, they may be very well qualified to work as an environmental scientist and be very knowledgeable within a specialty field of geoscience. We could debate at length whether these people are really “geologists”; but regardless of how you answer that question, we could likely agree that they could benefit from association with a professional group like AIPG. Likewise, AIPG could benefit from their membership and service to our profession. It is time to start thinking about the
larger body of geosciences and focusing less on traditional requirements. This may be particularly difficult for some geologists educated in the traditional sense. However, we must look at the universities and the type of degree programs now being offered in place of a traditional geology degree. Look at the places where geologists are working. The substance of applied geology is changing, and AIPG will do well to accommodate these changes.

**Uniting Efforts with Other Organizations**

A few weeks ago, I attended a meeting organized by the American Geological Institute (AGI). The purpose of the meeting was to discuss ways in which the geologic profession could, as a whole, agree on a course of action to strengthen and improve our profession. AGI is an umbrella organization of other geology-related organizations. AIPG is a member of AGI, along with more than 40 other professional societies and groups. That means that there are well over 40 professional organizations, each representing some fraction of the number of geologists in this country. Apart from AGI, each organization is following its own agenda and serving its members without much interaction with other groups. This splintering and weakening of the voice and focus of the geologic profession is a concern to both AIPG and AGI. There should be ways in which AIPG can work more closely with other sister organizations to accomplish something bigger than what each can do separately. It some instances, there may be opportunities to merge with like-minded groups in ways that would improve the effectiveness of the combined organization. The difficulty lies in just how to accomplish this goal and who gives up what, if anything, in the process. I believe the concept of working through a larger group like AGI is logical and likely to be the most effective mean in the short term to accomplish any large scale initiatives on behalf of the entire profession. However, with regard to the advancement of professionalism within the geosciences and as a means of serving the professional interests of the individual geologist, AIPG holds a unique and invaluable role.

To this end, AIPG needs to improve and build upon our relationships with other professional organizations.

**Promote Advocacy at the Section Level**

AIPG will always be attentive to the needs of its members and will attempt to exert its influence on their behalf in any forum available. However, the effectiveness of AIPG as a politically influential group is questionable at the national level. We just are not large enough to sway the opinions of Washington politicians in mass. In contrast, however, we can be very effective at the state government level. Therefore, I encourage the promotion of advocacy programs at the section level. State governments are where most of the regulations and laws are made that affect our day to day business. Licensing laws, environmental regulations and land use rights are just a few of issues decided largely at the state level. The interest of AIPG members are well served by having a strong local section with informed and concerned members, officers and committees.

**Capitalize on the Education Opportunity**

If certification of the professional geologists was the focus of AIPG years ago, perhaps the continuing education of the professional geologist should be the focus of AIPG tomorrow. Some feel that the future of AIPG may lie in the universal need for professionals to continue their education. Combine this need with the ability of AIPG to provide cost effective continuing education opportunities through distance learning and we may have a formula for success. Consider also that the mission of AIPG is well served by providing a means by which practicing professionals can acquire the training needed to maintain competency. Continuing education, involving both technical training and professional training through formalized programs, will without doubt be more universally required as registration laws, regulatory issues and corporate policies for career advancement grow in complexity. If we can continue to move forward with our fledgling distance learning capabilities, AIPG can fill a need and benefit from the demand for continuing education.

As I close this column, I applaud those AIPG sections that manage to maintain strong programs and support the needs of their members. I truly believe that the strength of AIPG lies at the section level, more so than at the national. Those sections that maintain consistent levels of interest and accomplishment often can attribute that success to a few key individuals. Thank you to all of those leaders, workers, and dedicated members whose efforts are critical to our survival as an organization and to whom too little credit is given. You (and you know who you are) are much appreciated. I hope you are enjoying a good summer.

Larry
TPG often contains articles about one of AIPG’s primary functions, advocacy on behalf of the profession. Perhaps then, a look at an advocacy activity in which AIPG engages annually will fit the bill for a timely topic. During the week of August 14, AIPG will exhibit at the National Conference of State Legislatures (NCSL) 2006 annual meeting in cooperation with six sister societies including AASG (Association of American State Geologists), AAPG (American Association of Petroleum Geologists), AEG (Association of Engineering Geologists), the Geo-Institute of ASCE, GSA, and AGI (American Geological Institute). Exhibiting at the NCSL annual meeting is not a new activity, but one in which AIPG has been engaged for about 20 years. Seven sister societies are working collaboratively to promoting the contributions of geoscientists to state and national wellbeing.

In brief, the NCSL (www.ncsl.org) annual meeting is attended by state legislators from both parties and from most states. It is an excellent opportunity for geologists to provide state representatives and senators insight into the critical role played by geology and geologists in the context of our economy and general state and national well being. Many other professions, businesses, and organizations also exhibit at NCSL.

NCSL has been referenced previously within the pages of TPG. Suffice it here to say that it is generally a worthwhile activity. Members of all geoscience organizations are invited and encouraged to attend and spend a few hours at the geoscience educational exhibit. The experience is both worthwhile and professionally satisfying.

In an article which appeared on page A-1 of the July 26, 2003 San Francisco Chronicle, the day after the 2003 NCSL meeting, a reporter referred to all NCSL exhibitors as lobbyists. He may have a point, but it is not likely any of us geologists staffing the exhibit could honestly be labeled as a lobbyist. None of us try to influence any legislator. Unless you would consider our encouragement to consider geologic factors when making decisions about statutes pertaining to energy, water supply, development, geologic hazards as lobbying.

The participating geoscience societies do the best to provide basic educational material (maps, literature, photographs, mineral specimens) designed to quite simply make legislators aware of geology and its impact upon every facet of daily life. It is a stretch to label any of the work we (geoscientists) do at conventions such as NCSL as lobbying. It is most appropriate to identify our advocacy work as educating and educational.

Advocacy Can Be Educational

William J. Siok, CPG-04773

Executive Director’s Column

INSURANCE PROGRAMS

Available to
AIPG MEMBERS

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Phone: 800-337-3140 or 805-566-9191

Professional Liability
The Novick Group
http://www.novickgroup.com
Phone: 301-795-6600/FAX: 301-795-6610
Representative: Greta Palya

Auto and Home Insurance
Liberty Mutual Insurance
http://www.libertymutual.com/lm/aipg
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Please mention client #111397 when you contact Liberty Mutual.

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Terry S. Maley

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Mineral Land Publications, P.O. Box 1186, Boise, Idaho 83701 Phone: 208-349143
Good News About the ASBOG® Exam

In column 99 (September-October 2005), I wrote about the bias towards hydrology, environmental geology, and engineering geology in the ASBOG® test and questioned the bases for the test weightings. These remarks caused quite a stir for a variety of reasons. One consequence was an invitation to be AIPG's representative as a subject matter expert to the ASBOG Council of Examiners' meeting in April. The Council of Examiners reviews past tests to determine which questions should be strengthened, revised, or discarded and to write new ones. The Council is divided into two groups, one to review the Fundamentals of Geology (FG) exam and one to review the Practice of Geology (PG) exam. Meeting over two days, the Council spends the first day reviewing the exams just given and the second day reviewing the questions on the next exam to be given.

I have a variety of good news to report based on my experience. First, ASBOG recognized that the subject matter weighting in the past two exams, October 2005 and March 2006, was too heavily weighted towards hydrogeology and environmental geochemistry and has altered to a far more even distribution in the question mix for the October 2006 and future exams. The table below presents the weightings. (ASBOG publishes these weights for each test in its candidate handbooks and on its web site prior to each exam.)

The weighting for the October 2005 and March 2006 exams was based on the task analysis questionnaire sent out in the summer of 2005 to a randomly selected group of licensed geologists around the country. This task analysis called for two items of information regarding each task, its importance in the practice of geology and the time spent on it. This is a standard psychometric technique used for professional exams. The tasks are then ranked on the basis of the means of the respondents' numerical ratings according to the following formula.

\[
\text{ranking} = \text{time-rank mean} \times \text{importance-rank mean}^2
\]

The importance of a task is weighted by its squared mean and the time spent on the task by its mean. For example, most of us do not spend a lot of time on detailed mineralogy, so that mineralogy would have a low time-rank mean. But if most of us feel that mineralogic knowledge including the ability to consult with a mineralogy book and readily find the answer when we have a mineralogic question is very important to our practice, the square of the importance-rank mean will lift the ranking of mineralogy in the overall mix of professional tasks.

It turns out that 68% of the respondents to the 2005 task analysis study were hydrogeologists. Whether or not this reflects an inference that 68% of practicing geologists these days are hydrogeologists (as opposed to a roughly similar percentage of petroleum geologists 30 years ago) is not important. What is important is that the imbalance of a test given in order to license geologists who practice in all specialties has been recognized and adjusted.

Personally, I view the first five content domains listed in the table as geologic fundamentals in which any practicing geologist should be well grounded. Most geologists will probably agree with this view. The final three domains are practice specialty areas. One can debate whether the foregoing domains are the best groupings. For example, should petroleum and mining be split? Should seismology be covered along with other geophysical methods in the first domain?

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**ASBOG® FG and PG Test Blue Prints**

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<thead>
<tr>
<th>Content Domains</th>
<th>10/05 and 3/06 exams</th>
<th>10/06 exam</th>
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<tbody>
<tr>
<td></td>
<td>FG%</td>
<td>PG%</td>
</tr>
<tr>
<td>General geology, field geology, geophysics, imagery, modeling, and graphical methods</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>Mineralogy, petrology, and petrography</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Sedimentology, stratigraphy, and paleontology</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Quaternary geology, geomorphology, and surficial processes</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Structure, tectonics, and seismology</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Hydrogeology and environmental geochemistry</td>
<td>36</td>
<td>41</td>
</tr>
<tr>
<td>Engineering geology</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Economic geology and energy resources</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Totals</td>
<td>100</td>
<td>100</td>
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or split between earthquake seismology, included with engineering geology, and exploration seismology, included within other geophysical methods or petroleum geology?

However, before engaging in lengthy debates about such questions of classification, a couple of things should be kept in mind. The first point is that the test questions are designed so that the entry-level geologist at both the fundamental and practice levels who possesses a good educational foundation (and some practical experience in practice for the PG exam) should be able to pass the test. My own experience with the March 2006 PG exam supports this intent.

I primarily practice mineral resource geology, primarily base and precious metals and industrial minerals, although I do some petroleum work and have some experience with coal and uranium. I have also been on a number of AIPG field trips emphasizing engineering geology, particularly landslides—a common problem in Colorado. But although I have attended some hydrology and environmental geology talks and read some papers on these topics, I do not consider myself qualified to practice in these areas. I attended the Council of Examiner’s meetings with no preparation and not knowing exactly what to expect. And so, with some trepidation due in part to complaints I had heard about the hydrology and environmental geology biases of the ASBOG® exam and the character of the questions published in each issue of TPG, I found myself spending 3 or so hours of the Friday session essentially taking the March 2006 PG exam. I had no help and did not have a calculator. All the other subject matter experts were doing the same thing. Our job was not only to answer the questions but to flag any questions or answers we individually believed were problematic in some way. After the group had completed the exam, we went through each question on the exam, identifying for the first time what the correct answer for each question was and discussing any concerns raised by the question or answers. Thus, I was able to score my performance as if I had taken the exam in March. Despite my lack of preparation, calculator, and an exam bias towards areas in which I do not practice, I had correctly answered a higher than passing percentage of the questions.

I was pleasantly surprised by this result. I found that application of basic geologic principles and reasoning to the questions allowed me to answer most of the questions. There were a few questions I did not even try to answer; I had no clue what they were about. But then the most clearly precious metal exploration question on the exam, which I regarded as a very fundamental, no brainer question, was one many of the engineering, environmental, and hydrogeology experts in group had not a clue about.

In examining the questions and answers closely to see if changes in wording, etc. were needed and in writing questions to ensure that an appropriate number of questions in each of the content domain areas were on the test for this October to meet the target distribution, I quickly realized that many questions can legitimately be classified under more than one task statements (the micro basis for writing and selecting exam questions). I was amused during a discussion of a question regarding a site investigation procedure that most of my colleagues were thinking of an abandoned mining site as they considered the question while I thought of it in terms of two major environmental clean-up sites in the Denver area, the Rocky Mountain Arsenal, which manufactured nerve gas bombs and other chemical nasties, and the Rocky Flats nuclear weapons plant. In terms of the question being considered, it did not matter which type of site one was considered.

In conclusion, I can say ASBOG is working very hard to develop reasonable tests containing questions of an appropriate degree of difficulty for the target group taking each of the two tests. 1 It is concerned that the tests be defensible in court, should they be challenged (the test has been challenged once and all challenged questions were successfully defended). And it is seeking ways to improve the information collected about the test so that statistical analysis of the questions and of those taking the exams can uncover problems that can then be corrected. For example, in the future, those taking the test may be asked to check one of several broad specialty practice boxes. The statistics derived from this information may be helpful in identifying questions that are more specialized than they ought to be. For example, if a particular question is answered correctly only by the hydrogeologists taking the test and not by those in other specialties who otherwise received high scores on the test, perhaps the particular question should be dropped from the pool of test questions.

