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Plan on Attending the
42ND ANNUAL AIPG MEETING

LEXINGTON, KENTUCKY

OCTOBER 8 - 13, 2005

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Picture: Big South Fork in Kentucky
Kentucky Tourism Cabinet
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THE PROFESSIONAL GEOLOGISTS

SEPTEMBER/OCTOBER 2005

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FRONT COVER — View of the joint separated blocks of the Devonian-age Granite of Cadillac Mountain (foreground) and the 110 ft. high Otter Cliffs (background), one of the highest headlands along the Atlantic Coast, in Acadia National Park, Maine. Composed of the same pinkish to greenish-gray, coarse-grained granite that form the picturesque summits of Mount Desert Island, these rocks originated as igneous plutons that accompanied the mid-Paleozoic Acadian orogeny. Pleistocene glaciaion and crustal rebound have dramatically reshaped Acadia NP into a textbook of glacial geomorphology. Photograph by John W. Jengo, CPG-08139.

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

The mission of the American Institute of Professional Geologists (AIPG) is to be the superior advocate for geology and geologists, to promote high standards of ethical conduct, and to support geologists in their continuing professional development.
The summer is still with us, but the anticipation and fragrances of Kentucky in October are upon us. It seems like yesterday we were driving along the entrance to the Gideon Putnam in Saratoga Springs in anticipation of the Annual Meeting! We are looking forward to another great Annual Meeting and a chance and enjoy the hospitality of the Kentucky Section as well as catch up with friends and meet other members of AIPG. We look forward to seeing all of you in Lexington from October 8 – 13.

I remember back just a short while ago when I took over the position as Editor of TPG. We were hoping to get good response to requests for articles and contributions to fill all of the issues of TPG. I was told that we would like to aim for approximately 40 pages for each issue. Well, we have exceeded that number of pages with ease for each and every issue of TPG. Thank You! It is with your efforts and contributions that we have making TPG a true publication of AIPG members. We cannot rest on past achievements, but must look at each issue of TPG as a new challenge. This is an important lesson taught by a well known, Super Bowl Champion coach, Bill Belichick of the New England Patriots. As such, I periodically solicit you for articles, both technical and general interest, for publication in TPG. Our next issue will be the last one for 2005 and we are already gearing up for the January/February 2006 Student Issue. There is plenty of time to get material in for the November/December issue before we sit down to enjoy the Holiday Season. Please feel free to e-mail or call me with any questions or thoughts you may have regarding material for TPG.

How is the geological profession faring in your state? Do you feel as though other professions have more visibility and a stronger lobby at the state house? If so, what are you doing to change attitudes? Alternatively, let us know if the profession has a strong voice at the state house and how you maintain this strong voice. There are thousands of readers of TPG and many who can lend advice. TPG can be a forum for some of this discussion and advice. Remember – TPG is your journal.

We look forward to seeing many of you in Lexington for the 42nd Annual Meeting! Thank You.

Ray Talkington, CPG-07935, Geosphere Environmental Management, Inc., 51 Portsmouth Avenue, Exeter, New Hampshire 03833, e-mail: rtalkington@geospherenh.com

Is Your Profile Correct?
It is important to keep your address, phone numbers, and e-mail information up to date in our records. Please take the time to go to the AIPG National Website <www.aipg.org> login to the member portion of the site and make sure your information is correct. You can edit your record online. If you do not know your login and password you can e-mail National Headquarters at aipg@aipg.org or call (303) 412-6205.

AIPG 2005 National Awardees

Ben H. Parker Memorial Medal
James W. Skehan, CPG-01505
Weston, Massachusetts

Martin Van Couvering Memorial Award
Lawrence M. Austin, CPG-05181
Grand Rapids, Michigan

John T. Galey, Sr. Memorial Public Service Award
John G. Parrish, CPG-03326
Sacramento, California

Honorary Membership
Rex Monahan, CPG-00424
Sterling, Colorado

Honorary Membership
Richard H. Young, CPG-03356
Parsippany, New Jersey

Outstanding Achievement Award
Thomas W. Dibblee, Jr.
Camarillo, California
AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS

SCHOLARSHIP PROGRAM

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

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

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

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

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

American Institute of Professional Geologists
Attn: Education Committee Chm.
1400 W. 122nd Ave., Suite 250
Westminster, CO 80234

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

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

Basis of Awards
Awards will be based on the content and creativity of the essays as judged by the Education Committee. The decisions of the Education Committee are final.
MEMBERS IN THE NEWS

Secretary Gale Norton Praises Leadership of U.S. Geological Survey Director Dr. Charles Groat

WASHINGTON, D.C. - Secretary of the Interior Gale A. Norton announced the resignation of Dr. Charles G. Groat, CPG-02774, as Director of the U.S. Geological Survey (USGS). Dr. Groat will resume his distinguished academic career - accepting appointments at the University of Texas at Austin. His resignation was effective June 17, 2005.

In a letter to Dr. Groat, Secretary Norton praised the knowledge, management skills, leadership and perseverance that he has brought to the USGS and the Department of the Interior:

“I cannot overstate your positive impact on the USGS and its contributions to science excellence and leadership under your stewardship,” she said. “You have worked successfully to ensure that the USGS’s scientific capabilities are effectively applied to supporting important decisions regarding resource and environmental management and policy. You have substantially increased the USGS’s interactions with organizations that use science in decision making, and especially those within the Department of the Interior, to ensure the relevance of the USGS’s work to their needs.”

Dr. Groat was confirmed as the 13th Director of the USGS on November 13, 1998. He plans to accept appointments as the Jackson Chair in Energy and Mineral Resources in the School of Geological Sciences and as Associate Director and Acting Director of the Bureau of Economic Geology.

The Department of the Interior will name an acting USGS Director upon Dr. Groat’s departure. A permanent replacement must be nominated by President Bush and confirmed by the U.S. Senate.

Secretary Norton Names Pat Leahy Acting Director of the U.S. Geological Survey

WASHINGTON - Interior Secretary Gale Norton today named Dr. P. Patrick Leahy, CPG-10507, as acting director of the U.S. Geological Survey. Leahy will take over from Dr. Charles G. Groat, CPG-02774, who has announced his resignation, effective June 17, 2005, to accept an appointment at the University of Texas at Austin. A permanent replacement for USGS director must be nominated by President Bush and confirmed by the U.S. Senate.

“Pat is a consummate professional with a wealth of scientific expertise and administrative experience on a broad range of issues,” Norton said. “He has been with USGS since 1974, and I am confident in his ability to take on this position.”

Leahy is currently the associate director for Geology of the U.S. Geological Survey. He has responsibility for federal Earth-science programs, which include worldwide earthquake hazards monitoring and research, geologic mapping of land and seafloor resources, volcano and landslide hazards, and assessments of energy and mineral resources. He also is responsible for all USGS international activities.
A recipient of the USGS Meritorious Service Award, Leahy has served in various technical and managerial positions, including chief of the National Water-Quality Assessment Program. He has authored or co-authored more than 50 publications on an array of Earth-science topics. Born in Troy, N.Y., in 1947, Leahy holds undergraduate and graduate degrees in geology (1968) and geophysics (1970) from Boston College. He received his doctorate in geology (1979) from Rensselaer Polytechnic Institute, where he specialized in regional groundwater studies and hydraulics.

Leahy is a fellow in the Geological Society of America and a member of the American Geophysical Union, the American Institute of Hydrology (former president), Sigma Xi, American Association for the Advancement of Science, the 50th Anniversary Committee of the American Geological Institute, and the Geological Society of Washington. He has received the Meritorious Service Award from the U.S. Department of the Interior and in 2003 was recognized as a Meritorious Senior Executive by President Bush.

Leahy is the past president of the U.S. National Chapter of the International Association of Hydrogeologists. In addition, he was selected by the National Academy of Science to head the U.S. delegation to the 30th International Geological Congress in Beijing, China, in August 1996. He also serves as the chair of the Federal Advisory Committee for the National Cooperative Geologic Mapping Program. He was a member of the U.S. National Committee on Scientific Hydrology. Leahy is a representative on the Atmospheric and Hydropheric Science Committee of the American Association for the Advancement of Science. He has also served on the Editorial Board of Water Resources Update of the Universities Council on Water Resources.

He is a member and the past chairman of the U.S. National Committee for Geological Sciences for the National Academy of Sciences. Leahy was the recipient of the 1996 Boston College Alumni Association Award of Excellence in Science. He was also the 1995 Alumni Association Fellow in Science for Rensselaer Polytechnic Institute. He is a member of the Indo-American Working Group for the Center for Disease Control. Leahy led the USGS efforts for the economic reconstruction of Afghanistan.

He visited Kabul in April 2005 to meet with Government of Afghanistan and U.S. Embassy officials.

U.S. Department of the Interior
News Release
Office of the Secretary
Contact: A.B. Wade,
(703) 648-4460
June 13, 2005

Arizona State Geologist Retires

Dr. Larry Fellows, Arizona State Geologist from 1979 to 2005, receiving a commemorative plaque from Survey Senior Geologist Dr. Jon Spencer at a retirement banquet held in Larry’s honor on June 29th in Tucson, Arizona.
AIPG members are encouraged to use the AIPG National website <http://www.aipg.org> on a regular basis. The website contains a huge amount of information. The two main areas to look for items on the site are in the About AIPG located on the left side index or the Select & Go! which is a drop down menu located at the top right of page. The picture below is what the AIPG website looks like when it opens in your browser. The content on this page does change from time to time but the site continues to work the same.

The Select & Go! drop down menu has an alphabetical list of items on the website which include:
- 2005 Annual Mtg
- Advertisers
- Advertising
- Annual Meetings Future
- Application Forms and Information
- Associate Editors
- Author Article Instructions
- Awards
- Benefits of Membership
- Bylaws
- Calendar
- CEU Program
- Code of Ethics
- Continuing Educ. & Prof. Dev.
- Corporate Members
- Corporate Membership
- Courses Online
- E-Newsletter
- Earth Science Week
- Ethics Issues
- European Federation of Geologists
- Fact Sheets
- Federal Agencies
- Geo. Salary Survey Links
- History of AIPG
- IET Web Resources
- Insurance
- International
- Job Board
- Job Postings
- Links to Other Associations
- Member Website Links
- National Exec Comm
- National Committees
- Policies and Procedures
- Position Statements
- Publications Publications
- Reciprocity Agreements
- Resumes
- Scholarship Program
- Section Officers
- Section Resources Brochures
- Section Websites
- Staff Contacts
- State Geologists
- State Registration Boards
- Statutes and Legislation Links
- Student Chapters
- Student Chapters Manual
- Students Page
- Teachers’ Planning Web Resources
- TPG
- USGS by State

Members need to log in to access:
- directory
  - update your own record
- free publications
- manuals
  - Annual Meetings
  - Section Officers
- pay dues
- register for annual meeting
- TPGs
- vote

If you do not know your login and password contact AIPG Headquarters at (303) 412-6205 or e-mail aipg@aipg.org. Your comments and suggestions for improving the website are always welcome.
Dear Editor:

This morning I was scanning the July/August issue of The Professional Geologist. As is my custom, I scan the table of contents and mark articles of interest (for routing to staff). Next I start thumbing from the back to the front, reading the summaries. I happened across an article with several tables summarizing information for a Geological Notebook. As I reviewed the tables I thought to myself, “This stuff is useful! This looks like something Hatheway would write.” Sure enough, when I got to the front of the article, there he was.

Dr. Allen Hatheway taught in the Geological Engineering Department at the University of Missouri-Rolla while I attended there in the 1980’s. I benefited greatly from his advice and tutelage while a student and, through journal articles such as this, the mentoring has continued throughout my professional career. I have always found his articles/advice to be right on the money - I still keep many of them in a notebook of my own. His comment regarding “bid shopping” in paragraph two had me talking to myself. He is exactly right. I have seen this first hand during my career and it is extremely frustrating. There are many projects we simply won’t bid because we don’t want our name associated with the results. This has limited our growth because we don’t want our name associated with the poor quality work that sometimes goes out the door.