Finally, perhaps the best news for those like me who have been out of school for 25 years or more and who really do not look forward to spending a lot of time preparing for a test to allow them to continue doing what they are currently doing in another state, if your geologic fundamentals are good, and I hope they are, it is possible that you can walk into the test cold and pass them. I should also say that most of the questions do not involve calculations or recall of formulas mentioned in some other exams, and if at all. There may be a few such questions, but they will not keep you from passing and most of the questions will involve simple calculations that can be done by hand if you do not have a calculator—yes you will have to add, subtract, multiply, and divide. Disseminating this conclusion, essentially public relations message, is perhaps something ASBOG and those promoting the use of its test need to do a better job of communicating to the geologic community at large. The character of the example questions published in each TPG issue should be revised as well.

Protecting the Public’s Health, Safety and Welfare—but does the public want protection?
(Column 102, March-April 2006)

Rob Blair, CPG, sent me the following: “I found your column 102 interesting, especially the ‘Protecting the Public’s Health, Safety and Welfare—but does the public want protection?’ As is often the case the answer is ‘no.’ Perhaps climbing can be used as an example. Climbers generally know the risks involved but make choices on whether to wear helmets and the route and time of season to do their climbs. It is their free will and they are doing it for fun and the challenge and do not want to be told when, how and where they should climb.” The same can be said, in

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part, on where a person lives. They want to make the choice and as is mostly the case (unlike climbers) they are clueless on the risk of potential geohazards.

"I would suspect that if automobile liability insurance was optional then many (most?) people would not buy it. But, it is state law that to be legally driving you must show evidence that you have liability insurance. So why is it required? I assume in part (no fault insurance) it facilitates easier settlement of claims and keeps it out of the overtaxed court system. I doubt that the insurance has deterred drivers from driving a car, but if a high risk driver has to pay more insurance then they might be squeezed out of driving. But as you know however there are a large number of uninsured drivers out there.

"So what has this to do with the article? An idea that is not new, but pops up on occasion is to reduce the number of people from living in high risk geohazard areas by letting economic cost act as a throttle. Push through the state legislature a requirement that all home owners in high-risk areas must pay for flood, earthquake, hurricane, forest fire, and other natural hazard insurance. This would not solve the problem of people being in harm's way but it would reduce the number of people impacted especially if the cost is high (on purpose?). For example, it is not unusual to find high-density trailer parks built on floodplains. But if each trailer home had to pay for a high-cost for insurance they likely would live some where else. The rich land owner might be willing to pay for his house and the geohazard insurance but if a disaster occurred then the insurance company would compensate and this would relieve the cost of public "disaster funds" that often are released after a disaster. This might help the state and federal budgets.

"To get people who are already living in hazardous areas to suddenly have to pay exorbitant insurance cost would not fly. But annual insurance increases over a period of ten years might or institute insurance requirements after a disaster has taken its toll and rebuilding is necessary. Does New Orleans require mandatory hurricane insurance?

"A spin off of requiring geohazard insurance is that insurance companies could become one of the bigger employers of geoscientists.”

Blair’s suggestion that requiring mandatory, appropriate geohazard insurance can be a motivator provides, at least in part, a potential solution. An article headlined, “Homeowners Face Rising Insurance Rates,” in the March 23, 2006 Wall Street Journal reported that as a result of losses from last summer’s hurricanes, insurers are dropping coverage or increasing premiums along the Gulf and Atlantic coasts. The article noted that although Massachusetts has not experienced a devastating hurricane for 50 years, a number of insurance companies will no longer offer homeowner’s policies on Cape Cod, Martha’s Vineyard, and Nantucket Islands. The insurer of last resource is a state program.

The centennial of the 1906 San Francisco earthquake prompted a column by John Gapper in the April 4, 2006 Financial Times titled “Earthquake insurance should cost a lot.” Gapper reported that reinsurance rates are increasing rapidly and insurance companies are being more selective in who they will insure. However, Gapper noted that state insurance regulations cap the cost of earthquake, hurricane, and other geohazard insurance in order to keep rates affordable. State insurance programs also are left as the insurers of last resort for those living in the most vulnerable locations. Gapper argues that these cost limits do not provide the incentive required to encourage people to move out of hazardous areas. He pointed out, “The best argument for state-backed insurance is that, faced with the true market cost of insuring expensive homes in hazardous areas, people will cross their fingers instead. That has happened in California, where only 13 percent of people have earthquake insurance. Since the 1994 Northridge earthquake, policies have been expensive and require holders to pay about 15 percent of any claim. Were the 1906 earthquake to be repeated, many Californians hope that the federal government would come to their rescue, just as New Orleans got aid after Katrina.”

As Blair recognized, getting our legislatures convinced that geohazard mitigation laws, through mandatory insurance, particularly at market cost, or other actions such as zoning bans, are needed face real opposition from a variety of groups. Aside from developers and other potentially affected land owners, such laws (including the laws requiring auto insurance) adversely impact those on the bottom of the economic system by increasing the cost of housing (and driving, which many do without insurance in order to get to their jobs). Building safety codes have the same effect but have nevertheless been deemed necessary by society at large. The impact of Katrina and other hurricanes may result in some movement on the hurricane front. It takes a major event like the hurricanes of recent years to convince legislatures of the need for action. But encouraging people to move out of hazardous areas results in population and economic declines, a hard sell when legislatures generally favor growth. Many geohazards, like rock, mud, and snow slides, etc. do not impact as many people and may be a harder legislative sell.

As I wrote the first parts of this discussion, I was visiting a number of mine sites around the western US. I noticed a significant increase in the amount of rockfall mitigation of varying types along the road cuts I drove past. Clearly state highway departments are increasingly recognizing the need to deal with rockfall issues along roads. So progress is being made in various areas, albeit slowly and perhaps without a lot of fanfare. But is this progress sufficient?

As always, further comments on this topic and its solution are welcome.
papers. However, if the joint paper was longer, you might be able to gain professorial approval. I gather that professors are increasingly searching the web, etc. to catch those students who are buying papers, etc. instead of doing the work themselves. This probably makes it more likely that the professors will be aware of the dual paper submission, because copying the papers of other students has a long history (I gather), at least in some instances. Explaining things ahead of time leads to a lot less grief than explaining later and suffering a bad grade.

Lies, Statistics, and “Spin”:
Sea Level Rise
(Column 102, January-February 2006)

Bob Finkelman, CPG, wrote, “Am I wrong or did you slip into a hole that you dug? In your discussion of the Sea Level Rise charts you correctly pointed out that there is a significant difference in the vertical scales. However, there is an equally significant difference in the horizontal scales. Making the appropriate adjustments I do see a discernible sea level rise in recent years. Assuming the data are correct, there has been a rise equivalent to 4 meters/2,000 years.”

Finkelman is correct that the horizontal scales in the two graphs are different. He is also correct that the long-term chart of post-glacial sea level rise shows slightly increasing levels for the past 2,000 years, although I would say the amount of rise has been fairly steady for the past 5-6,000 years. The real question is whether the data from 1880 through 2000 represents a change in the rate of sea level rise. From what it has been for 2,000 years, although I would say the slightly increasing levels for the past several thousand years. This change in graph scales appears to be putting the “spin” on the argument.

Engineers vs. Scientists
(Column 102 and 103, March-April and May-June 2006)

Vic Ridgley, CPG, sent me the following note after column 103 was finalized and before it was published. Ridgley noted the same issue of widow makers that Greg Hahn pointed out in column 103, but Ridgley’s comment cites a specific example of such a failure. Ridgley wrote, “Regarding the mine design image shown [in columns 102 and 103], there is a slightly bigger issue than the oversight of omitting ore benches from the mine access network. On the right side of the image, at the lower elevations there are two areas where the benches project towards the pit, unsupported on three sides; [these are labeled ‘widow maker’ peaks in the figure in column 103]. Such areas are prone to slope failure, as Santa Fe Pacific Gold discovered to its chagrin on a Christmas Day in the mid-1990s. The west wall of the MegaPit at Twin Creeks failed in such a manner, and covered up a zone of active mining zone for months, severely impacting the production for a year or so. Fortunately, there were no fatalities, as incipient slope failure on the local bench summit had been noted several months earlier, placing the area off-limits to mine personnel.”

Texas PGs—Meeting the Ethics CPD Requirement

During the DPA/DEG session at the April AAPG Annual Meeting, session co-chair Kevin Coleman, CPG and first chairman of the Texas Board of Professional Geologists, was asked about meeting the new Texas CPD requirements, particularly about meeting the 1 hour of ethics requirement. Kevin suggested that keeping track of your time reading this column on a regular basis should qualify. I appreciate Coleman’s encouraging folks to read this column. I have a further suggestion; contribute a topic, question, or comment to the column. I give credit to all contributors (unless asked not to) and having your name in the column provides documentary evidence of your contribution.

Topical Index to the Professional Ethics and Practices Columns

I have prepared a topical index covering columns that have been placed on the AIPG web site in the ethics section. The index is in PDF format. The original file is in Microsoft Excel format. If you would prefer the Excel file, send me an e-mail and I will send it to you. I will update this index periodically and post the new copy on the AIPG web site. If you have suggestions on organization, please let me know.

David M. Abbott, Jr., CPG-04570, 2266 Forest St., Denver, CO 80207, 303-394-0321, fax 303-394-0543, DMAgeol@msn.com

What’s going on during Earth Science Week 2006?

Since October 1998, the American Geological Institute has organized this national and international event to help the public gain a better understanding and appreciation for the Earth Sciences and to encourage stewardship of the Earth. This year’s Earth Science Week will be held from October 8-14 and will celebrate the theme “Be A Citizen Scientist!”

• Want to get involved in Earth Science Week 2006? Here are some ideas:
  • Events Near You:
  • Find Earth Science Week events in your community.
  • Contests:
    • Enter an Earth Science Week contest.
    • Participate in a Research Project:
    • Participate in a real Earth science research project.
  • Proclamations:
    • Since its creation, Earth Science Week has been officially recognized throughout the nation. Read our list of proclamations.
    • Earth Science Network:
    • Find organizations sponsoring Earth Science Week on our Earth Science Network.
    • Order an Earth Science Week toolkit!

To contact the Earth Science Week organizers:
E-mail: info@earthsciweek.org
Earth Science Week Manager - Geoff Camphire - 703-575-8815
Earth Science Week Program Assistant- Amy Spaziani - 703-379-2480 ext. 211
Director of Outreach and Development - Ann Benbow - 703-379-2480 ext. 245

www.aipg.org  JULY/AUGUST 2006 • TPG 21
Show-and-tell:
Specimens And Evidence That
Excite Your Audience

Allen W. Hatheway, Consulting Geological Engineer,
Rolla, Missouri & Big Arm, Montana, Allen@Hatheway.net

Introduction

As Kindergarten students, likely all of us were asked by Teacher to bring some object of curiosity to class to “share” with our fellow students. The object was to have been some three-dimensional item that had come into our lives during a recent venture out of the routine of our home life; some “thing” that had made an impression on us; some “thing” that would be of possible interest to the classmates and yet which would allow us the joy of passing on some degree of excitement. Teacher’s ploy was again repeated for many of us as a demand for “off the cuff” verbal discourse associated with a speech class or with one of the many service clubs that promote impromptu public speaking (such as the Toastmasters) as a talent-building exercise for members.

Not having had the benefit of membership in adult social-service clubs, it early came to me as a serving Lieutenant of Engineers that otherwise bored soldiers might be awakened by some legitimate explanation of a curious object or feature of Army life that might offer an explanation of some facet or term historic significance that made a difference as to how the Army wanted them to function or behave.

Those who know me well know that I am obsessed with identifying objects at both outcrops and in antique stores (Fig. 1, for instance), for starters, and that I commonly wear baggy-pocketed field trousers to accommodate this trait (addiction?).

Fact is, that hardly anyone else likes to put up with chafing rocks in pockets, and all too infrequently the virtue of “show-and-tell” is lost in today’s practice of applied geology.

Why Show-and-Tell

I like to think that any form of briefing of clients or prospective clients should include showing these folks something tangible as the basis of the ongoing discussion. Surely the graphic briefing is now the norm, and all graduating geologists and geological engineers should be expected to know how to put together a suitable computer-image (usually PowerPoint or Keynote) in about a half day’s time. That is, of course, if the actual materials, objects or images are at hand.

But, back to the fundamentals. When you conduct a show-and-tell briefing you are making a bold statement, to the effect that:

1) You really do know the site of the proposed project; or you cared “enough” to go out there and familiarize yourself with the place;

2) You are willing to put yourself “on the line” and deal with specifics of the site and of the proposed project;

3) Your degree of understanding has allowed you to identify and select something tangible about the site that may be otherwise unknown or unappreciated by your audience;

4) You have been able to locate, identify, select and preserve one or more physical features of the site as solid evidence of your relative sophistication concerning the features of the site that affect the interest of your audience, and;

5) You are able to provide some early “value added” to your potential engagement as the consultant, since many would-be clients are now searching for bargains and such other supposed “economies” from their consultants.

Generic Examples Of Show-and-Tell

My personal bias runs toward selection of rock or soil specimens, followed by other objects of interest, such forms of debris or waste (in forms non-threatening to the actual audience; including polluted or contaminated water specimens), followed by instructive images; all selected to make a point related to the client’s interests (Fig. 2).