In looking back at this incident, I am thankful that AIPG and the values it instills was available to educate our students in ethical values.

David K. Hylbert, CPG-04621 (1979-2000)

Thank you for the article, and I think you are right on the mark with your comments. It will be good for the members of AIPG to be reminded that professionalism goes beyond any 9 to 5 occupation and should be reflected in our total sense of duty to all around us. We have many opportunities to hear examples of technical services, geologic research, case studies, etc. Fewer are the times we get to hear of how a steadfast adherence to principles of honesty and integrity affects the lives of those within our sphere of influence. Your story provides an excellent example of one of the more distinctive and important services of AIPG – that is the professional conduct of our members. And, as you aptly convey, these guidelines apply to all facets of our life.

Thank you so very much!

Lawrence C. Weber, CPG-07120
AIPG President Elect

---

This Stuff is Useful!

Jeff Douthitt, P.E.
GEO Consultants, LLC

The Value of AIPG

As a (retired) member of AIPG and past president (1995) of the Kentucky Section of AIPG, I remember the meetings we used to have and discussions we had concerning the value and appeal AIPG has with students. As I remember, some people were somewhat critical that the organization didn’t offer more than the usual political focus on Registration of geologists and dealing with the sometimes nebulous realm of professionalism of geologists. At the Spring, 2005 meeting of the Kentucky Section, I had occasion to relate the following incident that really “made my day” and brought into focus the value of AIPG and the values it instills.

I retired full time from Morehead State University after a career of teaching geology in 1999. This April I received an unsolicited letter form one of my geology students who took a course from me in 1994. In his letter he apologized to me for having been involved in a cheating incident during a laboratory exam and was very thankful that I had allowed him to remain in college.

As I remember the incident, there were four or five students involved in what would be considered a “group effort” in arriving at an answer to a map problem. In my estimation, none of the students were inherently "bad" and in need of extreme punishment. As a result, I read the "riot act" to them about honesty and self-reliance and we went on from there. Also, from that time on, I made the AIPG code of ethics an essential part of my classes.

However, the best part of the story concerns that student and his life during the last ten years. He graduated from Morehead State University in 1995 and got a job with a petroleum company. After his company was sold, he took a position with another petroleum company in 1996 and has gotten two promotions and now holds a senior position.

Also, attended West Virginia University and received his MS degree in geology in 1999. In his personal life, he married in 1996 and he and his wife had their first son in 2005. He also accepted Christ in 2003 and serves as a deacon in his church. In his letter he stated, "I think back and lean on the past. I use the utmost integrity and honesty for all decisions, not just at work, but in my life altogether."

In looking back at this incident, I am thankful that AIPG and the values it instills was available to educate our students in ethical values.

Dear David,

Thank you for the article, and I think you are right on the mark with your comments. It will be good for the members of AIPG to be reminded that professionalism goes beyond any 9 to 5 occupation and should be reflected in our total sense of duty to all around us. We have many opportunities to hear examples of technical services, geologic research, case studies, etc. Fewer are the times we get to hear of how a steadfast adherence to principles of honesty and integrity affects the lives of those within our sphere of influence. Your story provides an excellent example of one of the more distinctive and important services of AIPG – that is the provide ethical guidelines for professional geologists. And, as you aptly convey, these guidelines apply to all facets of our life.

Thank you so very much!

Lawrence C. Weber, CPG-07120
AIPG President Elect

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Wiley’s Environmental Instrumentation and Analysis Handbook: An Encyclopedic Approach to Environmental Sensing and Data Analysis of Soil, Water and Air Media

Reviewed by James A. Jacobs, CPG-07760

As environmental professionals, we use a variety of instruments to measure and analyze the purity of, or the contaminants in the air, soil and water. The government sets standards and regulations in which many parameters are measured. The Environmental Instrumentation and Analysis Handbook [ISBN: 0 471 46354 X] presents a compilation of technical information on the design and application of instrumentation used specifically to measure and analyze these media.

Randy Down, P.E., an expert in environmental instrumentation and controls with Forensic Analysis and Engineering Corporation, and Dr. Jay H. Lehr, the Science Director of The Heartland Institute, have organized and edited the handbook which includes forty-four chapters written by dozens of engineers and scientists. This book provides nothing less than an encyclopedic approach to measuring the environmental aspects of the physical world. As with many of the Wiley’s environmental handbook series, this volume is expertly edited and contains the kind of information that is typically lacking in the scattered individual articles in trade journals or professional papers. The easy access to the information is a hallmark of the Wiley handbooks, and this volume meets the “easy to use, quick reference” test. Electromagnetic resistivity (geophysical) to photoionization detectors (gas) to gas chromatographs (gas-liquid-soils) to nuclear magnetic resonance (nuclear) are measured.

The book has the necessary technical background, complete with appropriate equations, as well as numerous diagrams and charts for each topic. Part I describes air instrumentation. The book starts out with a chapter on how regulatory requirements influence and drive instrumentation design. In this chapter, regulatory trends and product development are discussed. The following chapters in air instrumentation include a discussion about in-situ versus extraction sampling methods for continuous emission monitoring (CEM) systems for gases. Air pollution experts have also written about the validation of CEM system accuracy and reliability as well as the integration of CEM into distributed control systems. Other chapters focus on infrared spectrometry (and Fixed-Filter Analyzers +FTIR ), ultraviolet analyzers (UV), flame ionization detectors (FID), photoionization detectors (PID), and gas chromatographs. Many other instruments and methodologies are described in great detail.

Part II contains articles about water quality parameters, including thermal conductivity detectors, opacity and turbidity monitors, temperature measurement, pH and conductivity analyzers as well as other instruments. Part III focuses on groundwater monitoring, including water level measurements in monitoring wells, laboratory analysis of groundwater and wastewater samples, water sampling techniques, soil permeability and dispersion analysis, diffusion multilayer sampling (DMLS), microbiological field sampling and other topics related to groundwater sampling and instrumentation. Part IV describes wastewater monitoring, including pH treatment for wastewater neutralization, automatic wastewater sampling systems, optimum wastewater sampling locations and wastewater level measurement techniques. Part V describes air monitoring and air pollution control systems and the measurement of ambient air quality. Part VI is an in-depth discussion of flow monitoring, including air flow, gas flow, non-open channel flow, open channel flow measurement, as well as compliance flow monitoring in large stacks and ducts.

This book can be used as a stand-alone reference book. Environmental companies and regulatory agencies can also use this book as a field-training manual for background materials on specific equipment, limitations on data evaluation and methodologies. Even the pitfalls of certain analysis or procedures are discussed.

As environmental data collection has improved over the past three decades, the sensors have been getting better and better. The process of technological advancement will continue to evolve and improve, creating a daunting task for environmental professionals to keep up with the latest environmental instrumentation. As this occurs, we will be inundated with information, some meaningful and some superfluous. The Environmental Instrumentation and Analysis Handbook provides terrific value in helping to explain in clear and concise terms the types of instruments available and what the measurements mean. Since environmental instrumentation will continue to play a vital role in monitoring and protecting our health, this book is a great reference handbook for all professionals practicing in the environmental field.

This review as well as the review (TPG July/August, 2005) of Wiley’s Remediation Technologies Handbook: Major Contaminant Chemicals and Chemical Groups, Ground Water; 43:3; copyright by Blackwell Publishing, 2005, was used by permission.

James A. Jacobs, Environmental BioSystems, Inc., Mill Valley, California; augerpro@sbcglobal.net
Water in the Arab World: Perspectives and Progress

Reviewed by Barney P. Popkin, CPG-06547

Peter Rogers and Peter Lydon, eds., 1994, *Water in the Arab World: Perspectives and Progress*. Harvard University, Division of Applied Sciences. – Papers from a Conference Sponsored by the Arab Fund for Economic and Social Development, and Harvard University's Division of Applied Sciences and Center for Middle Eastern Studies at Harvard University, October 1-3, 1993.

This book is as timely today in 2005 as it was over 10 years ago. It covers chapters on The Water Problems of the Arab World; Transboundary Water and the Challenge of International Cooperation in the Middle East; Overall Perspectives on Countries and Regions; The Central Region: Problems and Perspectives; The Arab Mashrek (Syria, Lebanon, Jordan, Iraq); Hydrologic History, Problems and Perspectives; Water Resources Development in the Maghreb Countries (Mauritania, Morocco, Algeria, Tunisia, Libya); Water in the Arabian Peninsula: Problems and Perspectives; Desalination, an Emergent Option; Global Climate Change and Its Consequences for Water Availability in the Arab World; Conflict and Water Use in the Middle East; and Agenda for the Next Thirty Years.

If anything, water conflicts and crises in the Arab Middle East have been exasperated in recent years by continuing declines in rainfall, runoff, and natural groundwater recharge; increasing populations and refugees; reluctance to charge agricultural water users for irrigation water; poor water-demand management; dewatering of non-sustainable deep aquifers in Jordan, Egypt, and Saudi Arabia; recognition that transnational water pipelines are untenable (including the Red-to-Dead Sea pipeline); continued conflict in Gaza and the West Bank; disputes over the Golan Heights; upstream water diversions in Syria from the headwaters to the Jordan and Yarmuk Rivers; surface and groundwater pollution from untreated wastewater; uncertainty on climate change adaptations in agriculture and water use; and issues related to the reconstruction of Iraq after Operation Iraqi Freedom and of Afghanistan. Positive trends include growth in initiatives if not actualization of integrated water resources management and local water user associations and local-level water management, enhanced groundwater recharge and conjunctive surface water and groundwater use, greenhouse agriculture in Jordan and Egypt, wastewater reuse for irrigation in Jordan and Egypt, desalination of saline water for fresh water use in Jordan, and restoration of the Iraqi marshlands.

Sources


Barney P. Popkin, Water Resources & Environmental Management Consultant, RG, REA, CPSSc, EFG, ACHMM, bppopkin@yahoo.com

---

GeoScience Data Management Proudly Presents

Geo

An Introduction to Landslides or Mass Wasting

An Online Course

AIPG Accredited (3.5 CEU’s)

> Landslides classification
> Soil mechanics principles
> Strength of earth materials
> Geologic influences
> Case histories
> Factors influencing mass wasting
> Control & prevention of mass wasting problems
> Slope stability analysis

For more information, contact robert.font@geosciencedm.com, or visit our website at: www.geodm.com

www.aipg.org
Invitation from
The Professional Geologist

2006 STUDENT ISSUE

The annual STUDENT ISSUE will be published in the January/February 2006 issue of The Professional Geologist. AIPG encourages students to send in articles and photos to be included in this issue. Members please send in articles that students can use as a resource. Your submittal can be a letter, a few paragraphs, or an entire article. Send in what you feel would be helpful to our future professional geologists. Thank you.

Deadline for submittals to the
STUDENT ISSUE 2006 is
November 1, 2005

Just a Reminder

TPG is always in need of news, commentary, and articles of geologic interest. You are cordially invited to take advantage of the opportunity to use your news journal to publicly express your point of view or explain work products related to the science, practice and regulation of, and profession of geology.

Please consider submitting a thought provoking or informative article relating to your chosen profession or to the political issues which affect the profession.

R.S.V.P.

AIPG
National Headquarters
1400 W. 122nd Ave., Suite 250
Westminster, CO 80234
(303) 412-6205
aipg@aipg.org
Welcome to
Lexington, Kentucky!

Located at the heart of Central Kentucky’s famed scenic Bluegrass Region, Lexington is known around the world for its role in producing champion racehorses and fine bourbon. Lexington is the center of the world’s Thoroughbred horse industry and is where the top racehorses are bred, born, trained, officially registered, bought and sold, retired to stud, and buried. Countless opportunities exist for a close encounter with Lexington’s beloved Thoroughbred. In the Bluegrass, you can meet previous Derby champions - or perhaps catch a glimpse of a future winner on the world’s most famous and scenic horse farms. Keeneland Race Course, a beautiful park reminiscent of those in England, boasts two racing seasons annually in April and October. The 2005 annual meeting offers an opportunity to experience a day at the track. Lexington truly is the Horse Capital of the World.