Figure 1. Residential gas meter dumped at Sacramento, California Gas Works no. 2, and bearing the brass tag of its gas-company owner; prime show-and-tell evidence, ca. 1894! The meter is about 45 cm high in this view.
Some of my favorite approaches are covered in Table 1.

**Table 1**

<table>
<thead>
<tr>
<th>Item</th>
<th>Purpose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intact specimen of soil</td>
<td>Emphasize potential negative consequences of geologic constraints at the site</td>
<td>Place the specimen under crude stress in view of the audience; point out the obvious consequence in terms of specimen reaction to being stressed</td>
</tr>
<tr>
<td>Suite of two or three rock hand specimens or jars of soil</td>
<td>Forces recognition of a range of earth materials</td>
<td>Rely on obvious visual and mechanical features, mainly color and induration</td>
</tr>
<tr>
<td>Topographic map enlargement of physical model</td>
<td>Select obvious anomalies of contours as are visible to the eye</td>
<td>Superimpose the proposed project footprint as a faded outline over the contours; point out the intimate proximity of the situation</td>
</tr>
<tr>
<td>Aerial reconnaissance imagery</td>
<td>Point out site features of potential consequence</td>
<td>Fly the site and image the ground so as to enhance the obvious juxtaposition of the proposed development to geologic features of constraint</td>
</tr>
<tr>
<td>Seek images showing the site or similar sites under duress from natural hazard event(s)</td>
<td>Relate need to consider actual footprint alignment for optimal resistance to geologic constraints in or on the ground</td>
<td>Portrays a bevy of thought connections to the audience while demonstrating your high level of appropriate awareness as an expert</td>
</tr>
<tr>
<td>Incipient proof of suspected key geological conditions that may control site behavior</td>
<td>Give thought to what conditions might logically be expected on the basis of preliminary evaluation of the site landform and whatever exposures may be available</td>
<td>Try to find an explainable yet obvious connection between a minimum of two aspects of the site as are available for sampling and imagery</td>
</tr>
</tbody>
</table>

**Some Actual Examples Of Geologic Show & Tell**

Any practitioner who has become adept at transferring concepts to potential or existing clients likely has discovered *show-and-tell*! The purpose of this article merely is to provoke a constant reminder of the advantages of always being aware of collecting, sorting and saving the necessary evidence. Here (Table 2) are some of my own examples, as come to mind.

**Summary**

Now that many of us rely on digital cameras or on image scanning and computer manipulation of our older photographic images, all practitioners should...
be constantly mindful that the “where-with” of much show-and-tell opportunities lie in the geologists’ personal digital camera. In fact, I now scan my images, new and old, and file them in backed-up data files, for recall by key-word descriptive file-names. A high-end laptop computer thereby becomes your traveling image library, for instant use, on the road or in the office, for rounding out a show-and-tell based on hand specimens. Figure 3 is such an example, fished out of my laptop for this very article!

### Table 2

Actual Examples of Geologic Show-and-Tell In Application

<table>
<thead>
<tr>
<th>Case</th>
<th>Circumstance</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacramento Gas &amp; Electric Railway Company, Sacramento, CA (Gas Works no. 20)</td>
<td>PG&amp;E was suing three public agencies for causing release of toxic gas works residuals and wastes to the ground water regime</td>
<td>Archival review and site geologic characterization revealed the key existence of the gas works dump, containing “blue hilly” spent gas purification waste containing a ca. 1894 street railway punched fare card with “20 Mule Team” cleansing soap advertisement, and many adjacent trashed gas meters with tags bearing gas company’s name; case was withdrawn by plaintiff, whose corporate ancestor had discharged the toxic gas-house wastes in the first case, back in the late 19th century.</td>
</tr>
<tr>
<td>Little Big Amberjackmockamus Falls, ME</td>
<td>Great Northern Paper Co. wished to develop low-head electric power; preferred site turned out to be controlled by a 5-m-wide rhyolite dike standing above ground, and the river course by master jointing displayed in the crystalline rocks</td>
<td>Winning consultant presentation enhanced by ‘day-before’ color aerial photography enlarged to poster display boards, and three hand specimens (quartz diorite, granite gneiss, and rhyolite dike rock; prominent A&amp;E competition had neglected to send in a geologist to “case the site” and to become sensitive to the controlling geologic conditions.</td>
</tr>
<tr>
<td>Korean Demilitarized Zone, vicinity of abandoned hamlet of pre-Korean War, Jangpa-Ri</td>
<td>Drill-interception of North Korean invasion tunnel at depth of several hundred meters; with backup surface mapping of metamorphic terrane</td>
<td>Site area mapping and comparison of air-rotary drill cuttings produced striking physical variations in recovered drill spoil, indicating that the intersected segment of tunnel had been “packed” with previous mica schist mining spoil in an attempt to “fool” the ROKA (Republic of Korea Army) TUDS (Tunnel Detection Section) troops; a 600 mm rod drop and the striking shape differences between crushed rock spoil and air-rotary drill chips differences gave lie to the deception; another invasion tunnel discovered.</td>
</tr>
<tr>
<td>Boston Metropolitan Transit Authority Red Line, Porter Square Station Cambridge, MA</td>
<td>Intellectual proof of existence of definable geologic structural domains affecting permanent ground support of the subway station</td>
<td>1.3-m diameter vertical inspection shaft percussion drilled to 35 m depth, slightly below planned station invert, and mapped by author at 1:12 scale, with surface map transferred to transparent sheeting and inserted in 2-m-long clear Lucite tube; structural controls became visually evident to the managing engineers.</td>
</tr>
<tr>
<td>U.S. I-93; route reconstruction, Littleton, NH to St. Johnsbury, VT</td>
<td>Suite of rock hand specimens collected and identified as basis for benefit of field geologists and of geotechnical engineers</td>
<td>Sequence ran from quartz diorite (QD) through foliated QD and into metamorphosed lower Paleozoic Ammonusac Formation metavolcanic series, exhibiting decreasing effects of contact plutonic metamorphism and degree of foliation; this indicated variations in rock-slope excavation and slope retention characteristics.</td>
</tr>
<tr>
<td>Los Angeles Metro Red Line Subway, Hollywood Blvd. Ground Collapse</td>
<td>Low density ‘Young Alluvium’ discovered at the abandoned, shield-dug tunnel face subsequent to ground collapse</td>
<td>Pre-construction geotechnical baseline study had missed detection of this body of collapse-prone air-entrained silty sand which failed when local fluid utility lines flexed and failed causing wetting and collapse of overlying ground; collected specimen exhibited rapid collapse when dropped into jar of tap water.</td>
</tr>
<tr>
<td>U.S. Federal Railway Commission Railroad Test Track, Pueblo, CO</td>
<td>Ten 5-gallon buckets of type rock ballast delivered for assessment explaining observed degradation under repeated train-loading events</td>
<td>Samples were thin-sections and observed by petrographic microscope on a semi-quantitative basis by which fundamental rock strength character was related to microscopic evidence of the presence of secondary mineralization related to hard rock alteration; specimens were rated in descending order of predicted behavior and were correct except for direct juxtaposition of just two of the ten samples; visual proof was at hand.</td>
</tr>
<tr>
<td>Proposed Morris Farm Regional Sanitary Landfill, near Decatur, AL</td>
<td>Intervenor caused halt to actual site preparation of the permitted landfill; accused operator of operating on unsafe karst terrane</td>
<td>One of the late Prof. George Sowers last assignments; we back-hoe dug out two small depressions (alleged to have been subsidence pits), mapped the area, located all evidence of linear and inspected 5,300 linear feet (&gt; 2.4 ha. of vertical surface area) of exposed rock-quarry highwall nearby, which exhibited but one small (&lt;1 m diameter) karst tube; the depressions proved to be pre-WWII-era farm garbage and trash pits; hearing judge denied claim and landfill was constructed.</td>
</tr>
</tbody>
</table>
Greenhouse Gas/Temperature Feedback Mechanism May Raise Warming Beyond Previous Estimates

WASHINGTON - A team of European scientists reports that climate change estimates for the next century may have substantially underestimated the potential magnitude of global warming. They say that actual warming due to human fossil fuel emissions may be 15-to-78 percent higher than warming estimates that do not take into account the feedback mechanism involving carbon dioxide and Earth’s temperature.

In a paper to be published on 26 May in Geophysical Research Letters, Marten Scheffer of Wageningen University in the Netherlands and colleagues at the Potsdam Institute for Climate Impact Research in Germany and the Centre for Ecology and Hydrology in the United Kingdom use newly acquired ancient climate data to quantify the two-way phenomenon by which greenhouse gases not only contribute to higher temperatures, but are themselves increased by the higher temperatures. This higher concentration leads to still higher temperatures, in what scientists call a positive feedback loop.

The researchers achieved their breakthrough by interpreting the high-resolution data from polar ice cores and temperature reconstructions based on geological proxy data in a new way. Although the effect of greenhouse gases on temperature is well known, the reverse effect is usually ignored. The latter has now been estimated through a correction of the past climate data, using a model of the greenhouse effect.

One complicating factor was that some of the processes that play a role in the feedback loop are quite fast, taking place over a period of years, while others take centuries or even millennia. This implies that the strength of the feedback effect depends on the time scale being analyzed. Another factor was that the modern world looks quite different than it did tens of thousands of years ago, when the ice in the cores was formed.

Therefore, the authors focused especially on relatively recent climatic anomaly known as the “Little Ice Age.” During this period (about 1550-1850), immortalized in many paintings of frozen landscapes in Northern Europe, Earth was substantially colder than it is now. This, scientists have concluded, was due largely to reduced solar activity, and just as during true ice ages, the atmospheric carbon level dropped during the Little Ice Age. The authors used this information to estimate how sensitive the carbon dioxide concentration is to temperature, which allowed them to calculate how much the climate-carbon dioxide feedbacks will affect future global warming.

As Marten Scheffer explains, “Although there are still significant uncertainties, our simple data-based approach is consistent with the latest climate-carbon cycle models, which suggest that global warming will be accelerated by the effects of climate change on the rate of carbon dioxide increase. In view of our findings, estimates of future warming that ignore these effects may have to be raised by about 50 percent. We have, in fact, been conservative on several points. For instance, we do not account for the greenhouse effect of methane, which is also known to increase in warm periods.”

The research was funded by Wageningen University and the United Kingdom Natural Environment Research Council.

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Contract Language

As a result of my last column, I received the following from an AIPG member who requested anonymity:

“I particularly enjoyed reading your column on Contract Language where you discuss insurance and thought you might be interested in a situation we just encountered. I recently had a request for a reliance letter for a Phase I Environmental Assessment that included the client; Lender No. 1, its successors and assigns; Unidentified Entity (appears to be the title company), its successors and assigns; Law Firm No. 1; Law Firm No. 2; County Housing Commission; Lender No. 2, its successors and assigns; and the Trustee. Requests for reliance letters are fairly standard for lenders but this request was way over the top. They also wanted elimination of the limitation of liability clause in our contract. After discussions with our insurance carrier, we confirmed that:

1. Only those parties who have a financial interest in ownership of the site are insurable under most insurance coverage.
2. Legal fees come off of the top so that a one million professional liability policy might only have $700,000 in effective coverage. Even a frivolous law suit could cost a couple hundred thousand dollars in legal fees.
3. It is an aggregate policy. Since we have more than one client, a limitation of liability clause is very reasonable. No firm can afford to use up all its insurance coverage on one job.
4. The “and assigns” is totally unacceptable although it seems there are lots of firms out there that will use such language upon request.”

I will address the points raised by this member and then deal with the overall topic of reliance letters.

Insured Parties

When dealing with a professional liability policy, the intent of the policy is to provide coverage for the negligent acts or omissions of the entities that are named on the policy. Some firms will only have one firm named onto the policy. Others who have had various entities over the years may have a long list of entities that are insured for professional services under the policy. These are all considered to be “named insureds”. There is another classification of insured that are known as “additional insureds”. Additional insureds are only being covered for their vicarious liability arising out of the professional services provided by the named insureds. A common example of an additional insured is a holding company that owns the entities listed as named insureds. The holding company is not providing any professional services but could be named in a lawsuit against one of the insured entities. The policy would provide for defense of the holding company. A much less common example is naming a client as an additional insured on your professional liability policies. The problem with naming your client as an additional insured is that you could find your policy being eaten up by the cost of providing defense to your client.

Legal Fees

The second item in the member’s e-mail correctly points out that your professional liability policy covers both defense and indemnity costs. A situation could arise where even a nuisance claim can result in six figure defense costs. Usually you and your carrier will try to settle the claim long before the defense costs get to that point. But it is important to realize the impact defense costs can have.