Visit the home of true Kentucky bourbon..... The time-honored methods developed in the early 19th century when Lexington was a bustling frontier town are still used in our distilleries today. Labrot & Graham, Buffalo Trace & Wild Turkey distilleries open their doors and offer tours that unlock the mysteries and heritage of the United States’ only native spirit.

History comes to life in Lexington and the Bluegrass Region. Once only an outpost on the fringes of our ancestors’ westward expansion, Lexington quickly grew into a thriving community filled with opportunities for education, culture, business and recreation. Step back in time to life in Lexington during the early 1800’s by touring one of Lexington’s historic homes. Continue the trek through Lexington’s history at attractions including the Gratz Park historic district; the campus of Transylvania University, oldest college west of the Allegheny Mountains; Union and Confederate Civil War sites; and Shaker Village of Pleasant Hill, a national treasure with 33 restored buildings.

Our theme of Geologic Information: Racing into the Digital Age embraces the ongoing efforts to streamline our operations and our needs for government to leap into the race for digital excellence. The thoroughbred operation in the United States has been the Kentucky Geological Survey. Practitioners will sharpen their skills through attendance at AIPG 2005. Researchers, government geologists, and educators will find visionary applications and lessons to guide the future.

Our venue for the meeting, the Lexington Radisson Hotel is WIFI (wireless network) enabled turning the entire convention experience into a Campus of Progress. We hope to deliver a quality experience for those seeking digital breakthroughs, historical perspectives, and quality networking experiences.

Kentucky in the Fall is unsurpassed. Our field experiences to Mammoth Cave and Natural Bridge (just two of the 6 offerings) are rated among the most scenic drives in the nation. The Natural Bridge area in particular contains a greater concentration of natural sandstone arches than anywhere else in the world except for Southern Utah.

Thanks for choosing to visit Kentucky for the 2005 Annual Meeting and have a great time!

Tom Spalding, CPG, Co-Chair
Larry Rhodes, CPG, Co-Chair

To find out more about the conference go to the AIPG Kentucky Section Website at www.professionalgeologist.org/aipg2005/htm
### Program

#### Saturday, October 8, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 AM - 6:00 PM</td>
<td>Registration Booth Open</td>
</tr>
<tr>
<td>9:00 AM - 5:00 PM</td>
<td>Ethics Short Course, David Abbott</td>
</tr>
<tr>
<td>12:30 PM - 7:30 PM</td>
<td>Falls of the Ohio Trip</td>
</tr>
<tr>
<td>1:00 PM - 6:00 PM</td>
<td>Perryville/Camp Nelson</td>
</tr>
</tbody>
</table>

#### Sunday, October 9, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 6:00 PM</td>
<td>Mammoth Cave Field Trip</td>
</tr>
<tr>
<td>9:00 AM - 3:00 PM</td>
<td>AIPG Executive Comm. Meeting</td>
</tr>
<tr>
<td>9:00 AM - 9:00 PM</td>
<td>Registration Booth Open</td>
</tr>
<tr>
<td>9:00 AM - 5:00 PM</td>
<td>Computer Technology Short Course, General Report Writing and Computer Skills Workshop (offsite).</td>
</tr>
<tr>
<td>10:00 AM - 4:00 PM</td>
<td>Perryville Re-enactment</td>
</tr>
<tr>
<td>10:00 AM - 10:00 PM</td>
<td>Exhibit Area Open</td>
</tr>
<tr>
<td>6:00 PM – 8:30 PM</td>
<td>Photography of Attendees, John Beam</td>
</tr>
<tr>
<td>6:30 PM - 6:45 PM</td>
<td>Plenary Session - Opening Remarks by Larry Rhodes and Welcoming Remarks by Lexington Mayor, Teresa Issac; Tom Spalding, General Chair, 2005 Annual Meeting; Robert Font, 2005 AIPG President; and Bill Siok, AIPG Executive Director</td>
</tr>
<tr>
<td>6:50 PM - 8:00 PM</td>
<td>Keynote Address, Dr. James Cobb, Chief, KGS and Marshall Miller, CEO, Marshall Miller &amp; Associates</td>
</tr>
<tr>
<td>8:00 PM</td>
<td>Student Poster Session.</td>
</tr>
<tr>
<td>8:00 PM - 10:00 PM</td>
<td>Ice Breaker/Cash Bar (Exhibit area open)</td>
</tr>
</tbody>
</table>

#### Monday, October 10, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 8:00 AM</td>
<td>Speaker and Moderator Breakfast</td>
</tr>
<tr>
<td>7:00 AM – 8:00 AM</td>
<td>Past-President Meeting Breakfast</td>
</tr>
<tr>
<td>7:30 AM - 9:30 AM</td>
<td>2005 Advisory Board Meeting</td>
</tr>
<tr>
<td>8:00 AM -11:30 AM</td>
<td>Morning Technical Session</td>
</tr>
<tr>
<td>9:30 AM - NOON</td>
<td>Mary Todd Lincoln Home and JH Morgan Self Guided Tours</td>
</tr>
<tr>
<td>9:45 AM - 11:45 AM</td>
<td>2005/06 Advisory Board Meeting</td>
</tr>
<tr>
<td>10:00 AM - 4:00 PM</td>
<td>Jeptha Knob/Buffalo Trace Distillery</td>
</tr>
<tr>
<td>1:00 PM - 5:00 PM</td>
<td>Afternoon Technical Sessions</td>
</tr>
<tr>
<td>1:30 PM - 3:30 PM</td>
<td>2005/06 Executive Comm. Meeting</td>
</tr>
<tr>
<td>7:00 PM</td>
<td>Awards Banquet</td>
</tr>
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</table>

#### Tuesday, October 11, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 8:00 AM</td>
<td>FOUNDATION TRUSTEES BREAKFAST</td>
</tr>
<tr>
<td>7:00 AM – 8:00 AM</td>
<td>Speaker and Moderator Breakfast</td>
</tr>
<tr>
<td>7:00 AM – 8:00 AM</td>
<td>Women in AIPG Breakfast</td>
</tr>
<tr>
<td>8:00 AM -11:30 AM</td>
<td>Morning Technical Session</td>
</tr>
<tr>
<td>9:30 AM - NOON</td>
<td>Ashland Self-Guided Tour</td>
</tr>
<tr>
<td>10:00 AM - 6:00 PM</td>
<td>Natural Bridge</td>
</tr>
<tr>
<td>11:30 AM – 1:30 PM</td>
<td>Business Meeting/lunch</td>
</tr>
<tr>
<td>1:00 PM 5:00 PM</td>
<td>Afternoon Technical Sessions</td>
</tr>
<tr>
<td>5:00 PM - 9:00 PM</td>
<td>Kentucky River Pallisades Boat Trip</td>
</tr>
</tbody>
</table>

#### Wednesday, October 12, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 8:00 AM</td>
<td>Speaker and Moderator Breakfast</td>
</tr>
<tr>
<td>8:00 AM -11:30 AM</td>
<td>Morning Technical Session</td>
</tr>
<tr>
<td>11:30 AM -5:30 PM</td>
<td>Keeneland Racing</td>
</tr>
<tr>
<td>7:30 PM</td>
<td>Public Seminar: “Earthquakes, Tsunamis, Geologic Information and the Call to Action.”</td>
</tr>
</tbody>
</table>

#### Thursday, October 13, 2005

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 4:00 PM</td>
<td>PM KGS Post Conference Seminar</td>
</tr>
</tbody>
</table>

### Lodging

AIPG has reserved a block of rooms to be held for the meeting through September 10, 2005. The room rates are $95.00 for single occupancy and $95.00 for double occupancy. Please make your reservations through the Radisson by calling (800)333-3333 or (859)231-9000. You can find additional information about the hotel at www.Radisson.com.
# 2005 NATIONAL AIPG MEETING REGISTRATION FORM

<table>
<thead>
<tr>
<th>NAME (Last)</th>
<th>(First)</th>
<th>(Middle Initial)</th>
<th>NAME FOR BADGE</th>
<th>Meeting Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPANY/INSTITUTION</td>
<td></td>
<td></td>
<td>CPG or MEMBERSHIP NO.</td>
<td>CPG or MEMBERSHIP NO.</td>
</tr>
<tr>
<td>ADDRESS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CITY, STATE, ZIP CODE</td>
<td></td>
<td></td>
<td>COUNTRY</td>
<td>COUNTRY</td>
</tr>
<tr>
<td>PHONE</td>
<td></td>
<td></td>
<td>E-MAIL ADDRESS</td>
<td>E-MAIL ADDRESS</td>
</tr>
<tr>
<td>SPOUSE/GUEST NAME</td>
<td></td>
<td></td>
<td>NAME FOR BADGE</td>
<td>NAME FOR BADGE</td>
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</tbody>
</table>

Spouse/Guest Registration includes admission to Icebreaker and Exhibits

## FEES AND PAYMENT INFORMATION

<table>
<thead>
<tr>
<th>ANNUAL MEETING REGISTRATION</th>
<th>On or Before 9/10/05</th>
<th>After 9-10-05</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Registration (Member*)</td>
<td>$225.00</td>
<td>$270.00</td>
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<tr>
<td>Full Registration (Non-Member)</td>
<td>$250.00</td>
<td>$300.00</td>
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<tr>
<td>Daily Registration (Member*) Spec. Day(s)</td>
<td>$75.00</td>
<td>$100.00</td>
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<tr>
<td>Daily Registration (Non-Member) Spec. Day(s)</td>
<td>$100.00</td>
<td>$125.00</td>
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</tr>
<tr>
<td>Spouse/Guest</td>
<td>$50.00</td>
<td>$50.00</td>
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<tr>
<td>Student** (Full Registration)</td>
<td>$25.00</td>
<td>$25.00</td>
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</tr>
<tr>
<td>Daily Student Registration** Spec. Day(s)</td>
<td>$10.00</td>
<td>$10.00</td>
<td></td>
</tr>
</tbody>
</table>

* AIPG Members Only  **Student Confirmation Required

<table>
<thead>
<tr>
<th>FIELD TRIPS</th>
<th>Before 9-10/After</th>
<th>No. Attending</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1 Falls of the Ohio (10/8)</td>
<td>$50.00/$60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 2 Perryville/Camp Nelson (10/8)</td>
<td>$50.00/$60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 3 Mammoth Cave (10/9)</td>
<td>$75.00/$90.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 4 Jeptha Knob/BuffaloTrace Dist. (10/10)</td>
<td>$50.00/$60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 5 Palisades River Boat (10/11)</td>
<td>$50.00/$60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 6 Natural Bridge (10/11)</td>
<td>$75.00/$90.00</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SHORT COURSES</th>
<th>Before 9-10/After</th>
<th>No. Attending</th>
<th>Amount</th>
</tr>
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<tbody>
<tr>
<td>No. 1 Ethics (10/8) CEUs Available</td>
<td>$150.00/$180.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 2 General Computer Report Writing (10/9)</td>
<td>$100.00/$125.00</td>
<td></td>
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</tr>
<tr>
<td>No. 3 Web Geologic Information Toolbox (10/13)</td>
<td>$225.00/$270.00</td>
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<table>
<thead>
<tr>
<th>SOCIAL EVENTS</th>
<th>Unit Cost</th>
<th>No. Attending</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awards Banquet (10/10)</td>
<td>$25.00/$35.00</td>
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<td></td>
</tr>
<tr>
<td>Keeneland Horse Racing Event (10/12)</td>
<td>$50.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Speaker for Tsunami Relief (10/12 Evn.)</td>
<td>Free/Donation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse Trip 1 - Perryville Excursion (10/9)</td>
<td>$20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse Trip 2 – Historic Homes (10/10)</td>
<td>$20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse Trip 3 – Ashland: Home of Henry Clay (10/11)</td>
<td>$20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women in AIPG Breakfast (10/11)</td>
<td>$10.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ice Breaker (10/9) (Must Show Badge)</td>
<td>Complimentary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speakers/Moderators Breakfast</td>
<td>Complimentary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Lunch (10/11)</td>
<td>Complimentary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundation Trustees Breakfast (10/11)</td>
<td>Complimentary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past-Presidents Breakfast (10/10)</td>
<td>Invitation Only</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL AMOUNT DUE
Notes
- The Field Trips and Short Courses are subject to cancellation due to lack of participation.
- Registration fees for cancelled 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.

SPECIAL NEEDS/REQUESTS:

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 September 10, 2005. 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 September 11, 2005 and October 4, 2005 will be assessed a charge of 10% of the registration fee (to cover administration costs). NO refunds will be given for cancellations received after October 4, 2005, 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 John Beam or Catherine O’Keefe if you DO NOT wish to have your image used.

Lodging

AIPG has reserved a block of rooms to be held for the meeting through September 10, 2005. The room rates are $95.00 for single occupancy and $95.00 for double occupancy. Please make your reservations through the Radisson by calling (800)333-3333 or (859)231-9000. You can find additional information about the hotel at www.Radisson.com.
The President’s Message

Robert G. Font, CPG-03953

Dear friends and colleagues:

I have just returned from three international meetings where I had the honor of representing the AIPG. The first was the meeting of the Canadian Council of Professional Geoscientists (CCPG) in Quebec City, Canada, followed by the council meeting of the European Federation of Geologists (EFG) in Prague, Czech Republic and the annual meeting of the American Association of Petroleum Geologists (AAPG) in Calgary, Canada. Some of the topics addressed at these meetings affirm that many of the issues of concern to us in the AIPG are truly global in nature.

Just like us, both of our Canadian and European colleagues are concerned with issues regarding the practical value of our professional titles, specifically when related to the subjects of “mobility” or “portability” of our professional credentials across state, provincial, and national boundaries.

Continuing professional development (CPD) and its accountability is another area of mutual interest. Participation in a CPD program appears to be high on most everyone’s list and considered to be imperative for the maintenance of one’s professional credentials.

Public outreach through effective communication of scientific information, including geologic hazards and energy-related issues, yet constitutes another area of common relevance.

Ways in which to strengthen international relationships of collective benefit are additionally sought by all involved.

At the AIPG, we continue to formulate strategies and implement procedures to achieve our goals. Examples include:

- Supporting our CPGs through the assignment of letters and documents that may be valued by current and potential employers.
- Enhancing membership benefits through the application of substantial discounts related to professional events (see CPD discussion below).
- Gathering and publishing information of specific usefulness and value to the title holders, such as a salary surveys, state registration and reciprocity information, and the future development of study guides to meet “certification” and “registration” requirements.
- Magnifying our efforts to further strengthen the international acceptance and recognition of the CPG title, a credential that currently designates us as “qualified professionals” in Australia, Canada, and Europe.

With the goal of defining concrete steps to strengthen the “practical value” of the CPG title, I formed the “CPG Practicality Committee.” Headed by Chairman MB Kumar, the committee was formed by outstanding AIPG members such as Mark Sweatman, Barbara Murphy,
Allen Sunderman, Todd Church, Mark Rogers, Jim Shotwell, and John Hofer. Results from their work and final report will be published shortly.

AIPG's Continuing Professional Development Program and Our System of Online Instruction.

CPD:

- AIPG has a CPD program in place and some of us are actively keeping records of our activities to satisfy the requirements that are currently applicable. We are simplifying the program to make it easy for all to understand and follow. We will communicate this effectively in future issues of the TPG.
- At the May 2005 meeting of our Executive Committee, we agreed to make CPD requirements compulsory for new CPGs; for those who earn their titles after June 30, 2006.
- We have created a committee to evaluate if and when “testing” will be made compulsory for aspiring CPGs at some point in the future.
- We are providing attractive discounts to CPG members that participate and fulfill requirements in the CPD program.
  - A 25% discount will apply to online courses taken through our new system.
  - A 10% discount will pertain to the payment of annual dues, registration to annual national meetings and to publications and promotional items purchased from the AIPG.

Online System:

- The system is now in place and constitutes a grand example of the cooperation between the AIPG and the EFG (i.e., Robert Font and Detlev Doherr).
- AIPG can now accredit courses and officially assign CEUs (thanks to efforts by Bob Corbett and others).
- We have an accredited course in the system already; an “Introduction to Landslides and Mass Wasting.”
- We are actively seeking contributions (new courses) to place in the system.
- Our vision is for this online system to provide a valuable service to geoscientists everywhere and for it to become a truly international venue with global participation.

Public Outreach Initiatives.

Both the AIPG and the AAPG (Robert Font and Pat Gratton, respectively) have agreed to form an intersociety committee on geological hazards. The goal of this committee is to:

- Inform the general public as to how the implementation of sound geological knowledge can help in the mitigation, prediction and even prevention of natural disasters.
- Emphasize prevention, when possible, and solutions based on geological input.

Other societies including GSA, AEG, etc., will be invited to join in this effort and coordination is intended to be established with the AGI. AIPG will be exceptionally well represented by committee members including Larry Fellows, Jon Price, Tom Matzen, and David Thomas.

A similar effort may soon apply to energy issues. At a recently-held meeting of the “Public Outreach Committee” of the AAPG, where various scientific and professional societies were represented, I suggested the following on behalf of the AIPG:

- That we, as professional and scientific societies, collectively define areas where we all clearly agree on and combine forces to speak with one voice.
- That we emphasize solutions that are both scientifically sound and economically viable, addressing both the critical energy needs and the desired environmental protection.
- That we select the proper venues to reach those that we must, rather than simply spend our time “preaching to the choir.”

Additionally, we will:

- Follow the idea presented to us by Barbara Murphy and seek to publish articles on what geologists do and the value of geological knowledge to society and public safety in publications that are widely read by the general public, such as “Time Magazine”, “USA Today”, “Newsweek”, etc.
- Release the new addendum to the “Citizen’s Guide to Geologic Hazards” in the next few months, which Ed Nuhfer is so aptly developing on our behalf.

International Relationships and the Third International Professional Geology Conference (3IPGC).

The AIPG is committed and looks forward to hosting the 3IPGC in 2008 in North America, along with our colleagues from the CCPG. At the EFG meeting in Prague, I emphasized that to make it successful, participation from the EFG is essential. I specifically asked for the EFG’s commitment to participate in the conference, through attendance and professional contributions. The following define our current thoughts and plans on this subject:

- To hold the 3IPGC in conjunction with our AIPG annual meeting.
- To have it possibly in the area of the Grand Canyon.
- To invite the AAPG (especially its Division of Professional Affairs), ASBOG and possibly others to act as additional hosts.

As you can see, we are going forward at full steam! Come join us in our efforts to help our profession and our beloved institute. And let us have some fun along the way too!

Doctoral Candidate Seeking Work

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AIPG and the Profession

William J. Siok, CPG-04773

The American Geological Institute (AGI) is an umbrella organization to which AIPG subscribes and which has benefited from AIPG leadership. AGI was founded in 1948 and has had 57 presidents, including some very distinguished colleagues. Of the 57 AGI presidents, 35 are AIPG CPGs and 11 of these served as AIPG President prior or subsequent to election to the AGI leadership position!

AIPG has made a disproportionately large leadership contribution to AGI over the years considering the large number of sister societies within AGI (44 presently). This is an accomplishment for which all AIPG members should be proud.

Please consider this list of AIPG Past Presidents who also led AGI in the same capacity. Note that this list does not include the 24 other AIPG CPGs who also served as AGI presidents, but who were not presidents of AIPG. (Remember that AIPG was established in 1963.)

AGI PRESIDENTS
2005 -- Stephen M. Testa (AIPG President 1998)
2001 -- Larry D. Woodfork (AIPG President 1993)
2000 -- Russell G. Slayback (AIPG President 1994)
1998 -- Susan M. Landon (AIPG President 1990)
1991 -- William L. Fisher (AIPG President 1993)
1986 -- M.O. Turner (AIPG President 1982)
1982 -- John D. Haun* (AIPG President 1976)
1980 -- Grover E. Murray* (AIPG President 1978)
1978 -- Charles J. Mankin (AIPG President 1987)
1975 -- Frank B. Conselman* (AIPG President 1974)
1973 -- R. Dana Russell* (AIPG President 1969)
*Charter Member

One more rather astounding statistic, of the 35 AIPG CPGs who served as AGI president, 16 are Charter Members of AIPG!

My reason for presenting these statistics is in part to publicly thank these AIPG members for their support of the profession through selfless contribution of time and energy, and partly to put in a statement of support for the efforts of AGI on behalf of its entire member society professional membership.

At the June 20, 2005 AGI Member Society Council meeting, the member societies discussed, at some length, the necessity of more and closer cooperation/collaboration on the part of geosocieties. (More about this subject will appear in subsequent columns.)

However one promotes the furtherance of our profession, it is essential to recognize the advantages to all practitioners of seeking closer cooperation with sister societies. It is obvious that a sharing of resources (i.e. Leaders) has to result in better communications and therefore increased opportunity for collaboration on projects benefitting all.

Moreover, when one also considers the relatively small number of geoscience practitioners in the USA, it is easy to appreciate the difficulty of getting the same level of recognition as our professional colleagues in engineering, medicine, and law. Only with increased inter society high profile efforts will the geoscience community be viewed with more credibility. Many geoscientists do not stay current with the efforts of the various associations, but all the associations encourage their members' active participation, all of which serves the entire geoscience community.

Test Your Knowledge

Questions for this issue are:

1. Assume the following conditions:
   Consider a retaining wall 30 feet high (H = 30 ft.). It has a triangular backfill. Its back is vertical and there is no friction between the wall and the backfill. The surface of the fill (and soil) is horizontal and at the same level as the top of the wall. Geostatic conditions apply. The unit weight (γ) of the backfill (and soil) remains constant with depth. The active Rankine zone is confined to the triangular backfill. A surcharge pressure (qs = 2,000 lbft⁻²) is exerted by a structure placed on the surface of the backfill. Now, if γ = 115 lbft⁻³, the angle of internal friction of the backfill material is 25° and, correspondingly, the coefficient of active earth pressure (Ka) is 0.406, find the horizontal component of active thrust (Pah) acting on the retaining wall.
   a) 45,370 lbft⁻¹
   b) 90,740 lbft⁻¹
   c) 25,000.5 lbft⁻¹

2) Of the following genera, which of these is not a foraminifera that indicates a marine depositional environment?
   a) Textularia
   b) Stellatochara
   c) Gümbelina

3) This mineral is green to black in color, with a hardness of 5.5, a pale green streak and two cleavage directions that intersect at 60° and 120°. What is it?
   a) Olivine
   b) Augite
   c) Hornblende

Answers on page 34.
Is the Basis for the ASBOG Exam’s Questions Unethical?

The ASBOG exam is based on a task analysis completed by a random selection of ASBOG-state-licensed geologists every 5 years1 (see Bill Greenslade’s Letter to the Editor, TPG, Nov/Dec ’04, p. 3). As Greenslade noted, “Since a high percentage of the licensed practitioners are consultants and many are in the largest market segment (environmental geology), the weighting in the test blueprint is environmental geology.”

This weighting of the exam for the majority of ASBOG-state-licensed geologists is its ethical problem. Canon 4 of the AIPG Code of Ethics states, “Members should respect the rights, interests, and contributions of their professional colleagues.” That includes respecting the rights and interests of the minority of ASBOG-state-licensed geologists who do not practice environmental geology, let alone the rights of those geologists not licensed by an ASBOG state. The relative quantity of practitioners in a specialty reflects current employment realities. Thirty years ago the majority of geologists worked in the petroleum industry. A truly fair and ethical examination would permit ready passage by those having appropriate education and experience regardless of their specialty or employer.