Aggregate Policy

Your policy has a per claim limit and an aggregate limit. What this means is that the policy will pay no more than lets say $1,000,000 per claim and $1,000,000 in the aggregate. In that case if you have a single claim that costs the carrier $1,000,000 then you will have no further coverage for the remainder of that policy period. Or if you had two $500,000 claims then those two would have exhausted your aggregate limit. If you had a policy with $1,000,000 per claim and $2,000,000 in the aggregate and you had that single claim with the $1,000,000 paid you would still have $1,000,000 of your aggregate remaining to deal with any further claims during that policy period. Some firms and their clients like that extra level of comfort from having the higher aggregate.
“And Assigns”

Who are those guys? You may never know until the claim happens. Allowing that type of language does not allow you to control who may have access to your report and who will be able to claim that you had a reasonable expectation to use that report. The use of “assigns” is so broad as to create considerable liability problems for you.

Third Part Reliance Letters

This is an area where you need to be incredibly careful. Phase I ESAs are risky enough as it is especially in light of the minimal fee that you get. It is important to include language in your contracts and reports that the Phase I is being performed for the use of your client and that use by any other parties is not authorized. Should you receive a request for third party use of the report is important to have that third party accept the same terms and conditions as those negotiated with your original client. That they acknowledge that the scope was for the original client.

Several years ago a consulting firm had performed a Phase I and the client came back to the consultant and asked them if they would provide a copy to a third party. As a courtesy to the client the consulting company provided a copy of the report without a reliance letter and further the consulting firm charged the third party a nominal fee for the report duplication costs. The third party decided to purchase the property based upon the report and when they came upon some unanticipated contamination during construction they sued the consultant. The courts found that because of the consultant accepting a fee for the report that there was a contract between the third party and the consultant and that it was reasonable for the third party to depend on the report. This claim paid out $650,000. Had there been a proper third-party reliance letter and proper terms and conditions this claim would probably not have paid this amount.

Grand Street Artists

This case dates to the late 90s and shows how the courts can extend your firm’s liability to third parties. One of the firms named, Jenny Engineering Corp (Jenny) was retained by Quality Tool and Die (Quality) to provide assistance in preparing documents under New Jersey’s Environmental Cleanup Responsibility Act (ECRA) for cessation of operations. Jenny made it clear in their documents that the report was for cessation of operations not for sale or transfer. Quality sold the property to another party who then developed it for residential and artist’s lofts. The occupants then found extensive mercury contamination from past industrial uses of the property. Jenny maintained that the third parties were not entitled to rely on their report as the report was only done for cessation of operations not for property transfer. The court held that because Jenny’s report was part of a public filing, it was foreseeable that others would come to rely on the reports. Limitations statements are still an important risk management tool but as the Grand Street case shows, the statements are not bulletproof. If your report will be part of a public filing, you need to be aware of your potential exposure to third party claims.

HAVE YOU SIGNED UP A MEMBER LATELY?

REQUIREMENTS FOR GENERAL MEMBERSHIP

(Postcard size application on page 32.)

EDUCATION: 30 semester or 45 quarter hours in geological sciences* with a baccalaureate or higher degree

SPONSORS: 1 required from a CPG or Member

SIGN-UP FEE (prorated): Jan-Mar = $60; Apr-Jun = $45;
Jul-Sept = $30; Oct-Dec = $15

ANNUAL DUES: $60 plus Section dues

APPLICATION: Available on website www.aipg.org

*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.
“I Didn’t Know You Guys Did That”

Duane A. Carey, CPG-10305

“I didn’t know you guys did that” can be one of the worst phrases a consultant can hear, because it represents lost opportunity. Consider the following example.

You are a consulting hydrogeologist managing a groundwater monitoring program at a municipal landfill. Part of the site is closed, but there is an active face accepting trash daily. The facility manager, Don, is very pleased with your work over the past three years, and you have developed a very strong working relationship. Beyond the nuts and bolts of the job, you enjoy hearing about each other’s kids and you love to talk about football. One day, Don and you are discussing some recent monitoring results that appear to be statistical anomalies when you notice your biggest competitor arrive at the site and begin work near the open face. Uh oh.

You try to stay cool, not wanting Don to see you sweat, and calmly ask what they are up to. Don explains that the regulators are concerned about the integrity of the side slope and mandated a slope stability analysis. So the municipality asked a few engineering firms for proposals and your competitor’s was the best. They are now collecting data and will present their report on Friday. You explain that you have an entire geotechnical engineering division that can provide those services. Moreover, you could have saved Don the trouble of putting together the bid documents and soliciting proposals, because you could have wrapped such a small job into your existing contract. Don apologizes and says “I didn’t know you guys did that kind of work – I’ve always just thought of you as my groundwater monitoring guys.”

Three months later when it is time to renew your contract, Don sheepishly tells you that his boss was very pleased with the quick service from your competitor and wants them to bid on the work. You have just paid a steep price for poor communication. You do not know what the damage will be, but there will definitely be damage. In the worst-case scenario you will lose the contract; in the best case, you will lose a portion or all of your profit, because your competitor is willing to undercut his own costs to unseat you as the incumbent consultant. If you do not want to lose the client, you might have to reduce your price.

What could you have done differently? You could have been a better communicator. Technical people often complain about having to “sell”. For many reasons, which we will not go into now, they are unable or unwilling to take the risk and make themselves seem like that unsavory salesman who is concerned only with his personal gain. That is a good thing! Who wants to be around someone like that? The truth is, you do not have to be like that. All you need to do is communicate. Communicate your abilities. Communicate your company’s abilities. And most importantly, communicate the benefit of those abilities. Think how much Don would have personally benefited if he had known of your ability to do the slope stability work. He would not have had to write a Request for Proposal, review the submittals, choose a consultant, and tell his buddy that he would have to bid for the project on which he had done so well the last three years.

There are a couple of great ways to communicate your company’s abilities without sounding like a salesman. One method is to simply incorporate anecdotes into your discussions. If you are a groundwater expert, talk about your coworker who did the archeological survey for the new highway. If you are a geochemist, mention the civil engineers in your office who saved the neighboring municipality a bundle of money by designing a more efficient pumping station. If the client knows you for one specific type of work, mention other projects you’re working on that require a different skill set. You never know what other needs they may have or if they can refer you to one of their colleagues.

If you are not comfortable speaking about all the great things that you or your company can do, put it on paper. One of my favorite approaches is to put together a “one-sheet”. People like to see examples of what you have done, rather than descriptions of what you claim you can do. I recommend making a one-sheet for every project you or your company completes.

As the name implies, the document comprises just one page. This will force you to be concise. I suggest including a photo for each project. Format all the one sheets consistently so it is easier for the client or prospect to find the information of interest. Most importantly, include the five W’s and two H’s: who, what, where, when, why, how, and how much. Do not hesitate to include these W’s and H’s as headings for the reader to easily follow along. You will have their attention for only a limited time and you will keep it longer if they can easily scan the document with their eyes.

After you complete your one-sheets, print and file them for easy retrieval. These documents can be great resources for last-minute proposals; just include them as addenda to establish credibility by showing examples of the types of project being proposed. Just as important, however, they can help you communicate your abilities in an easy-to-read format that will speak very clearly to the reader. If you discipline yourself to write one for every project, even those that are incomplete, you will have an impressive marketing arsenal in no time at all.

If everyone in the company produces one-sheets for their projects, then any employee can have access to the
SCIENCE IN THE NEWS
from Sigma Xi,

Rocks May Hold Key to Oldest Life
from the Chicago Tribune

As microbes go, they’re renegades, perfectly at home in the world’s hottest, coldest, saltiest or most sulfuric waters. They hang out near hydrothermal vents on the ocean floor or in the hot springs at Yellowstone, and happily colonize our digestive tracts and those of cows, termites and marine organisms. This microscopic branch of life—called archaea—likely has been thriving for more than 3.4 billion years, according to new research from a team of Australian scientists. Writing in the journal Nature, they argue that miles of oddly shaped mounds of layered sedimentary rock found in Western Australia are not geologic features but the very earliest fossil evidence of life on Earth. The rocks, they say, are remnants of thriving microbial communities that dominated the world in the days when the young planet roiled with boiling oceans and the atmosphere was rich in ammonia and methane and probably sizzling hot. Those conditions, while toxic to plants and animals, can nurture archaeans.


Global Warming Is Spurring Evolution,
Study Says from National Geographic News

German birds are changing migration patterns. Canadian red squirrels are reproducing earlier in the year. Mosquitoes in Newfoundland remain active longer into August. Traditionally, scientists have viewed such changes simply as behavior modifications in the face of a changing environment - in this case, global warming. But scientists say these shifts provide mounting evidence that for some animals, global warming is sparking genetic changes that are altering the ecosystems we live in. The effect is most striking in the northern latitudes, where climates are becoming more and more like those in the south, researchers say.


Researchers Say Fossils Reveal Dwarf Dinosaur from the Associated Press

NEW YORK - Dwarf dinosaurs? It sounds like the old George Carlin joke about jumbo shrimp: two words that just don’t go together. But fossils from northern Germany have revealed a dinosaur that was a dwarf, only about one-third the size of its closest known relatives, scientists report. The four-legged plant-eater was no lap dog: It measured about 20 feet from its snout to the tip of its long tail and it weighed about a ton. But next to its close cousin Camarasaurus, a well-known beast that stretched 59 feet long, this guy was a runt.


Saturn’s Titan Like Earth, Yet Enigmatically Different from the San Francisco Chronicle

Saturn’s cryptic moon Titan bears scars of violent activity on its surface that make the ringed planet’s satellite at once more familiar and more mysterious than scientists say they ever expected. Radar observations by the Cassini spacecraft that is circling the planet Saturn nearly a billion miles from Earth show craters and rivers, icy sand dunes and volcanoes, and possible signs of continental motion like Earth’s. At the same time, the distant moon and its atmosphere are made of materials far different from our planet’s rocky composition, scientists say. “It’s comforting to find that Titan is so amazingly Earth-like in so many ways, but it’s fascinating to find so much that’s a mystery,” said Stephen D. Wall, a leader of the Cassini radar team at NASA’s Jet Propulsion Team.

http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/06/08/MNGO3JAE861.DTL or http://tinyurl.com/fq399
The “Broader Impacts” Criterion: A Look at Community Outreach

Nancy Price, SA-0382

For a student, getting good grades and achieving a high GPA is important. Gaining technical skills is also important. Breaking into the field, experiencing the profession, and developing contacts is probably the most important. All these things will help you transform an interest in geology into a career in geology, but what about community service and outreach? Where does that fit in?

Undoubtedly in high school the guidance counselors told you that on top of good grades, a wide variety of extra curricular activities, and shining recommendations that it also would not hurt to add a little community service experience to your record. There are those students that found this part easy to do because chances are they had already been doing it through such organizations as the Boy and Girl Scouts of America or even church groups. For the rest of us, it was a wake up call to start making a difference. At that time, community service meant little more than time spent as a volunteer, perhaps in a soup kitchen or nursing home. For the well organized it could even mean a food collection campaign for the poor. Anything that you could do to legitimately help was good enough to show universities your dedication.

Fast forward to college and things have changed. You have a major now and time spent volunteering in the community is admirable but might not be enough. You have become part of the geologic field and with that comes the responsibility of professional stewardship. The quality of a community is only as good as the values and efforts of the members, so if we as geologists want to maintain the community that has nurtured so many of us over the years, we must have the ideas and willingness to give back the same and more. I advocate that this requires a fundamental shift in the way that we think about community outreach.

If you were one of the thousands of students who applied for a National Science Foundation Graduate Student Fellowship, you were faced with the daunting task of trying to comply with the broader impacts criterion of the NSF. It is defined as:

“Contributions that (1) integrate research and education at all levels, infuse learning with the excitement of discovery, and assure that findings and methods of research are communicated in a broad context and to a large audience; (2) encourage diversity, broaden opportunities, and enable the participation of all citizens-women and men, underrepresented minorities, and persons with disabilities- in science and research; (3) enhance scientific and technical understanding; and (4) benefit society.”

I admit, my initial thought was agitation. I am already spending the majority of my time trying to read, learn, and still find time to work on my thesis and on top of that I am expected to save the world?!? Ok, well, I suppose I was overreacting, but the idea that somehow my thesis project was supposed to have a greater impact on society than just adding to the broader pool of scientific knowledge was daunting and exhausting at the same time. When the shock wore off, I spent a good amount of time thinking about what this means to me as a future professional geologist.
If you are interested in becoming an academic researcher or anyone else who plans to apply to the National Science Foundation for funding, be forewarned: the NSF broader impacts criterion does not go away. The idea of knowledge for knowledge’s sake is antiquated and has been replaced with the question: “How is this going to benefit society?” After all, it is the taxpayers’ money and it should benefit them in some way that they can directly identify with. It is easy to become indignant to such an expectation, but recent history has proven how important such things as community education are. The whole evolution-intelligent design debate shows us how poorly the people of this nation understand the scientific method and as scientists we are partially to blame for this deficiency. If we are, therefore, more committed to making community outreach and education as important a part of our professional considerations as writing publications, then we can easily just incorporate it into the way things are done. Instead of just spending two hours thinking about how to incorporate an outreach component into your already planned project, keep the need for outreach in your mind as you make your plans in the first place. Make it part of your professional lifestyle.

Even if you never have to write one NSF proposal throughout your whole professional career, you can still make outreach a part of your business. At the extreme end, big oil companies like Exxon-Mobil give large amounts of money to support education initiatives and youth programs. On the smaller business end, outreach can help create a partnership between your business and the community that can have far reaching benefits. You can create awareness, and perhaps even a level of acceptance, in the community of what your company does. You can increase your level of positive publicity. On the longer time scale, you can even influence future employment through education and internships. People like to see companies that have priorities other than to just make money.

I would say that the bottom line comes down to the idea that there is a time to take and a time to give. Students have a strong sense of entitlement, myself included, that keeps us thinking that it is all about what we can get from the system. We are given scholarships, advice, and opportunities and it is easy to get used to all that help. Yet, it can not be take, take, take our whole lives because then there will be no one left to give and thus nothing more left to take. A time will come when we will be in a position to give something back and it is good to start thinking about that now rather than later when the transition from take to give will be more of a shock. I am still not entirely sure how to deal with the NSF’s broader impacts criterion, but at least I have some more time to think about it.

If you have any ideas, questions, or comments about this article or any other issues, please feel free to contact me via email at: nancyaprice@yahoo.com.
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.

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<td>Joshua A. Keeley</td>
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<td>$36.00</td>
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<td>A Correlated History of the Earth - Laminated Wall Chart</td>
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<td>Gold Lapel Pin/Tie Tack</td>
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<td>**Self-Inking Stamp</td>
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David M. Abbott, Jr.
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AIPG CPG, F AusIMM, Ch Geol, FGS, EuroGeol, PG-TX, UT, & WY

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1. The answer is “b” or 1.27 kgcm$^{-2}$.
   Given $\sigma_3 = 2.0$ kgcm$^{-2}$
   Deviatoric stress = $\sigma_1 - \sigma_3 = 2.8$ kgcm$^{-2}$
   Then, $\sigma_1 = 2.8 + 2.0 = 4.8$ kgcm$^{-2}$
   Now, $\tau = \frac{|(\sigma_1 - \sigma_3)|}{2} \sin 20$
   $\tau = \frac{|(4.8 - 2.0)|}{2} \sin 114^\circ$
   $\tau = 1.27896$ kgcm$^{-2}$

2. The answer is (a) or $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$ or the mineral “talc.”
   Talc is a white to gray, brown or yellow mineral with a white strike, soapy feel, pearly to greasy luster that may be massive or foliated. It has a hardness of 1.0 and a specific gravity of 2.7–2.8. It is commonly used in the development of talcum powder, facial makeup, ceramics and paint.
   Apatite or $\text{Ca}_5\text{F}(\text{PO}_4)_3$ is a brown, green, blue, yellow, purple or black mineral with a white streak, one poor cleavage plane, a hardness of 5.0 and a specific gravity of 3.1-3.2. It is commonly used in the making of pesticides and fertilizers.
   Olivine or $(\text{Mg,Fe})_2\text{SiO}_4$ is a green, black or yellow mineral with conchoidal fracture, a hardness of 7.0 and specific gravity of 3.3-3.4. It is commonly used as a gemstone (peridot) and as a source of magnesium metal.

3. The answer is (a) or the outpouring of 1,600,000 km$^3$ of basalt in Siberia.

   Mass extinction at the end of the Paleozoic is believed to have been influenced by:
   - The formation of Pangaea and the closure of most of the equatorial sea.
   - Sea-level fall resulting from a slowing down of the sea-floor spreading process.
   - Climate change resulting from the formation of Pangaea and the presence of less shoreline and more land located away from the moderating influence of the ocean.
   - The massive outpouring of basaltic lava flows in Siberia and the resulting emission of volcanic gases into the atmosphere increasing the greenhouse effect and acid rainfall.

   Mass extinction at the end of the Mesozoic Era is believed to have been influenced by:
   - Sea-level fall at the end of the Cretaceous resulting from a slowing down of the sea-floor spreading process.
   - The massive outpouring of basaltic lava flows in India causing severe climate change.
   - The catastrophic asteroid impact at Chicxulub in the Yucatan area of Mexico and the resulting earthquake, tsunami, release of dust and gases into the atmosphere causing first a “nuclear winter” (adversely affecting photosynthesis) followed by highly elevated temperatures searing the Earth for years.

4. The answer is (b) or time-rock unit.

<table>
<thead>
<tr>
<th>Time Unit</th>
<th>Equivalent Time-Rock Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Era</td>
<td>Erathem</td>
</tr>
<tr>
<td>Period</td>
<td>System</td>
</tr>
<tr>
<td>Epoch</td>
<td>Series</td>
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<tr>
<td>Age</td>
<td>Stage</td>
</tr>
<tr>
<td></td>
<td>Zone</td>
</tr>
</tbody>
</table>

Rock units, whose boundaries can cross time boundaries, include: Group, Formation, Member, Bed, Lentil, Tongue.
AIPG 43rd ANNUAL MEETING
“Sustainability”
Saint Paul, Minnesota
September 23 - 28, 2006

Hosted by:
The Minnesota Section of AIPG

Welcome to
Saint Paul, Minnesota!

Situated on the bluffs of the mighty Mississippi River is Minnesota's beautiful capitol city, Saint Paul, our location for the 2006 Annual Meeting. Saint Paul's historic downtown offers spectacular views of the Mississippi River while viewing some of the city's Old World charm from architectural buildings along Summit Avenue, the European-style Saint Paul Cathedral to the historic buildings of Saint Paul's downtown including the State Capitol and the Fitzgerald Theater (home to Garrison Keillor's A Prairie Home Companion), and the Landmark Center. Saint Paul is also a thriving center of ideas and new buildings from the Science Museum of Minnesota, the Xcel Energy Center (home of the Minnesota Wild hockey team) and Harriet Island Regional Park - all within an easy walk from our venue.

Just across the Mississippi River to the west is Saint Paul's twin city, Minneapolis. The two cities, known as the Twin Cities, comprise a vibrant metropolitan area that incorporates some of the most scenic urban lakes in the U.S. Just minutes from the downtown district in Saint Paul, Como Park has provided a beautiful outdoor haven including Lake Como and the Como Park Conservatory and Gardens. In Minneapolis, Cedar Lake, Lake of the Isles, Lake Calhoun and Lake Harriet are referred to as the “Chain of Lakes” where visitors can enjoy over 13 miles of lakeside paths within minutes from Minneapolis' downtown district.

The Twin Cities metro region is home to the Mall of America – the largest shopping and entertainment complex in the U.S. making the Twin Cities an international shopping destination. The Mall of America is located in Bloomington, Minnesota, just south of Minneapolis. The Mall of America is a popular destination for both locals and visitors from around the world.

The historic Saint Paul Hotel is our site for the 2006 Annual Meeting. Located in the beautiful Rice Park District in downtown Saint Paul, The Saint Paul Hotel is just minutes from everywhere you want to be in the Twin Cities.

Our theme “Sustainability” for the 2006 conference appropriates most all aspects of our professional practice(s). As our Keynote Speaker defines this purpose, “Geoscientists are contributing to an ever-widening list of issues that relate to ensure human well-being. We help to ensure health by addressing toxic substances and waste disposal, and we secure our heritage by providing an understanding of our land, our oceans, the history of life, and a comprehension of our planet. We enhance our wealth by ensuring a supply of energy and materials and by guiding construction. We augment our security by helping society prepare for and cope with climate change and hazards. And we have broad contributions to the study of water, which more than any other topic, comprehensively dictates our well-being. Earth scientists will prosper as we focus our efforts on the needs of our society, and as we produce what is needed in a format that can readily be used by a broad range of our clients. And while doing so, we will continue to take a broad approach to our work, to ensure the progress of fundamental knowledge, to facilitate serendipity, and to prepare ourselves for unanticipated requirements. By relentlessly taking this approach, and by repeatedly re-inventing ourselves, geoscientists will have a secure future”.

As we prepare for AIPG's 43rd Annual Conference, our broad ranging theme lends a cohesive approach based upon the fundamentals of the geosciences of our professions. It is our goal to maintain a common direction, but keep open the varied aspects we have confronted and will continue to confront for generations to come. Expanding new technologies and applying what we have learned to what we confront will always be an on-going issue to the geoscience profession. However, AIPG's annual conference will always bring us something new to sustain the science and technologies. We have prepared for the 2006 Conference to provide you with diversity, sustainable diversity. Through technical sessions, short courses, keynote presentation, field trips and more, we plan on hosting an Annual Conference that results in years of continued professional success.

From the shield, to the field, we welcome you to Minnesota. Thank you for giving us the opportunity to host the 43rd Annual Conference and we promise you the understanding of “Minnesota Nice”. Check our website for details www.aipg2006.org

See you in September!

Michael W. Ruddy, CPG, PG, RG, Program Co-Chair
Jane M. Willard, CPG, PG, Program Co-Chair
## PROGRAM

### SATURDAY, SEPTEMBER 23, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>9:30 am – 3:00 pm</td>
<td>FIELD TRIP 1 - North Shore/Mesabi Range (9/23 - 9/25)</td>
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<tr>
<td>9:00 am – 5:00 pm</td>
<td>Registration</td>
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</table>

### SUNDAY, SEPTEMBER 24, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 am – 8:00 pm</td>
<td>Registration</td>
</tr>
<tr>
<td>10:00 am – 2:00 pm</td>
<td>SOCIAL TRIP 1 - Welcome to the Mississippi River Brunch Cruise</td>
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### MONDAY, SEPTEMBER 25, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am – 9:00 am</td>
<td>Executive Committee Continental breakfast</td>
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<tr>
<td>9:00 am – 3:00 pm</td>
<td>Executive Committee Meeting</td>
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<tr>
<td>9:00 am – 9:00 pm</td>
<td>Registration</td>
</tr>
<tr>
<td>10:00 am – 9:00 pm</td>
<td>Exhibits</td>
</tr>
<tr>
<td>9:00 am – 12:30 pm</td>
<td>SHORT COURSE 4 - What is All Appropriate Inquiry (AAI)?</td>
</tr>
<tr>
<td>11:30 am – 4:30 pm</td>
<td>SOCIAL TRIP 2 - St. Paul Historic Tunnels, Waterfalls, Bluffs, and Fossils Tour</td>
</tr>
<tr>
<td>12:30 pm – 4:00 pm</td>
<td>SHORT COURSE 1 - Tune up for PG and FG Exams</td>
</tr>
<tr>
<td>6:00 pm – 8:00 pm</td>
<td>Glacial Icebreaker, cash bar</td>
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### TUESDAY, SEPTEMBER 26, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:00 am – 8:00 am</td>
<td>Past Presidents Breakfast Meeting</td>
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<tr>
<td>7:00 am – 8:00 am</td>
<td>Women in AIPG Breakfast Meeting</td>
</tr>
<tr>
<td>7:30 am – 9:30 am</td>
<td>2006 Advisory Board Meeting</td>
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<tr>
<td>8:00 am – 5:30 pm</td>
<td>FIELD TRIP 4 - Twin Cities Aggregates</td>
</tr>
<tr>
<td>7:30 am – 5:30 pm</td>
<td>FIELD TRIP 5 - Pine County Karst</td>
</tr>
<tr>
<td>8:30 am – 3:30 pm</td>
<td>Technical Sessions</td>
</tr>
<tr>
<td>9:00 am – 9:00 pm</td>
<td>Registration</td>
</tr>
<tr>
<td>9:00 am – 4:00 pm</td>
<td>SOCIAL TRIP 3 - Wisconsin Amish Country and Crystal Cave Tour</td>
</tr>
<tr>
<td>9:45 am – 11:45 am</td>
<td>2006/2007 Advisory Board Meeting</td>
</tr>
<tr>
<td>10:00 am – 7:00 pm</td>
<td>Exhibits</td>
</tr>
<tr>
<td>10:00 am – 4:00 pm</td>
<td>Student posters</td>
</tr>
<tr>
<td>11:30 am – 1:00 pm</td>
<td>Annual Business meeting/lunch Harvey Thorleifson, Director of the Minnesota Geological Survey: Keynote Speaker</td>
</tr>
<tr>
<td>1:30 pm – 3:30 pm</td>
<td>2006/2007 Executive Committee Meeting</td>
</tr>
<tr>
<td>7:00 pm – 9:00 pm</td>
<td>Awards Banquet</td>
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</table>

### WEDNESDAY, SEPTEMBER 27, 2006

<table>
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<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 am – 8:00 am</td>
<td>Foundation Trustees Breakfast</td>
</tr>
<tr>
<td>7:30 am – 5:30 pm</td>
<td>FIELD TRIP 2 - St. Croix River</td>
</tr>
<tr>
<td>8:00 am – 5:30 pm</td>
<td>FIELD TRIP 6 - Karst Geology of Southeastern Minnesota</td>
</tr>
<tr>
<td>8:30 am – 3:30 pm</td>
<td>Technical Sessions</td>
</tr>
<tr>
<td>9:00 am – 5:00 pm</td>
<td>Registration</td>
</tr>
<tr>
<td>10:00 am – 5:00 pm</td>
<td>Exhibits</td>
</tr>
<tr>
<td>10:30 am – 2:30 pm</td>
<td>SOCIAL TRIP 4 - Wabasha Street Caves and St. Paul Gangsters Tour</td>
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<tr>
<td>3:30 pm – 4:30 pm</td>
<td>Roundtable Session on Sustainability</td>
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<tr>
<td>6:00 pm – 10:00 pm</td>
<td>Social Banquet at the Science Museum</td>
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<tr>
<td></td>
<td>The Kensington Runestone: Compelling New Evidence by author/geologist Scott Wolter, PG, CPG</td>
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### THURSDAY, SEPTEMBER 28, 2006