As I recall the Geology GRE exam, it appeared to give about equal weight to all the standard undergraduate courses offered at the time and, while I had not taken all of them, I nevertheless achieved a high percentile score. The ASBOG exam does not do this because of the way in which questions are weighted in the task analysis. It should no more be weighted to environmental geology today than it should have been to petroleum geology 30 years ago.

The AIPG 2005 Membership Directory (p. 123-131) lists 53 primary specialties. Many of us are environmental geologists, engineering geologists, and hydrogeologists. There are several specialties with only a few members and there are 5 specialties with only one member listed (geothermal, mathematical geology, micropaleontology, palynology, and tectonics). There are 15 CPGs listed under petrology/petrography. I enjoyed petrography as a student, but have seldom had the opportunity to look down a microscope during my professional career. So I am glad there are a few consulting petrographers around that I can hire when I need some petrographic work done. Further, I believe that some basic petrographic questions would not be inappropriate in a test of basic geologic education, the purpose ASBOG test. Those practicing these uncommon specialties are just as much professionals as any of us.

Any test purportedly covering all of geologic fundamentals and practice must recognize and allow for the minorities just as much for the majority if it is to comply with AIPG Ethics Canon 4.

Comments on this question would be appreciated.

Contingency Fees for Expert Witnesses
(columns 93 & 94, Sept & Nov ’04)

William M. Greenslade, CPG and retiring member of the Arizona Board of Technical Registration (BTR),2 followed up on last fall’s discussion writing, “[the] BTR, at its June 21, 2005 meeting, adopted language prohibiting the acceptance of contingency fees in dispute resolution. The language will have to go through formal rule making before it becomes final.

“The vote was not unanimous as the argument that contingency fees favor those with little financial means is a powerful one. One of the things that influenced my decision to support the prohibition was an opinion by the Arizona Court of Appeals that said ‘a contract providing for compensation of a witness contingent on the success of the litigation is subversive of public justice for the reason that his evidence may be improperly influenced, as a result such contracts are void and not enforceable’. I felt that if the courts found the practice to be ‘subversive of public justice’ then the Board should put registrants on notice that acceptance of contingency fees in dispute resolution is not proper.”

As the previous discussion of this topic has pointed out, accepting a contingency fee for expert witness work leaves one open to attack that the opinion rendered was “bought” by the other side and therefore was to be avoided even though there is not a specific prohibition against such fees in the AIPG Code of Ethics. However, Canon 2 of the AIPG Code of Ethics states in part that members should “avoid even the appearance of impropriety” and Standard 3.1 and the Rules thereunder discuss conflicts of interest and can be cited as indirectly prohibiting the acceptance of contingency fees for expert testimony because of the inherent conflict of interest. The quoted opinion from the Arizona Court of Appeals provides a stronger foundation for that opinion and, given that basis, I concur with Greenslade’s vote on the issue. As always, comments are welcomed.

Ethics in Academia

George D. Klein, CPG, commented that this column has not devoted much space to ethical issues in academia. Because I have not been a regular part of academia since I received my MS degree, I am not intimately familiar with the various goings-on and must rely on those who are to supply topics for this column.

Klein’s contribution following our exchange on the forgoing observations was his book, Dissensions, about the

1. The most recent task analysis questionnaire was sent out last year.
2. Greenslade also reported that Dawn H. Garcia, CPG, replaced him on the AZ BTR.
I distinguish between morality and ethics by classifying as “ethics” formally adopted statements like AIPG’s Code of Ethics. Morals are western university.

I would like to include more on academic issues in this column but this requires that those of you in academia provide the topics. Academic politics can become very nasty and involve ethical issues. Unfortunately, one of the consequences of academic tenure is that it can be very difficult to remove an individual causing undue or inappropriate problems, an issue Klein addresses in his book. Also, because the academic community is relatively small, even generic descriptions of situations can be fairly transparent to those familiar with the details. One professor friend of mine described an unethical situation to me but preferred that even a generic discussion of the situation that I drafted not be published because of potential transparency. I appreciate the problem. On the other hand, if nobody ever yells out that “The emperor has no clothes,” the problems are not addressed.

I do not know how widely the details of the Ward Churchill kerfuffle at the University of Colorado, Boulder have been reported, or whether you have paid attention to them. In the Colorado Front Range, the matter has been hard to avoid. The evidence uncovered to date indicates that Mr. Churchill (he does not have a PhD) has played very fast and loose with the “facts” reported in his research and does not appear to have a good idea of what constitutes plagiarism and proper attribution. Nevertheless, the main cry from his professorial colleagues at the University of Colorado has focused on academic freedom rather than a professor’s professional responsibilities and ethics. One result has been questioning of the ethics and professional practices of the entire CU-Boulder faculty.

The official university investigation into the Churchill matter has not been completed. I’m awaiting the outcome with interest. Will CU prove to be inhabited by vertebrates or brachiopods?

Common Morality—Deciding What to Do

In column 55 (June ‘00), I reviewed Bernard Gert’s Morality: Its Nature and Justification (1998, Oxford Univ. Press, 408 p.). I find that Gert’s exploration and explanations of common morality provide a fundamental and realistic basis for moral and ethical analysis, for examination of the more difficult or contentious issues presented in this column. Gert has published a much shorter and refined version of his ideas in Common Morality—Deciding What to Do (2004, Oxford Univ. Press, 179 p.). Everyone who is serious about the study morality and ethics, professional or otherwise, should read this book.

Gert maintains that common morality, a system of informal rules, ideals, and procedures that are recognized by all societies we know about, “is the moral system that thoughtful people use, usually implicitly, when they make moral decisions and judgments.” Gert does not claim to have created or developed common morality. Rather, Gert has provided a detailed description of something that previously existed. Gert maintains that his “detailed description of common morality provides a framework that all parties to a moral dispute can accept, even though they may disagree with each other on what morally ought to be done in a particular case.”

One of Gert’s fundamental observations is that a complete moral theory should not and cannot result in unique answers to every moral question. Failure to accept that unique answers are not possible is among the reasons that ethical systems advocated by such philosophers as Kant and Mill are incomplete and impractical.

Gert points out that the lack of unique answers to moral questions stems from four unresolvable difference factors.

1. The scope of morality; that is, who is covered by the moral rules. Gert points out that differences in opinion about if and when fetuses are covered by the moral rules are at the heart of the debates over abortion. Similarly, the more extreme animal rights activists who believe that all animals, or at least all mammals should be covered by the moral rules, do not represent a common view and so most of us have no moral qualms about eating meat.

2. The ranking of harms and benefits resulting from taking a particular course of moral action differs. The changes in airport security procedures, etc. following 9/11 with the consequent loss of personal freedom in order to increase the public’s safety are an example.

3. The harmful and beneficial consequences of the violation of a moral rule being publicly allowed when the moral analysis is based on ideological views that are not open to empirical investigation. The debates over creation science and similar alternatives to evolution are of this type.

4. “The interpretation of a moral rule, such as whether turning off a respirator of a ventilator-dependent patient who has refused further treatment counts as killing.”

Recognition that common morality does not provide unique answers to all moral questions can allow those on opposite sides of an issue to mutually respect the legitimate moral position of those on the other side and this can help in arriving at solutions. Gert points out that a consequence of the inability of morality to uniquely decide such questions is one of the reasons that government and legal systems, which are devised to provide unique answers, are necessary. For example, in the discussion of whether contingency fees should be allowed for expert witnesses, Bill Greenslade noted that the argument that such fees allow those with little financial means access to experts vied with the potential for encouraging biased testimony in the BTR’s debate. The BTR’s decision to prohibit the acceptance of such fees legally decides the question even though some feel that this was an incorrect decision.

Gert recognizes that common morality’s failure to provide unique answers to all moral questions annoys some people. But he maintains that by allowing people of differing views to respectfully talk to each other, it can help eliminate dogmatism and relativism. As Gert notes, “The most persuasive argument in favor of ethical relativism, the view that equally informed rational persons need not agree on the answer to any moral question, is the falsity of the
view that all equally informed rational persons must agree on the answer to every moral question” (emphasis in the original). The universal agreement on a question required by either view proves them both false.

Gert observes that while common morality is complex, its complexity, like that of the grammar of a language, does not prevent it being understood by all rational people, even if the details of the system are not explicitly reviewed every time a moral decision is made, just as those fluent in English can use the future pluperfect even if they never learned or forgot the formal definition of that tense.

Common morality includes moral rules and moral ideals. Moral rules and moral ideals are frequently mixed together, as is the case with the AIPG Code of Ethics and most professional ethics codes and statements. Yet the distinction between moral rules and moral ideals is critical because only moral rules can be violated. Gert’s description of common morality also includes a two-step procedure, again generally used implicitly, for determining whether a particular violation of a moral rule will be allowed.

Gert’s moral rules are:
1. Do not kill.
2. Do not cause pain.
3. Do not disable.
4. Do not deprive of freedom.
5. Do not deprive of pleasure.
6. Do not deceive.
7. Keep your promises.
8. Do not cheat.
9. Obey the law.
10. Do your duty.

Gert notes that the first five rules could be collapsed into “Do not cause harm” and the second five into “Do not trust” but notes that doing so results in a lack of specificity that impedes the utility of the system. For those who object to the negative “Do not” of most of the rules, remember that it is far easier to list what is prohibited than to list what is allowed, which are all other actions. Violation of a moral rule generally results in punishment of the violator if the violation becomes publicly known, unless the violation is a recognized exception to the moral rule.

Having listed the basic moral rules that all moral agents (generally but not exclusively rational adults) are expected to follow with respect to all persons covered by the moral rules, it is also clear that there are generally recognized exceptions to the moral rules. For example, self-defense is an almost universally allowed exception to the “Do not kill” rule. Likewise, most people permit surgeons to cut them open because they believe that greater harm will be avoided by the temporary harm resulting from surgery. The two-step process for determining whether a particular violation of a moral rule will be discussed below. But first, a description of the moral ideals is needed.

Moral ideals are intentional actions that “avoid, prevent, or relieve the suffering of harm of someone protected by the moral system.” Most types of charity work qualify as acting on a moral ideal. Unlike moral rules, there is no need to provide detailed descriptions of moral ideals. Further, while people are encouraged to engage in actions that embody moral ideals, there is no requirement to do so and no punishment for not doing so, a significant difference from the requirement to follow the moral rules. Gert also points out that there is also a distinction between moral ideals, which seek to lessen harms suffered from utilitarian ideals that aim at increasing the amount of goods or benefits, although the distinction is not always clear.

Another characteristic of moral ideals is that it is not possible to achieve the ultimate goal of the moral ideal. For example, while one can contribute to a local food bank, none of us can relieve all the hunger in the world. Further, we are allowed to choose which morally ideal actions we engage in. Unlike moral rules, which should be observed impartially for all people, we can be partial in selecting both morally ideal actions and for whom those actions will be done. For example, I can choose to support AIDS education efforts and not similar efforts for heart disease. Or professionally, I can choose to contribute to the AIPG Foundation rather than similar foundations connected with other professional societies.

Returning to the two-step process for determining whether a particular violation of a moral rule is justified, one of the fundamental features of common morality. As explained above, we all recognize some exceptions to the moral rules such as willingly undergoing surgery that causes pain to avoid a greater harm of some sort. When everyone, or almost everyone, accepts a particular kind of violation, that violation is strongly justified. When there is disagreement about whether a violation should be allowed, for example, whether capital punishment is an allowed violation of the “Do not kill” rule, the violation is weakly justified.

The first step in the two-step process for justifying violations of a moral rule is using the morally relevant features of the violation to describe the act. Gert provides a 10-item list for identifying the morally relevant features.