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:00 am – 8:00 am</td>
<td>Speakers Breakfast</td>
</tr>
<tr>
<td>7:00 am – 7:00 pm</td>
<td>FIELD TRIP 3 - Glacial Lake Agassiz</td>
</tr>
<tr>
<td>9:00 am – 12:30 pm</td>
<td>SHORT COURSE 2 - Forensic Geology</td>
</tr>
<tr>
<td>12:30 pm – 4:00 pm</td>
<td>SHORT COURSE 3 - Intro to Phase I Environmental Site Assessment</td>
</tr>
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Fractures in cross bedded pre-Cambrian age Hinckley sandstone, Sandstone, Minnesota (see Field Trip 5).
# 2006 NATIONAL AIPG MEETING REGISTRATION FORM

<table>
<thead>
<tr>
<th>NAME (Last)</th>
<th>(First)</th>
<th>(Middle Initial)</th>
<th>NAME FOR BADGE</th>
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<td>COUNTRY</td>
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<tr>
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Spouse/Guest Registration includes admission to Icebreaker and Exhibits

### FEES AND PAYMENT INFORMATION

#### ANNUAL MEETING REGISTRATION

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<th>On or Before 8/23/06</th>
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* AIPG Members Only  **Student Confirmation Required  ***Registration Required

#### FIELD TRIPS

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<tr>
<th>No.</th>
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<tr>
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<td>North Shore/Mesabi Range (9/23-25)</td>
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<td>Pine County Karst (9/26)</td>
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<td>6</td>
<td>Karst Geology of Southeastern Minnesota (9/27)</td>
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#### SHORT COURSES

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<tr>
<td>1</td>
<td>Tune-up for PG &amp; FG Exams (Mon 9/25) CEUs Available/PDHs (MN)</td>
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<td>What Is All Appropriate Inquiry (Mon 9/25) CEUs/PDHs</td>
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#### SOCIAL EVENTS

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<tr>
<td>Awards Banquet @ St. Paul Hotel (Tues 9/26)</td>
<td>$60.00/70.00</td>
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<tr>
<td>Social Banquet @ Science Museum (Wed 9/27)</td>
<td>$65.00</td>
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<tr>
<td>Downtown St. Paul Geology &amp; Architecture and/or Historic Summit Ave (at your leisure)</td>
<td>free/self guided</td>
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<tr>
<td>Social Trip 1 – Welcome to the Mississippi River Brunch Cruise (Sun 9/24)</td>
<td>$45.00</td>
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<tr>
<td>Social Trip 2 – St. Paul Historic Tunnels, Waterfalls, Bluffs, and Fossil Tour (Mon 9/25)</td>
<td>$45.00</td>
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</table>
**Social Trip 3 – Wisconsin Amish Country and Crystal Caves Tour (Tues 9/26)**  
$80.00  

**Social Trip 4 – Wabasha Street Caves and St. Paul Gangsters Tour (Wed 9/27)**  
$45.00  

**Women in AIPG Breakfast (9/26)**  
$30.00  

**Ice Breaker (9/25) (Must Show Badge)**  
Complimentary  

**Speakers/Moderators Breakfast (9/28)**  
Complimentary  

**Business Lunch (9/26)**  
Complimentary  

**Foundation Trustees Breakfast (9/27)**  
Invitation Only  

**Past-Presidents Breakfast (9/26)**  
Invitation Only  

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**National and Sectional Meetings**  
<table>
<thead>
<tr>
<th>Event</th>
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<tbody>
<tr>
<td>National Executive Committee Meeting (9/25)</td>
<td>yes / no</td>
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<tr>
<td>2006 Advisory Board Meeting (9/26)</td>
<td>yes / no</td>
</tr>
<tr>
<td>2006/2007 Advisory Board Meeting (9/26)</td>
<td>yes / no</td>
</tr>
<tr>
<td>2006-2007 Joint Executive Committee Meeting (9/26)</td>
<td>yes / no</td>
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</table>

**Notes**  
- The Field Trips and Short Courses are subject to cancellation due to lack of participation.  
- Registration fees for canceled events will be refunded to registered attendees.  
- Full Registration Includes Ice Breaker, Technical Sessions, Exhibits, Business Meeting, Student Posters, Coffee Breaks, and Registration Package.  
- CEU Credits Available.  
- Please indicate if you have any special dietary requirements.  

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**SPECIAL NEEDS/REQUESTS:**  

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**METHOD OF PAYMENT**  

**TOTAL AMOUNT DUE $________**  

**PLEASE CHECK METHOD OF PAYMENT**  

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

Card No._________________________ Expiration Date________  

Print name of cardholder: ___________________________________________  

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

_________________________________________________________  

_________________________________________________________  

Authorized Signature__________________________________________  

Mail to:  
American Institute of Professional Geologists  
1400 W. 122nd Avenue, Suite 250  
Westminster, CO 80234  
or fax to (303) 253-9220 or register on-line at www.aipg.org  
National AIPG Phone Number is (303)412-6205  

Refund Policy: Refunds of 100% will be given upon receipt of a written request until August 23, 2006. Notification and full refund for field trips or social activities will be given in case of required cancellations. Cancellations for full convention registration made between August 24, 2006 and September 18, 2006, will be assessed a charge of 10% of the registration fee (to cover administration costs). NO refunds will be given for cancellations received after September 18, 2006, or for no-shows after the meeting.  

I understand that submission of this registration form gives AIPG the authority to utilize any photograph taken of me at the conference for conference related publicity (e.g., photo gallery on cd, web site, TPG...). AIPG agrees not to use my likeness for any other purpose. Please contact Catherine O’Keefe if you DO NOT wish to have your image used.
WASHINGTON - If Earth’s past cycles of warming and cooling are any indication, temperatures by the end of the century will be even hotter than current climate models predict, according to a report by researchers in Berkeley, California.

The scientists studied Antarctic ice cores containing a 360,000-year record of global temperature and levels of carbon dioxide and methane—two of the major greenhouse gases implicated in global warming. They found that during periods of warming, greenhouse gas levels rose and created significantly higher temperatures than would be expected solely from the increased intensity of sunlight that triggered these warm periods.

Though the ice core data do not point to specific processes that amplify the warming, the researchers suspect that it is due to warmer soils and oceans giving off more carbon dioxide and methane, which add to the greenhouse effect of carbon dioxide from fossil fuel burning and other human activities.

Thus, while current models predict temperature increases of 1.5 to 4.5 degrees Celsius [2.7 to 8.1 degrees Fahrenheit] from a doubling of atmospheric carbon dioxide levels, the natural processes injecting additional carbon dioxide into the atmosphere will lead to temperature increases of 1.6 to 6 degrees Celsius [2.9 to 11 degrees Fahrenheit], with the higher temperatures more likely, the researchers say. The report is scheduled for publication on 26 May in Geophysical Research Letters.

“The warming caused by our release of carbon dioxide triggers changes in the Earth system that lead to release of more carbon dioxide to the atmosphere,” says lead author Margaret Torn, head of the Climate Change and Carbon Management program at the Lawrence Berkeley National Laboratory. “If that is the case, then every bit of carbon dioxide released now is actually committing us to a larger carbon dioxide change in the atmosphere.”

“We are underestimating the magnitude of warming, because we are ignoring the extra carbon dioxide dumped into the atmosphere because of warming,” says John Harte, professor of energy and resources at the University of California in Berkeley. “Warming gets an extra kick from carbon dioxide feedback.”

The result, Torn and Harte conclude in their paper, is “that the upper value of warming that is projected for the end of the 21st century, 5.8 degrees C [10 degrees F], could be increased to 7.7 degrees C [14 degrees F], or nearly 2 degrees C [4 degrees F] additional warming.”

Current climate models, called General Circulation Models, start from fundamental physical processes to calculate a probable temperature increase based on likely atmospheric carbon dioxide levels, typically a doubling of today’s carbon dioxide concentration.

But models are only now beginning to take into account the extra carbon dioxide and methane injected into the atmosphere as global temperatures increase.

This effect is expected, because warmer soils decompose faster, releasing more carbon dioxide, and warmer oceans also release more carbon dioxide, but scientists have yet to quantify the full impact of these processes. “Without a mechanism, people feel uncomfortable putting it in a model. I think that’s a big mistake,” Harte says.

It is possible to estimate the effect of carbon dioxide feedback by looking at how Earth responded to past cycles of warming and cooling, which were caused by natural variations in the strength of sunlight hitting Earth, rather than by human production of greenhouse gases. Ice cores drilled in Antarctica’s Vostok ice sheet in 1998 and 1999 span nearly 420,000 years and carry information about four major climate cycles and many smaller temperature swings. Climate scientists had pointed out that the ice core data imply a strong positive feedback to global carbon dioxide and methane levels, but how much this impacted warming trends was unclear.

Torn and Harte devised a way to use these data and current global climate models to estimate the effect of increased carbon dioxide entering the atmosphere as a result of warming, called the “gain.” From previously published data, they were able to extract the effect of temperature on carbon dioxide and methane levels. They then calculated the reverse—the effect of carbon dioxide and methane levels on temperature, or the so-called climate sensitivity—from climate models.

The researchers added the resultant gains from carbon dioxide and methane to the gain already known for other climate feedbacks, in particular the largest source, increased atmospheric water vapor, to arrive at a total gain. They used this figure to calculate the temperature increase that would result from a doubling of current carbon dioxide levels.

Both researchers emphasize that the wide temperature range they predict—1.6 to 6 degrees Celsius [2.9 to 11 degrees Fahrenheit]—does not mean that Earth has an equal chance of ending up with less warming as with greater warming, in other words, that the uncertainties are symmetric about an average increase of 3.8 degrees Celsius [6.8 degrees Fahrenheit].

“They see this uncertainty and think that we have an equal probability of dodging a bullet as catching it. That is a fallacy,” Torn says.

“By giving the appearance of symmetric feedback, people have an excuse to say maybe we don’t have to worry so much,” Harte says.

“But while there are uncertainties in the feedbacks, all the major feedbacks are positive, meaning they would increase warming, and we know of no significant negative feedbacks that would slow warming.”

“Whatever the mechanisms that cause temperature to create a change in carbon dioxide and methane, they are repeatable again and again and again over many cooling and warming cycles. So, although the world is different today than it was then, we don’t have a basis for ignoring them,” Torn says.

“We need to know the effect of warmer temperatures in all different habitats “says Harte, “not just temperate Rocky Mountain forests,” where he has conducted experiments, “but also the tropics and European boreal forests and Eastern U.S. deciduous forests and savanna and prairie. There are huge data gaps.”

Torn notes, however, that humans are the biggest unknown. “To predict the future, you have to guess how much carbon dioxide levels will go up. That depends on the biggest uncertainty of all: what humans decide to do. Do we get smart and prevent carbon dioxide emissions? Do we continue with business as usual? Or will we end up somewhere in between?”

The research was supported by the U.S. Department of Energy’s Climate Change Research Division and by the National Science Foundation.

American Geophysical Union
Lawrence Berkeley National Laboratory
University of California Berkeley
Joint Release
AGU Release No. 06-18
AGU Contact: Harvey Leifert
(202) 777-7507
hleifert@agu.org
Can We Reach Energy Independence?...

Yes, We Must!

Raul A. Deju, CPG-04025

For the past 36 years, the world of White House and congressional programs has been riddled with slogans aiming to achieve energy independence, pollution-free vehicles, and reductions in oil consumption in America. Yet, each year our consumption of oil goes up and equally our oil imports. Most imports, in fact, come from countries that do not really like us!

Recently, President George W. Bush noted that the U.S. population is “addicted to oil”. Translating such a comment into a viable national energy policy is easier said than done but as Yoda, the sage Jedi master of Star Wars fame would say “done it must be!” Strong conservation programs, emphasis on environmental protection, a clear usage of domestically available fuels and a real emphasis on renewable fuels need to be essential tenets of a sensible American Energy Policy in the 21st century. Previous attempts at energy independence provided good sound bites but accomplished little in terms of diversifying our economy from foreign oil production (see bulleted items). We must do better in our next attempt at “Energy Independence.”

Previous attempts at energy independence... a disappointing legacy

- 1970: Nixon proclaimed “I am inaugurating a program to marshal both government and private research with the goal of producing an unconventionally powered virtually pollution free automobile within five years.”
- 1974: President Richard Nixon launched Project Energy Independence declaring “Let this be our national goal: At the end of this decade, in the year 1980, the United States will not be dependent on any other country for the energy we need to provide our jobs to heat our homes, and to keep our transportation moving.”
- 1975: President Ford changed the date to achieve energy independence from 1980 to 1985.
- 1977: President Carter noted that “energy independence was the moral equivalent of war.”
- 1979: President Carter declared on television “Beginning this moment, this nation will never use more foreign oil than we did in 1977- never.”
- 1991: President George H. W. Bush in his national energy strategy proposed to “strongly reduce our dependence on foreign oil.”

The American Economy is fueled by growth. In turn, such growth requires energy usage. However, man’s usage of energy generally is not very efficient. In fact, the efficiency of machines for manufacturing and transportation in most instances is between 10 and 30%. Technology is the key to improving energy efficiency and America is good at developing new technologies. Especially when new technology is coupled with strong conservation programs it can dramatically expand our ability to support our production needs and guarantee our living standards. Significant technology improvements in energy efficiency and utilization need to be at the core of any new rational national energy policy.

The current growth in energy usage in the United States, especially non-renewable resources is not sustainable. The consequences of the usage of mostly carbon-based fuels without adequate air emissions control can significantly alter the atmosphere of our planet if left unchecked. While providing the tools for economic growth must be at the heart of an energy policy, such growth must be carried out wisely without damaging beyond repair the fabric that gives us life.

To develop an “aggressive yet achievable” energy policy, the work needed to frame its context must be constructed on a solid basis and without slogans and must have a broad base of support. De-politicizing energy is nearly impossible, but absolutely necessary. Maybe a good start is to assemble a group of the best minds in the country and give them a mandate to recommend a specific program to Congress and the Executive Branch that this time has a chance to achieve Energy Independence, almost like the famous Manhattan project of a previous generation. Such a group should bring together business leaders, NGO’s, academics, finance and taxation experts, conservationists, and government sector representatives. The effort needs to be carried out with the priority level and the speed of the Manhattan or the Apollo Projects of past generations.

To keep the process simple I suggest the consideration of the following “10 must-do items:”

1. It is good to let the country know that “we are addicted to oil”, however that is not enough. A rational energy policy must begin with dramatically intensifying our conservation and energy efficiency activities. We need to increase average car mileage at
least 10-15% per decade over the next two decades. We need to substantially increase power plant efficiency. We need to reduce emissions from the generation of equivalent amounts of power and emissions connected with machines providing equivalent amounts of output. Experts can then detail the road map.

2. Energy policies must have a broad constituency. Environmental protection needs to be strongly factored into these policies. A standard theme should also be to provide the power needs to maintain the nation's economic growth and protect our nation's jobs. An energy policy that leads to economic downturn is as doomed to failure as one that disregards environmental protection. A balance is needed.

3. An over-riding national goal is needed with a clear target much as landing a man on the moon by a date certain was a goal in the early space program. One such goal could be to aim to cap oil imports at the 2006 levels with conservation, efficiency, new technologies, and increased usage of energy alternatives taking care of the added energy needs. Making such a statement, however, will not get the job done. Having a road-map to get there is what is needed. The over-arching goal should address short term (0-10 years), mid-range (10-30 years), and long-range (the balance of the century) needs.

4. A clear plan to develop alternative U.S. based fuel options needs to be completed with clear goals for ethanol, biodiesel, solar, wind, and other renewable fuel options. The goals need to be translated into quantitative measures. It would not be unreasonable by 2025 to reach 20% of all liquid fuels consumed in the U.S. to be from renewable sources. Similarly 20-25% of all power consumed could come from alternative power sources by 2025. Experts, however, need to tell us what is truly achievable.

5. Efficiency improvements are needed in the reservoir extraction and refining processes. Incentives and research and development work are needed to obtain greater production levels from given oil and gas fields. Measures that co-mingle sequestration of carbon and other greenhouse gas reduction processes with increased oil field extraction efficiencies should be encouraged. Measures to obtain fuel value from pet-coke should be encouraged.

6. The transportation infrastructure for moving power through transmission lines and substation systems as well as for moving liquids and gaseous fuels through pipelines, rail or trucks, needs to be developed in parallel with the re-adjustment of the energy picture considering the realities of where alternative fuel plants may be located and where improved clean power production is likely to be located. Sitting of these new plants needs to factor efficiency of power movement in the overall planning process.

7. Government, business, environmental groups and academia need to address the new technology needs that will be required to move the nation over several decades from a carbon-driven to a hydrogen-driven economy. A transparent approach minimizing political polarization is needed to ensure the smoothness of this process during the transition decades to come.

8. Government incentives should be focused on those specific areas where they are critical to effecting a smooth transition form a carbon to a hydrogen economy.

9. Education and communications at all levels need to be part of a sensible energy policy. Everyone is a stakeholder and everyone must understand what is at stake. Bipartisan approaches at all levels are needed in order to succeed.

10. Given the emphasis placed on alternative fuels to meet the gap between fuel consumption needs and fuel imports, agricultural policies in the U.S. must be designed to factor increased usage of crops such as corn, soybeans, canola, etc. for non-food uses. Agricultural policies need to be coupled with energy policies. The agricultural policies currently in place were designed for America to become the world's food basket. We now need policies that also allow for American agriculture to be the source of clean, home grown fuels.

Are these overly idealistic goals? Probably not, however it will take some bending by most sectors of our business, political, and NGO leaders to make a rational energy policy happen. Examples abound in states where in a smaller way rational energy policies have been implemented. For example, the State of North Dakota through a broad bi-partisan effort has led the way and implemented goals that over the next five years will replace 12% of current in-state gasoline consumption with renewable fuels. Equally, they are adding over 4-5 years the wind infrastructure in place that would allow wind to represent 10% of North Dakota's power generation portfolio. Why can not we repeat such successes at the national level?

We as a nation are used to accomplishing many firsts. Now we need to think out of the box, creatively, and in a broad bipartisan manner in order to develop a rational and achievable national energy policy with broad popular support. An effort to contain our oil imports is not protectionism, but instead it shows our leadership helping the world to see how we truly expect to conquer our addiction to oil.

Raul A. Deju, a Ph.D. geoscientist is a Professor at St. Mary's College of California and J.F. Kennedy University, a Managing Partner at Sienna Ventures and formerly the Founder and President of ISG Resources (now Headwaters Incorporated, a NYSE listed company), recognized for developing the largest recycling program in America converting coal ash, a byproduct of power generation, into usable cement thus replacing equivalent amounts of cement production and eliminating the equivalent greenhouse gas emissions associated with such cement manufacturing. Dr. Deju is an energy consultant and a venture-capitalist, with over 150 publications to his name. In 2005 he was named “One of the Top 25 Leading Hispanics in the San Francisco Bay Area.”
Jump-Start Your Career

BEFORE
You Leave School

Clay Garretson, SA-0757, Paleontological Geologist, PaleoWorld Research Foundation

Being a young professional in the field of paleontology I have noticed many things that are essential to the field that were never covered in or ever could be covered in a classroom setting. In the words of my professional mentor these include paleo politics, field life, and most importantly how to jump-start a career?

Paleo Politics

Just how do you negotiate land access? How do you get a town that is suspicious of people from “the east” to accept the fact that you are in town? How do you find an institution that will allow you to pursue your research interest?

Field Life

What does it take to live in a tent for a month and a half? How do you deal with a difficult field assistant? How do you improve field radio reception with limited materials?

Career Jump-Start

Where can an undergrad go to get field experience? What can you do if a museum volunteer program is not an option? What else do I need other than a degree to jump-start my career?

Yes, all these questions came up during my undergraduate field experience and many more and I would not trade the experiences that led to the answers for the world but none of them were through my university. Even though you can get a degree with only minimal field experience, I would not recommend it.

Many websites I have read indicate two routes to get a jump-start on your career: a traditional and a non-traditional route. Traditional being degree and non-traditional being museum volunteer programs and other hands on experiences. But many students are in the same position I was: Interested in vertebrate paleontology, but stuck in the middle of the Western Interior Seaway with no museum within a reasonable distance.

Without any guidance it was mere chance that I found a website advertising a field program open to the public that would later add a student field program. The current paleontologist with this organization has been a big influence in my professional experience that includes three abstracts in two years with the Geological Society of America.

So what recommendations would I make to an under grad trying to get a jump-start on a paleontology career?

- Find a Field Camp;
- Find a Professional Mentor; and
- Take a Chance

I put find a field camp first because this is the source of field experience and that will help you get an idea of what you would like to specialize in and this will help narrow your choice of mentor.

Once you have an idea of what to specialize in (I choose paleontological geology) looking for a mentor should be fairly easy because they may already be working closely with you. Keep in mind, however, that your mentor may not be someone working in the exact specialty that you intend on going into. As I have discovered, your research interest should compliment one another. For instance, my mentor is a paleontologist who looks more at dinosaurs themselves. My work compliments his studies by giving insight into the paleo-environment of the study area.

Paleontology seems to be one of those fields that never left the time period of master and apprentice or padawan as my mentor puts it. This is because you need someone to provide both career guidance and opportunities for field experience. And yes, part of the politics just may be each of you getting accustomed to the others quirks.

Last but not least, do not be afraid to take a risk in order to advance your prospects. I remember right before I submitted my first abstract I was so worried that my writing was not up to the caliber needed for a professional publication. It took a group of people to convince me otherwise and when I finally got the nerve to submit my work it resulted in my first publication. A paper based on that abstract would later result in a course grade of “B”, but even this I got over before the next field season.

During the off-season that year I designed the stratigraphic study that would result in my second published abstract. I tell this story only to illustrate that a single set back is not a reason to give up.

In short to jump-start your career you must:

Be a Leader

Show younger students how to start their careers.

Be a Friend

Be a friend to those you work in the field with. This may seem simple but under the pressures of field life proves easier said then done.

Be of Service

Publish the results of your studies to the scientific community in order to advance scientific understanding. And boost your resume as well!

As for the answers to the other questions in this article those you will have to find during your own fieldwork.

If I can be of help to anyone reading this article please do not hesitate to contact me by e-mail at paleogeologist@gmail.com
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Introduction

Dakota County, Minnesota is committed to having safe, healthy citizens and a quality physical environment. In support of that commitment, Dakota County Water Resources (referred to as “the County”) has been conducting a long-term study of groundwater and private wells, its Ambient Groundwater Quality Study (AGQS). The results raise concerns about contamination found in some residential wells.

Dakota County, south of St. Paul, is the third most populous county in the state, after Hennepin and Ramsey counties (Figure 1). Despite the County’s large and growing population of approximately 360,000 people, about two-thirds of its land area is still rural.

Ninety-one percent of Dakota County residents obtain their drinking water supply from groundwater. The two most heavily used aquifers in the County are the Shakopee dolomite formation of the Prairie du Chien Group (OPDC) and the Jordan Sandstone (CJDN) for both private and municipal supplies. While many of the state’s hydrogeologists consider these formations as a single aquifer system, County staff has found that they behave as separate aquifers in most of the County; the Onota formation of the OPDC acts as a confining unit between the Shakopee and the CJDN. The OPDC underlies most of the County, as can be seen on the first bedrock map from the Dakota County Geologic Atlas, Figure 2. (The black line on Figure 2 shows the location of the cross-section illustrated in Figure 5.)

In 1998, Dakota County Environmental Management Department was seeking a tool to measure the effec-
tiveness of its well management, solid waste, and hazardous waste programs; this, coupled with concern for increasing nitrate levels in domestic wells and the City of Hastings’ municipal wells, spurred the creation of the AGQS. Dakota County conducted its first AGQS sampling event in 1999. The planned duration of the study is 20 years.

The study has established a baseline of groundwater quality data to which future data can be compared. This has enabled the County to identify issues of concern, track changes in groundwater, and protect the future of this valuable resource.

Well Selection

The study concept is to sample the same set of privately-owned drinking water wells, located throughout the County, once each year in order to study changes in the groundwater over time and space. For the first five years of the AGQS (1999-2003) the same 23 wells completed in the OPDC and 19 wells completed in the CJDN were sampled once each year. The parameters for which the water samples are analyzed and the time of year has varied with each sampling event.

The wells selected for sampling represent the County’s geologic and geographic conditions (Figure 3). First, a well completed in the OPDC was selected based on geology and geographic distribution. Next, a nearby CJDN well was identified, usually within 1500 feet of the OPDC well. In some areas of the County a nearby CJDN well could not be located. Once wells are selected, the owners are invited to participate; participation is voluntary and uncompensated.

In 2004, 24 screened wells completed in the Quaternary sands and gravels (Q) plus one completed in the OPDC were added to the study. The Q wells selected are located near the paired OPDC and CJDN where possible. Only a few private domestic wells were sampled within the Metropolitan Urban Services Area where municipal water and sewer exists. In 2005, the five City of Hastings municipal wells completed in the CJDN and one additional Q well were added. In 2005, 68 private wells and 5 municipal wells were sampled.

Analytical Parameters

Minnesota Valley Testing Laboratories, Inc. (MVTL) collects untreated water samples from faucets. The water samples are analyzed for field parameters: temperature, specific conductance, pH, dissolved oxygen, turbidity, and appearance. In the lab, MVTL analyzes the water samples for general chemistry: total alkalinity, sulfate, total chloride, bromide, nitrate, nitrite, ammonia nitrogen, total kjeldahl nitrogen, calcium, magnesium, sodium, potassium, iron, manganese, fluoride, and total organic carbon.