1. Which moral rule is being violated?
2. What evils or harms (including their kind, severity, and probability; the length of time they will be suffered, and their distribution) are (a) being caused by the violation, (b) avoided by the violation, or (c) prevented by the violation?
3. What are the desires and beliefs of the person toward whom the rule is being violated? For example, a patient consenting to an operation.
4. Is the relationship between the person violating the rule and the persons toward whom the rule is being violated such that the former sometimes has the duty to violate the moral rules with regard to the latter independently of their consent? For example, parents reasonably disciplining children or governments imposing some restrictions on their citizens.
5. Which goods or benefits (including kind, degree, probability, duration, and distribution) are being promoted by the violation?
6. Is the rule being violated toward a person in order to prevent that person from violating a moral rule whose violation would be (a) unjustified or (b) weakly justified?
7. Is the rule being violated toward a person because that person violated a moral rule (a) unjustifiably or (b) with a weak justification? This point is critical when discussing punishment for the violation.
8. Are there any alternative actions or policies that would be morally preferable?
9. Is the violation being done intentionally or only knowingly? Lying is always intentional while withholding information may only be knowingly deceiving. While sometimes there is a difference between intentional action and a knowing action,
in most cases either alternative is morally unacceptable.

10. Is the situation an emergency such that people are not likely to plan to be in that situation? For example, when sufficiently large numbers of people have been injured to overwhelm available medical facilities, doctors are permitted to abandon those with a small chance of survival in order to treat those expected to survive.

Gert points out that point of the foregoing list is to help identify the morally relevant features and facts of the situation. Once these have been identified and agreed upon by all concerned parties, then arriving at a moral consensus may be easier, or at least the specific reasons for disagreement will have been identified.

For example, I earlier noted that most of us grant an exception to the “Do not cause pain” (and perhaps other rules) in the case of surgery. But I can think of two types of objections to surgery. One is the case of those who decide that surgery or other “heroic” procedures that will add a few more months of life due to temporary abatement of a terminal illness are not warranted. This case involves the relative rankings of harms and benefits. The other is the case of those whose religious faith objects to such procedures. This is another example of the third type of unresolvable difference discussed above.

The second step of the two-step process is estimating the consequences of everyone knowing that kind of violation is, or is not, allowed. Gert expressly uses “estimated” in this step because accurate determination of the consequences is not always possible. When all agree that a particular kind of violation should or should not be allowed, the decision is strongly justified. When there is disagreement, particularly by a significant number of people, then the decision to allow or disallow the violation is weakly justified.

The foregoing is a brief summary of Gert’s explanation of common morality. I urge everyone to read the book, which is itself a summary of Gert’s Morality: Its Nature and Justification (1998) that more serious students of morality will want to read as well. I believe that common morality provides a required and firm basis for the exploration of professional ethics. The ideas and procedures that Gert makes explicit in his books underlie, usually implicitly, the discussions in this column.

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What We Should Expect from Undergraduate Training of Engineers Practicing in the Geosciences

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Introduction

This article is written at the provocation of Dr. Richard Jackson, a hydrogeologist practicing in the field of groundwater, in Colorado. “Dick” has been serious about groundwater for several decades. Recently he posed the following question to me and I now take his challenge as worthy of this forum:

“Now my request to you, as co-author of Geology & Engineering (Legget & Hatheway, 1987) is this: What do you think should be substance of an engineer’s knowledge of the geosciences when he or she leaves academia? What geological understanding and appreciation, in your experience -- and I believe that you must have degrees in both engineering and geology -- is it that you feel is essential to the practice of good engineering that the engineer-in-training must take with him from college? I can wait months for reply!”

Being the impatient chap that I am, Dick’s question was good bait! Dick, by the way is in the process of updating John Harvey’s translation (from the German) of Georg Matthes’ (late of the University of Kiel, Germany) The Properties of Groundwater.

Some Essential Background

Here is my own simplified understanding of how “engineering” and geology have been fundamentally linked during their histories. My concept is illustrated by a series of time-related steps:

1) The modern science of geology was created by British civil Engineer William Smith, in the first half of the 19th century;

2) Smith’s development of geological science was to support his layout and design of many of Britain’s canals of commerce;

3) Engineered works became largely feasible in the 19th century due to the Industrial Revolution and the power of steam;

4) The Revolution demanded natural resources that were “won” by a combination of engineering and geology; hence most civil engineers became adroit in the practice or, at least, developed respect for geological influences on their profession;

5) This condition improved well into the 20th century, especially as affected by the teachings and writings of the late Karl Terzaghi; perhaps the first geological engineer, not by holding such a university degree, but his possessing a dual education in geology and engineering;

6) All of this influence led to a considerable presence of geology in the undergraduate training of civil engineers in North America;

Many civil engineering departments gave considerable attention to teaching geology or requiring such instruction, and much civil engineering research was grounded in geologically-based topics, all of which peaked about 1970;

7) Then, came devotion to the computer, about 1960 and with this, academic engineering attention toward geology, and, for that matter, land surveying, started to “go out the window” for training of engineers.

8) Both “curves” of educational imperatives coincided in about 1970; geological and positional survey education on the decline and computer-based instruction on the rise;

9) From 1965 to 1980, sanitary engineering, a branch of civil engineering, metamorphosed through environmental engineering and now generally is known as geoenvironmental engineering;

10) At about 1998, ASFE, the association of “Engineering Firms Practicing in the Applied Geosciences” openly
began to claim this area of practice;
And so now, we are in a morass that surely dignifies Dick Jackson’s question ....

The Situation in 2005
Surely “The Environment” remains the main focus of perhaps a third to a half of consulting engineering assignments. Into this crowded arena have moved not only the geotechnical engineers and the environmental engineers, but their spawned step-child, the geoenvironmental engineers.

Also in 2005 we have a wide variety of hybrid geologists and engineers, who can lay some claim on at least a limited capacity to practice in each other’s camp. This makes Dick’s question all the more important to address, but, at the same time, more difficult!

The situation is acute and has been so recognized by the three major professional societies covering our disciplines; AIPG, the Association of Engineering Geologists (AEG) and the American Society of Civil Engineers (ASCE). As a result, the Joint Task Force on Areas of Practice (JTFAP) for Geologists and Engineers, was established in October of 2005 and is making headway toward resolution of as many of the underlying issues as is possible. More about the progress and work product of JTFAP will appear in The Professional Geologist at least semi-annually.

A Presumption
It stands to reason, by this observer, that those engineers who lay claim to practicing in the Applied Geosciences, should come forth with some established degree of education, background and experience in geology. Individuals not possessing such a background truly cannot practice in the “applied geosciences” but would therefore become the clients of those geologists and engineers who are so qualified.

As a member of JTFAP, I can presume that the single most determinative factor in qualifying anyone to practice in the “applied geosciences” will turn out to be reference to their professional license. After all, that is why we have this form of protection of the public in North America. So, let me establish that position as my anchor in moving forward on Dick’s question!

What Business Do Engineers Need to Know to Practice in the Applied Geosciences?
If we go on the premise that it is the engineer who produces a design for construction of engineered works for use of people, then that engineer needs, at a minimum, some sense of what it is that he or she requires of geoscience specification input to devise a design that is feasible and constructible and which has a high degree of potential performance during its lifetime. Right away, this leads us to the conclusion that the geoscience specification should be developed by a qualified geologist and that the engineer should know enough about geology to wisely acquire qualified geological support, and to know enough to formulate a scope of work for that geologist, and then to evaluate the worth of the geological work product.

This is a simple enough agenda, in words, but try to fit that into the few semester hours that engineering education administrators provide in the BSCE curriculum!

Better that we should set down some obvious geological-knowledge objectives for education of BS-level engineers. We truly are limited to objectives, for course titles or names do not set the bar for the geological knowledge needed for an engineer to deal effectively with geologists or with specified geologic input. Here is a list of ten objectives that seem most imperative for preparation of every undergraduate engineer being trained to work in the constructed environment:

1) A physical property/characteristics definition of the earth media; soil, weak rock, rock and ground water;
2) An appreciation of the manner in which these earth media are found in nature;
3) An appreciation of regional physiography as the expression of the combined effects of earth media upon which have been superimposed the effects of climate, weathering, and a history of all previous geologic forces and phenomena;
4) How geologic field data are collected, sampled, tested, evaluated, interpreted, and turned into definitions and projections of the nature and character of sites for construction, particularly in their subsurface;
5) A sense of how anomalies occur routinely in the masses or bodies of the earth media and the ways in which
such anomalies can alter, disturb or remove what is most predictable about subsurface interpretations and projections;

6) A concept of how geologic discontinuities can alter the mass behavior of earth media;

7) How the presence of water in earth media can take control of the behavior of a site or its environs in terms of constructability and performance of engineered works;

8) How dynamic earth processes are continually bringing change to the landscape and to the subsurface;

9) The nature of risk as it relates to the potential for presence and potential impact of undetected geologic features, or the absence thereof, and;

10) How to formulate a Scope of Work to seek geological specification of the nature (“Site Characterization”) of the proposed construction location.

Summary: How do You Package this Body of Imparted Knowledge?

Almost universally, engineers are taught geology from the standpoint of what we geologists know as "Physical Geology," interesting enough for geology majors about to go forth on a full curriculum of geology courses. But for the average lower division engineer? Surely a killer of interest, especially when taught by a faculty member who has no interest, even a killer of interest, especially when taught by a faculty member who has no concept of what engineering is all about and the geologic points are not made with the concept of what engineering is all about and the geologic points are not made with illustration to their near-total control of foundation design. The 'Physical Geology' mind set should be dropped and a new course adopted with a title akin to 'Geology and Earth Materials.' This would recognize geology as constituting a body of knowledge relating to the various civil engineering course instruction in the synthetic materials used in construction, such as concrete, steel, plastics, and composites.

The solution? In this current state of engineering education, no institution is going to provide more than one three-unit course of undergraduate instruction in geology. But, it is my profound belief that a stimulating faculty instructor can devise such a course around the ten above-stated principles, and leave bright and questing engineering students with a profound and lasting message about how to deal with geology and geologists, or suffer the peril of those who go forth to construct with various degrees of geologic ignorance.

Harvey, John, 1982, Geology for Geotechnical Engineers: Cambridge University Press, Cambridge, UK, 163 p. (The author was Lecturer in Geotechnical Engineering, Plymouth Polytechnic University, UK; the text is now under revision in 2005 by Richard Jackson as Earth Science for Engineers: An Introduction to Environmental Practice.)


Allen Hatheway (allen@hatheway.net) is an early-retired Professor of Geological engineering who has practiced for 44 years, in his native Los Angeles, and at San Francisco, Boston, and in Missouri. He has served his profession as a teacher, soldier, public servant, and consulting firm staff and partner. He is professionally licensed as Geologist and/or Engineer in several states (AZ, CA, MA, ME, and MO), but swears that his formal education has been strongly tempered in the School of Hard Knocks. He serves as one of AEG's ambassadors to AIPG, as an Honorary Member (2002) and past president of the former (1985). He and wife Dina split their time between Big Arm, Montana and Rolla, Missouri.

Editor’s note: This is an interesting question and has been asked for many years because of the ongoing concerns of many geologists regarding the role of the engineers in making "geological" decisions. There may be some progress, though on a small scale and it may only be a blip on the radar screen! I have been invited to give a couple of geological lectures to a graduate class of civil and environmental engineers at the University of Connecticut. The course title is "Geology in Civil Engineering." According to the course description, "The course will explore the role of geological materials, earth processes and landforms in siting, designing, constructing and maintaining structures and facilities." It will be interesting (exciting?) to talk geology and geological methodology to a group of engineers. I will let you know how it went in a later TPG.
Masters or Ph.D.?  

Another consideration that you should have regarding your decision to start a Masters program or whether to go right for the Ph.D. is the level of indecision you may feel over your choice in which subject to study. In a Ph.D. program you work for 5 years or more on the same project. At times you may be investigating different avenues of that project, but, for the most part, you spend those five years under the same branch of science. For example, if you decide that you want to work on a project related to groundwater hydrology, then for five years you will be spending all of your time working on a project related to some aspect of that very topic. If you decide that after 3 years you are more interested in geophysics, you still have to continue working on the project in groundwater hydrology if you want your degree. If you are sure of what you want to study, then jumping right into Ph.D. research is for you, but if you are not sure then it would be better to test the waters with a Masters level project first. Since a Masters program only lasts for 2 or 3 years, if you decide to change your mind halfway through, it will not be as painful to finish out your thesis work to the end. By working on a Masters program first, you get the chance to test the waters of a field to see if you really like it and to change to something else for your Ph.D. if you do not.