Each well was analyzed once for volatile organic compounds and caffeine; none were found and the analysis has not been repeated. In addition, each well in the study was sampled one time for arsenic; only low concentrations were found. Each year the water samples are analyzed for pesticides associated with corn and soybean farming, which are the most widely used pesticides in Minnesota and the nation. In 2001, Dakota County began a partnership with the United States Geological Survey (USGS) to investigate pesticides and pesticide breakdown chemicals as part of the AGQS. In its research, the USGS Organic Geochemistry Research Group in Kansas has the capacity to analyze water for a wider variety of pesticide and pesticide breakdown chemicals, at lower detection levels, than is available through commercial laboratories.

AGQS Results

The contaminants of concern in the AGQS have been nitrate, pesticides, and pesticide breakdown chemicals. Nitrate, pesticides, or their breakdown chemicals were detected in 56 of the 68 private drinking water wells sampled in 2005 (82%).

Nitrate

Nitrate is the most common source of groundwater contamination in Minnesota. In general, nitrate concentrations in the AGQS have not changed since the study began in 1999, so the 2005 results shown in Figure 4 are typical. The study’s results for 2005 found that 36 of the 68 wells sampled (53%) had detectable concentrations of...
nitrate; 12 of the 68 (18%) exceeded the drinking water standard for nitrate of 10 mg/L (milligrams per liter). Nitrate contamination can be derived from a variety of sources, but in Dakota County’s Hastings Area Nitrate Study (HANS, available at http://www.co.dakota.mn.us/environ/Hans/hans.pdf), it was found to be strongly associated with corn and soybean farming. In particular, the HANS wells’ nitrate results were highly correlated with the total mass of agricultural pesticides and pesticide breakdown chemicals (Spearman’s rho = 0.793, p = 0.0000).

As shown on Figure 4, high nitrate concentrations in the AGQS appear most often in eastern Dakota County, which is particularly vulnerable to groundwater contamination. The predominant land use in this part of the County is row-crop agriculture, and a number of factors contribute to the vulnerability of the drinking water aquifers:

- Permeable, coarse-textured soils over glacial deposits of sand and gravel;
- A buried bedrock valley (Figure 2) that can be as deep as 500 feet, as well as a lesser (400 feet) bedrock valley under the Vermillion River;
- Karst;
- The Empire Fault; and
- The Vermillion River, which contributes contamination from its upper reaches downstream to the groundwater underlying its lower reaches.

As shown on Figure 5 the buried bedrock valleys cut into the OPDC and CJDN, replacing any confining layers with permeable glacial deposits. The lesser bedrock valley under the Vermillion River lies along the geologic formations offset by the Empire Fault.

Pesticides and Pesticide Breakdown Chemicals

Adjustments have been made to the list of AGQS analytes each year. From 2001 through 2003, samples from the bedrock wells in the AGQS were analyzed for pesticides and pesticide breakdown chemicals by the USGS Organic Geochemistry Research Group. The pesticides for which analysis was conducted were predominantly herbicides associated with corn and soybean farming, since these have been the most widely detected pesticides in the USGS’s National Ambient Water Quality Assessment program. Those analyses detected numerous compounds, but at levels well below the applicable Health Risk Limits (HRLs) or Health Based Values (HBVs).

In 2004, 24 wells screened in Quaternary sands and gravels were added to the AGQS and they were analyzed for pesticides by the USGS using a different set of analytical methods than in previous years. The 2004 results found five Q wells that had cyanazine breakdown chemicals that exceeded the HBV for cyanazine and one well that exceeded the draft HRL for alachlor.

In 2005, all the AGQS wells were analyzed using the “new” analytical methods. Table 1 lists the analytes and shows which were detected and which chemicals had exceedances. The study’s results for 2005 found that 53 of the 68 private wells tested (78%) had detectable concentrations of pesticides or their breakdown chemicals. Combined concentrations of cyanazine breakdown chemicals that exceeded the HBV for cyanazine were found in 7 of the 68 wells and concentrations of alachlor that exceeded the draft HRL for alachlor were found in one well.

Most of the pesticide detections were breakdown chemicals, which are generally less toxic than the parent pesticide but which persist longer in the environment. Cyanazine itself (sold as Bladex) has not been legal for use since 2002, and the parent compound was not detected in the AGQS.

Figure 6 shows the location of the cyanazine breakdown chemical detections and the alachlor exceedance. As with nitrate, the worst pesticide results were found in the geologically sensitive eastern portion of the County.

In Table 2, the chemicals are grouped by the parent pesticide and listed in order of the frequency of detection. (Alachlor ESA, the most frequently detected chemical, is listed separately because it has a higher HBV than the HRL for alachlor.) Fifty-three of the 68 wells (62%) had multiple pesticides detected in them, with as many as seven different pesticides detected per well. As in Dakota County’s early HAN Study, nitrate results were highly correlated to the total mass of pesticides and pesticide breakdown chemicals in a well (Spearman’s rho = 0.7735, p = 0.0000).

As mentioned above, in Dakota County, the OPDC and CJDN are regulated as separate aquifers, although this is not the case in other parts of Minnesota. The AGQS results have supported the sepa-
rate treatment of the two aquifers. The wells screened in the Quaternary and the OPDC wells have had very similar results in terms of nitrate and pesticide detections, as shown in Chart 1, whereas the detections in the CJDN have been significantly lower. The CJDN wells are deeper than the Q and OPDC wells; in addition, the CJDN has denitrifying conditions: high iron and low oxygen.

### Response to Ambient Contamination of Groundwater

Dakota County is working with the Minnesota Department of Agriculture (MDA), the Minnesota Department of Health (MDH), and other agencies in

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**Table 1. 2005 USGS LC/MS Pesticide Analytes**

<table>
<thead>
<tr>
<th>2005 USGS LC/MS Pesticide Analysis</th>
<th>2005 Reporting Limit (µg/L)</th>
<th>2005 USGS LC/MS Pesticide Analysis</th>
<th>2005 Reporting Limit (µg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detects in Red</td>
<td></td>
<td>Detects in Red</td>
<td></td>
</tr>
<tr>
<td>Analyzed for, but not detected, in italics</td>
<td></td>
<td>Analyzed for, but not detected, in italics</td>
<td></td>
</tr>
<tr>
<td><strong>Exceeds applicable draft Health Risk Limit or Health Based Value in bold and red.</strong></td>
<td></td>
<td><strong>Exceeds applicable draft Health Risk Limit or Health Based Value in bold and red.</strong></td>
<td></td>
</tr>
<tr>
<td>Acetochlor</td>
<td>0.02</td>
<td>Atrazine (Aatrex)</td>
<td>0.025</td>
</tr>
<tr>
<td>Acetochlor deschloro</td>
<td>0.02</td>
<td>Bromacil</td>
<td>0.025</td>
</tr>
<tr>
<td>Acetochlor ESA</td>
<td>0.02</td>
<td>Cyazine (Bladex)</td>
<td>0.025</td>
</tr>
<tr>
<td>Acetochlor hydroxy</td>
<td>0.02</td>
<td>Cyazine amide (CAM)</td>
<td>0.025</td>
</tr>
<tr>
<td>Acetochlor OXA</td>
<td>0.02</td>
<td>Cyazine acid (CAC)</td>
<td>0.025</td>
</tr>
<tr>
<td>Acetochlor SAA</td>
<td>0.02</td>
<td>Deethylatrazine (DEA)</td>
<td>0.025</td>
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<tr>
<td>Acetochlor/ Metolachlor ESA - 2nd Amide</td>
<td>0.02</td>
<td>Deethylcyazine (DEC)</td>
<td>0.025</td>
</tr>
<tr>
<td>Acetochlor/ Metolachlor - 2nd Amide</td>
<td>0.02</td>
<td>Deethylcyazine acid (DCAC)</td>
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<tr>
<td><strong>Alachlor (Lasso)</strong></td>
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<td>Alachlor -- 2nd amide</td>
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<td>Deethylhydroxyatrazine (DEHA) (2004)</td>
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<tr>
<td>Alachlor deschloro</td>
<td>0.02</td>
<td>Deisopropylatrazine (DIA)</td>
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</tr>
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<td>Alachlor ESA</td>
<td>0.02</td>
<td>Deisopropylhydroxyatrazine (DIHA)</td>
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</tr>
<tr>
<td>Alachlor ESA -- 2nd Amide</td>
<td>0.02</td>
<td>Didealkylatrazine (DDA)</td>
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<tr>
<td>Alachlor hydroxy</td>
<td>0.02</td>
<td>Hydroxyatrazine (HA)</td>
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</tr>
<tr>
<td>Alachlor OXA</td>
<td>0.02</td>
<td>Hydroxysimazine</td>
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</tr>
<tr>
<td>Alachlor SAA</td>
<td>0.02</td>
<td>Prometon (Framitol)</td>
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</tr>
<tr>
<td>Dimethenamid (Frontier)</td>
<td>0.02</td>
<td>Propazine (Milgard)</td>
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</tr>
<tr>
<td>Dimethenamid deschloro</td>
<td>0.02</td>
<td>Simazine (Princep)</td>
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<tr>
<td>Dimethenamid ESA</td>
<td>0.02</td>
<td>Diuron</td>
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</tr>
<tr>
<td>Dimethenamid hydroxy</td>
<td>0.02</td>
<td>Fluometuron</td>
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</tr>
<tr>
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<td>Linuron</td>
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<td>Flufenacet</td>
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<td>Demethylfluometron (DMFM)</td>
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<tr>
<td>Flufenacet ESA</td>
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<tr>
<td>Flufenacet OXA</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Metolachlor (Dual)</td>
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</tr>
<tr>
<td>Metolachlor deschloro</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Metolachlor ESA</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metolachlor hydroxy</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metolachlor OXA</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Propachlor (Ramrod)</td>
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<td></td>
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<tr>
<td>Propachlor ESA</td>
<td>0.05</td>
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<td></td>
</tr>
<tr>
<td>Propachlor OXA</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
addressing the groundwater contamination identified in the AGQS. This response combines communicating with private well owners about the concerns identified in the AGQS with efforts to prevent future contamination.

Each year, the County sends an individualized report to the well owners who participate in the study, informing them of that year’s results and explaining any related health concerns and potential point-of-use treatment systems. The Environmental Protection Agency has included in the AGQS suite of analytes until any significant trends in the data can be identified.

Based on the 2005 results, the County is developing a broader communications campaign to inform its estimated 8,000 households that rely on private drinking water wells about the AGQS results. The goal of this effort to inform these households about the contamination that has been found, reassure them about the availability of effective treatment, encourage them to have their own wells tested for nitrate, and educate them about ways to protect their wells.

In terms of prevention, research by the MDA has found that farmers in eastern Dakota County generally follow the University of Minnesota’s recommendations for the application of fertilizer and pesticides; however, the area’s sensitive geological conditions make it very susceptible to groundwater contamination. Since that research, the University and MDA have revamped their recommendations for fertilizer applications in sensitive areas like Dakota County. In addition, in 2005 MDA issued a revised Pesticide Management Plan for the state. Dakota County, MDA, MDH, and a number of other agencies are working together to promote adoption of farming practices that will protect the County’s future water resources.

The first five-year report for the AGQS (1999-2003) has been published and is available on-line at www.co.dakota.mn.us/environ/water.htm. For additional information, contact the authors at vanessa.demuth@co.dakota.mn.us or jill.trescott@co.dakota.mn.us.

Vanessa Demuth, MEM-0863, PG (State of MN), Environmental Geologist, Dakota County Water Resources Office, Apple Valley, MN. Should you have comments or questions you may email vanessa.demuth@co.dakota.mn.us.

Jill V. Trescott is an Environmental Scientist with the Dakota County (Minnesota) Water Resources Office. She has a bachelor’s degree from Wellesley College and a master’s degree from the University of North Texas. She manages non-point source groundwater pollution monitoring and prevention efforts for Dakota County, including the Hastings Area Nitrate Study (Phases I and II) and Ambient Groundwater Quality Study (co-manager with Vanessa Demuth). The Hastings Area Nitrate Study was recognized by the National Groundwater Association as its Outstanding Project in Groundwater Protection for 2003.

Reviewed by AIPG Associate Editors: Brett Coulter, Solomon Isiorho, CPG, and Doug Perisutti, CPG.

<table>
<thead>
<tr>
<th>Pesticides and/or their degradates detected in 2005 Ambient Groundwater Study private wells (n = 68)</th>
<th>% Detections</th>
<th>% Over Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alachlor ESA</td>
<td>65%</td>
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</tr>
<tr>
<td>Alachlor (Draft HRL = 0.7 ug/L)</td>
<td>38%</td>
<td>1%</td>
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<tr>
<td>Metolachlor</td>
<td>54%</td>
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<tr>
<td>Atrazine</td>
<td>50%</td>
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<td>Cyanazine (Draft HRL = 1.0 ug/L)</td>
<td>41%</td>
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<td>Prometon</td>
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<tr>
<td>Propazine</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Bromacil</td>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Frequency of Detection in Private Drinking Water Wells, by Parent Pesticide.

Chart 1. Nitrate and Pesticide Summary, By Aquifer

Vanessa Demuth, MEM-0863, PG (State of MN), Environmental Geologist, Dakota County Water Resources Office, Apple Valley, MN. Should you have comments or questions you may email vanessa.demuth@co.dakota.mn.us.
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NEW! MARBLE MUG - 11 oz., blue with matte gold lettering on both sides. Price: $8.95


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