Another consideration that you should have when deciding between a Masters and Ph.D. program is the level of knowledge that you have of your subject of interest. As an undergraduate, you may have been very sure about what you wanted to study and with such determination it is possible to build a vast reserve of knowledge prior to starting graduate school. A good knowledge of the field provides the confidence and background necessary to make good decisions and conclusions in a study. For those that already have a very strong background in their field, a Ph.D. program where you are expected to make many of the decisions of what to do or where to go may be the right choice. If you really do not have the understanding needed to take control of your project, then the extra experience provided by first obtaining a Masters degree can be invaluable when you start work on your Ph.D. In my opinion, when you complete your Ph.D., whether or not you got your Masters degree first, you should be able to stand confidently alone in your knowledge as a contributing member of the scientific community.

On top of the personal considerations that go into your decisions, there are also the broader scale implications that go along with whichever path you chose. Obviously, by bypassing the Master’s Degree you will be spending less time...
in school and will be closer to starting your career. For those that already know what they want to do and where they are going, bypassing the Masters can keep a student from wasting time on experiences that they do not really need. Yet, if you chose this path, it may be harder to convince employers that you have had enough experience to really get the job done. You may find that you will have to spend time in post-doctoral positions in order to gain more experience and add to your resume before you are chosen for a quality career-level job. If you instead decided to get a Masters degree first, you will definitely have more experience to draw from. In addition, if you go to different institutions for each degree than you will have the experience of working under two different people with two different styles, which also provides a greater variety to what you have learned. This may be more attractive for employers and increase your chances of getting a job over someone else. However, you will be in school longer which means more money for tuition and possibly even greater student loans. Also, if you are a self-motivated and able student, you may become bored spending the time working on a Masters degree and the extra attention that comes along with it may become frustrating and possibly even stifling as well.

In whatever decision you make, feel rest assured that many schools are flexible in their categorizations. Often schools will allow you to change to a Ph.D. program once you have already started your Masters research. If you really enjoy the project you are working on and if you want to expand it to a larger scale, then making the change could be a good decision. In other words, if you pay attention to where your interests lie and where you want your career to be going, you can make changes fairly quickly and easily. Once you make a decision, you are not necessarily bound to it until the end, but making the right decision early can save time and effort later down the line.

Next Issue: Finding the Right Internship

If you have any ideas, questions, or comments about this article, the upcoming article, or any other issues, please feel free to contact me via e-mail at: small fzzy mamml@yahoo.com.
AGI Announces Earth Science Week Theme and New National Contests for 2005

ALEXANDRIA, VA - The American Geological Institute (AGI) announces the theme for Earth Science Week 2005: “Geoscientists Explore the Earth.” Focusing on the wide variety of careers available in the geosciences and the contributions geoscientists make to society, this theme will raise awareness among students and the public of the exciting opportunities to work in the field. Earth Science Week takes place October 9-15, 2005.

Earth Science Week 2005 will mark the eighth year that AGI has sponsored this international event as a service to the public and the geoscience community. Each year, local geoscience organizations, educators and interested individuals organize events to celebrate Earth Science Week. The week was developed to give the public new opportunities to discover the Earth sciences and stewardship of the Earth, as well as highlight the important contributions the earth and environmental sciences make to society. Earth Science Week is supported by the U.S. Geological Survey. To learn more about this event, visit www.earthsciweek.org.

In the United States, special events for Earth Science Week will include three national contests, hosted by AGI. The contests encourage students and the public to become involved in Earth Science Week by submitting artwork, an essay or a photograph. Entries must be received by October 1, 2005. A grand prize winner in each category will win $300 and a one-year subscription to AGI’s monthly news magazine, Geotimes. AGI’s Earth Jobs theme is illustrated in the chosen careers.

Visual Arts: Students in grades K-5 are eligible to compete in the Visual Arts Contest. They should make a drawing, collage or other 2-dimensional piece of artwork that illustrates the theme “Earth Jobs.” Students should depict themselves as geoscientists, engaged in a career they might like to have in the Earth sciences. The artwork should also show some of the scientific tools that would be used in the chosen career. Submissions should be flat and no larger than 24 x 36 inches.

Essay: Students in grades 5-8 are encouraged to compete in the Essay Contest. Submissions should answer the question: “What kind of geoscientist would you like to be, and why?” Essays should be fewer than 500 words in length and should be based on student research about a particular career in the Earth sciences. Students might imagine themselves as geoscientists, explaining the reasons they are interested in their chosen careers.

Photography: The Photography Contest is open to the general public. Submissions should illustrate the theme “Extreme Earth Science” by showing an exciting Earth science subject or geoscientists in an amazing location or situation. Examples might include (but are not limited to) geology field trips to exotic locations, unique geological samples, or photos that capture the breathtaking beauty of the Earth. The goal is to create pictorial evidence of why Earth science is an exciting field to study. Photographs of children under age 18 must be accompanied by a parental consent form that can be found on www.earthsciweek.org/contests. Submissions can include print or digital photographs.

More information on the Earth Science Week contests, including rules and submission guidelines, can be found at http://www.earthsciweek.org/contests.

FOR IMMEDIATE RELEASE
Cindy Martinez, cmm@agiweb.org
June 27, 2005

www.aipg.org
This service is open to AIPG Members as well as non-members. The Professional Services Directory is a one-year listing offering experience and expertise in all phases of geology. Prepayment required. Advertising rates are based on a 3 3/8” x 1 3/4” space.

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GeoScience Data Management (GDM) was established in 1991 on the premise that knowledge about your company and your business will allow you to perform your work more efficiently and effectively. To this end, we provide computerized record center setup and management, seminar and internet-based instruction for the petroleum or engineering geology sectors, and a variety of short-term service types.

GDM was founded by its current president, Robert Font, Ph.D. Several members of the GDM management, supervisory and general staff hold the titles of “Certified Professional Geologist” (AIPG), “Certified Petroleum Geologist” (AAPG), “Certified Records Manager” (ARMA), “Registered Environmental Manager” (NREP) and “Registered Professional Geologist” (PG) throughout various states. Accordingly, our clients expect and receive the highest levels of professional and ethical behavior and confidentiality possible.

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It has been said that, “Geoscientists spend 80% of their time looking for data, and 20% of their time working on it.” From the very beginning GDM’s efforts have been focused upon reversing this trend - making the data available at the finger tips of those who should be looking for drill sites, not data. Our efforts toward adding value to assets, and service to internal and external users.

In addition, the course covers an introduction to exploration economics and risk analysis. The course has been presented as an AAGP-sponsored professional seminar for PDVSA (Venezuela) and as a two-day seminar for Union Pacific Resources. It has also been taught as a semester-long, graduate-level course at the University of Texas at Dallas. Course materials are presented as 700+ Power Point slides.

Our third course, Understanding Natural Geohazards covers all of the natural geologic hazards resulting from earth-related natural processes and emphasizes mitigation, prediction and prevention techniques. The course has been presented as an AIPG-sponsored professional seminar for geologists and non-geologists (realtors) in Alaska. It has also been taught as a semester-long, college-level course at Collin County Community College in Plano, Texas. This CD-ROM reference contains approximately five hundred Power Point slides.

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- Evaluation of properties for petroleum potential
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- Aquifer testing
- Customized Access database development for electronic capture of essential information.

For a more complete listing of services offered, please visit our website (www.geodm.com).

Some of our present and past clients include the following:
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- ExxonMobil Corporation
- Kerr McGee Corporation
- Maxus Energy Company
- Nearburg Producing Company
- Oryx Energy Company
- Snyder Oil Corporation
- Union Pacific Resources

GDM currently has offices located in Texas, Michigan, and Arizona.

Principals and Contact Information:
Robert Font, Ph.D., CPG, PG, EurGeol – Founder & President, Plano, TX, rfont@geosciencedm.com,
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Dale Clinton – Project Manager, Houston, TX, delinton@geosciencedm.com
Elaine Travers, CPG, CRM - Operations Manager, Plano, TX, etravers@geosciencedm.com
The 2006 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 the Martin Van Couvering Memorial Award is service to the Institute. As in other awards, a wide variety of contributions to the Institute may be considered. By far the most important contribution a geologist can make to the Institute is that of time. It is the contributions by individuals to the Sections, the committees, and special projects that enable the Institute to enhance the practice of geology.

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

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

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

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

**AWARD OF HONORARY MEMBERSHIP**

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

**OUTSTANDING ACHIEVEMENT AWARD**

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

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**American Institute of Professional Geologists**

**Nomination form for 2006 AIPG Awards**

(Please check one)

☐ Ben H. Parker Memorial Medal  ☐ John T. Galey, Memorial Public Service Award

☐ Martin Van Couvering Memorial Award  ☐ Award of Honorary Membership  ☐ Outstanding Achievement Award

**NAME OF CANDIDATE:**

Telephone: __________________________

Address: __________________________

Fax: __________________________

Address: __________________________

E-Mail: __________________________

**NAME OF PERSON MAKING THE NOMINATION:**

Telephone: __________________________

Address: __________________________

Fax: __________________________

Address: __________________________

E-Mail: __________________________

Signature: __________________________

Date: __________________________

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

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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, 2005.
CPG Practicality Committee Work: A Summary Report

Madhurendu B. Kumar, Ph.D., C.P.G., R.P.G.

In October, 2004 President Font established the CPG Practicality Committee comprised of eight AIPG members, namely, Madhurendu B. Kumar (Chair, Louisiana), Jim Shotwell (Texas), John Hofer (Tennessee), Barbara Murphy (Arizona), Mark Sweatman (Michigan), Todd Church (Virginia), Allen Sunderman (Minnesota), and Mark Rogers (Hawaii). The Committee’s primary goal was to investigate the ways in which the Institute can strengthen the “practical value” of the CPG title. Accordingly, the Committee conducted opinion surveys in two phases. During the first (preliminary) phase, over 90 responses were received from the Section Presidents and other members, and were summarized in a preliminary report submitted to President Font in January, 2005. Based on the preliminary survey, a questionnaire of twenty questions was designed and utilized for the second (final) phase of the survey in which 837 members (mostly CPGs) participated. The final report submitted to the AIPG Headquarters on May 5, 2005 was based on the electronic files of the voluminous survey responses stored at the Headquarters. The questionnaire utilized for the final phase survey included three sets of questions. They were designed to obtain a professional profile of each respondent, opinions on the current practical value of the CPG title, and suggestions for its enhancement. The respondents represent about 16% of the entire membership of AIPG. The suggestions or recommendations received greatly vary due to numerous factors such as the member's length of professional experience, geology specialty, status of state registration, and regulatory constraints affecting their professional practice.

The survey results demonstrate that the CPG title is beneficial to a great number of geologists because of the following:

- It enables them to be recognized as Qualified Persons for the world stock exchanges.
- It helps them establish their credentials in the extractive industries as well as federal government agencies.
- It provides credibility to the geologists who appear as expert witnesses in the court of law, public hearings and legislative activities.
- It helps them obtain job interviews, build business clientele, and secure licensure or registration in some states.
- It provides leverage or credibility to the geologists in the international business.

The CPG title is “important to very important” to 56 - 58% of the respondents who use it to support the advancement of the geologic profession, and demonstrate to clients that they have geoscience credentials. However, the title is superfluous for 43% of the respondents, because it does not help them meet regulatory requirements. Furthermore, the title has not been helpful to 67 - 77% of the respondents in procuring jobs, achieving promotions, and obtaining better compensations or monetary savings related to professional events. On the other hand, a significant percentage of the respondents recognize and appreciate the practical value of the title. Those, who are particularly recognized as “Qualified Persons” for the world stock exchanges and extractive industries, underscore the need for the enhancement and strengthening of the requirements for the CPG title.

Among several other issues, the survey addressed two paramount issues:

1. How to make ‘CPG’ a requirement for the geoscientists to work in the states with no registration?
2. How to make the registry states recognize ‘CPG’ at least a partial fulfillment of the state requirements for each PG or RG?

Relative to the first issue, a significant majority of respondents from the registry states as well as the non-registry states indicated that requiring CPG registration would not be feasible or would be very difficult. However, several respondents indicated that it was feasible through lobbying efforts and/or political avenues and tying the process with ASBOG, and emphasizing that CPG title is on equivalent footing to the PE designation.

Regarding the second issue, over 76% of the respondents indicated that it would take substantial lobbying efforts of either AIPG Headquarters or State Sections. 48% of the respondents indicated that the registry state recognized ‘CPG’ in some manner for state registration or at least for some pending legislation; 46% of the respondents indicated that ‘CPG’ is not recognized for the state registration; 6% of them had no response.

An overall evaluation of the survey results indicated that the Institute should focus its efforts on the four areas: publicity and promotion; continuing professional development; testing program for CPG; and enhancement of services and benefits for the membership. The suggestions and comments offered by the respondents are summarized as follows:

1. **Publicity and Promotion:**
   - Publicize and promote at the national level the importance of geology, geologists, and CPG (AIPG) through mass media (TV & Radio), popular magazines, billboard advertising along major highways. Adopt the effective techniques of advertisement employed by American Institute of Architects (AIA).
   - Promote geology and geologists in the community through the students and faculty of the local...
colleges and universities, high school fairs, active membership on civic boards, and support of geologists running for public office.

- Promote services of geologists and AIPG as well as the value of the CPG title to other professions and their organizations through various trade magazines. To this end, wherever necessary, team up with other geological and related organizations such as AAPG, GSA, AGI, SME, and SPE.

- Promote AIPG and CPG to local, state and federal government. Encourage government geologists to join AIPG; emphasize the use of CPGs for government-funded projects; work with state regulators to acknowledge the value of CPG; work with the legislature to adopt CPG as the geologic professional standard for the state; work with various states to have the CPG title allow for ease in obtaining registration through reciprocity agreements thereby having CPG recognized as a national level of certification; organize mini-fly-ins to the state capitol for a “Geologists at the Capitol Day”.

2. **Continuing Professional Development (CPD) Program:**

76% of the respondents favor the implementation of a strong CPD Program by accrual of CEUs through participation in on-line short courses, on-site seminars, and field trips, pertaining to core scientific and business disciplines. The requirements of 6 to 8 CEUs per year and 20 to 24 CEUs over 3-year period, subject to renewal/certification should be as stringent as the present state boards. The program should include a national on-line registry for CEU requirements toward establishing reciprocity with the state boards and other organizations (e.g. NGWA, GAS, AAPG, AGWSE).

3. **Test Program For CPG:**

The results of the survey on “Should the passage of a written test be a basic requirement for AIPG certification?” are as follows:

<table>
<thead>
<tr>
<th>Opinion on Test for CPG</th>
<th>YES</th>
<th>NO</th>
<th>ABSTAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Respondents</td>
<td>44.5%</td>
<td>34.8%</td>
<td>20.5%</td>
</tr>
<tr>
<td>Average Years of Experience</td>
<td>23.9 YEARS</td>
<td>29.6 YEARS</td>
<td>31.3 YEARS</td>
</tr>
</tbody>
</table>

A slight majority represented by geologists of relatively less experience favor a type of written examination for CPG, the test being very similar to, if not the same, as the ASBOG Exam, geared toward the geology specialty and the region of the country in which the examinee practices. The issues of “grandfathering” and reciprocity with the ASBOG program should properly be addressed.

4. **Enhancement of Services and Benefits for the members:**

- Conduct, publish and update regularly salary surveys that may be used as reference for compensation by employers.
- Publish regularly information on states that require registration and any reciprocity policy in effect.
- Facilitate employment/employer search (Job Bank)
- Provide certain discounts to CPGs for the annual meeting registration fees, short courses, and field trips or any other event.
- Periodically seek suggestions from the membership for improvement.

---

### Answers to Questions on Page 16

1. The answer is (a) or 45,370.5 lbft⁻¹. The proof follows:

\[
P_h/P_v = K_a
\]

\[
P_h = K_a P_v
\]

\[
P_v = \gamma z + q_a
\]

\[
P_h = K_a \gamma z + K_a q_a
\]

\[
P_{ah} = \int P_h dz \quad \text{from 0 to } H
\]

\[
P_{ah} = \frac{1}{2} K_a \gamma H^2 + K_a q_a H
\]

\[
P_{ah} = \frac{1}{2} \left( \frac{0.406 \text{ lbft}^{-3}}{15 \text{ ft}^3} \right) (30^2 \text{ ft}^2) + (0.406 \times 2000 \text{ lbft}^{-2})(30 \text{ ft})
\]

\[
P_{ah} = 45,370.5 \text{ lbft}^{-1}
\]

2) The answer is (b) or Stellatochara.

Textularia is a marine foraminifera with an elongated, compressed, arenaceous test that is biserial throughout. Gümblænæ is a marine foraminifera with a calcareous, biserial test with globular chambers. Stellatochara is a charophyte or class of lacustrine green algae. Fossil charophytes are the calcified oogonia of these plants.

3) The answer is (c) or hornblende.

Augite is a calcium ferromagnesian silicate with a similar color and hardness to hornblende, but it tends to have stout crystals, a white streak and two cleavage directions that intersect at 77° and 93°. Olivine is a green, black or yellow ferromagnesian silicate with a white streak, conchoidal fracture (no cleavage) and hardness of 7.0. Hornblende is a calcium ferromagnesian aluminum silicate with the properties already described and with slender crystals that may be splintery or fibrous. The specific gravity for all three of these minerals is similar, in the range of 3.0 to 3.4.

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A Review of Ethical Enforcement Proceedings Against Competent and Qualified Persons

David M. Abbott, Jr., AIPG Ethics Committee Chairman,
(Presented to the Geological Society of Nevada’s Windows on the World Symposium, May 2005)

Abstract

The definitions of Competent and Qualified Person as defined in Australia, Canada, and elsewhere require that such professionals be members of a recognized professional organization that has and enforces a code of professional ethics or conduct. The validity of the Competent or Qualified Person concept in the eyes of securities regulators and the general public depends on the willingness of the recognized professional associations to enforce these codes by those who would generally be recognized as mining industry professionals is small; generally mining frauds are not conducted by industry professionals. Nevertheless, a record does exist that provides a basis for judging the effectiveness of various organizations in their disciplinary efforts.

Two varieties of professional credential are recognized, those issued by peer-review professional organizations like the American Institute of Professional Geologists (AIPG) and the Australasian Institute of Mining and Metallurgy (AusIMM), and government licensing organizations. Peer-review organizations are viewed as weak by some because of (1) a perceived unwillingness to sanction members, (2) their dependence on volunteers to conduct the disciplinary proceedings, and (3) the potential liability due to lack of the statutory immunity granted government organizations. Government organizations may be subject to the same unwillingness to sanction professionals. Government organizations have statutory immunity but may be hampered by the reluctance of Attorneys General or similar government legal teams to proceed with technical cases they do not fully understand and the competition for prosecutorial resources coming from a plethora of prosecutorial opportunities. Candidates for Attorney General generally campaign on their willingness to put criminals in jail, not on their willingness to prosecute white collar crime and such mundane matters as professional incompetence or malpractice. The medical profession’s legal problems come from private attorneys, not Attorneys General. Therefore, the record of actual cases going through the system provides the best basis for judging the effectiveness of either type of professional credential, certification or license. AIPG’s experience in enforcing its Code of Ethics provides a basis for evaluating the types of violations that occur and the sanctions imposed. AusIMM’s experience will also be reviewed.

Introduction

The definitions of Competent and Qualified Person as defined in Australia, Canada, and elsewhere require that such professionals be members of a recognized professional organization that has and enforces a code of professional ethics or conduct. The implicit purpose of this definitional requirement is that the recognized professional organization will protect the public by taking action in appropriate cases. This paper presents an overview of the process of taking action and some case histories of actions taken. The number of cases involving violations of professional ethics or conduct codes by those who would generally be recognized as mining industry professionals is small; generally mining frauds are not conducted by industry professionals. Nevertheless, a record does exist that provides a basis for judging the effectiveness of various organizations in their disciplinary efforts.

Two varieties of professional credential are recognized, those issued by peer-review professional organizations, for example, the American Institute of Professional Geologists (AIPG) and the Australasian Institute of Mining and Metallurgy (AusIMM), and government licensing organizations such as the state and provincial licensing boards in the U.S. and Canada. Peer-review organizations are viewed as weak by some because of (1) a perceived unwillingness to sanction members, (2) their dependence on volunteers to conduct the disciplinary proceedings, and (3) the potential liability due to lack of the statutory immunity granted government organizations. Government organizations may be subject to the same unwillingness to sanction professionals. Government organizations have statutory immunity but may be hampered by the reluctance of Attorneys General or similar government legal teams to proceed with technical cases they do not fully understand and the competition for prosecutorial resources coming from a plethora of prosecutorial opportunities. Candidates for Attorney General generally campaign on their willingness to put criminals in jail, not on their willingness to prosecute white collar crime and such mundane matters as professional incompetence or malpractice. The medical profession’s legal problems come from private attorneys, not Attorneys General. Therefore, the record of actual cases going through the system provides the best basis for judging the effectiveness of either type of professional credential, certification or license. AIPG’s experience in enforcing its Code of Ethics provides a basis for evaluating the types of violations that occur and the sanctions imposed. AusIMM’s experience will also be reviewed.1

Adoption of a professional ethics or conduct code by a professional organization is optional; many professional organizations choose not to adopt such codes to avoid legal liability and other, legitimate reasons (Abbott, 1999, Melrose, et al., 1999 & 2000). For those organi-

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1. Whether peer-review or governmental organizations are better at protecting the public is a matter of opinion and consequent on-going debate, for example, see Abbott, 2005.
izations that have adopted a code, the validity of the Competent or Qualified Person concept in the eyes of securities regulators and the general public depends on the willingness of the recognized professional associations to enforce these codes.

Demonstration of willingness by a professional organization to enforce its professional ethics or conduct code requires four things:

1. The organization must be made aware of allegations of potential violations in order to initiate proceedings.

2. The investigation into the alleged violations and resulting prosecution, if warranted, must have been completed.

3. In cases where violations are found, the sanctions must be viewed as meaningful.

4. The results of these activities must be reported to the public.

An organization can only act if the appropriate individuals within the organization are made aware that a potential violation of the professional ethics or conduct code has occurred. Most frequently, the appropriate individuals are the Executive Director and/or the Chairman of the Ethics Committee or Disciplinary Committee; the organization’s bylaws and, hopefully, website should assist those wishing to make an allegation in identifying the appropriate individual(s).

In order for an allegation to warrant organization action, the allegation (or allegations) must be accompanied by sufficient evidence, preferably documentary, to either demonstrate the veracity of the allegations or to allow the investigating parties to readily obtain that evidence. This is not an easy requirement. The fact that a situation doesn’t pass a personal “smell test,” a suspicion that something improper is occurring, is not sufficient evidence that a violation has occurred. The smell test is equivalent to an initial working hypothesis, one of several possible hypotheses that can explain the situation. As with any scientific study, a particular hypothesis can only be demonstrated by collecting appropriate evidence that both supports the hypothesis and refutes other possible hypotheses.

Assuming that sufficient evidence is found to demonstrate that one or more violations of a professional ethics or conduct code has (have) occurred, the sanction imposed should reflect the severity of the violation(s) and be viewed as meaningful by the general public, within the limits of the professional organization’s ability to impose sanction. The maximum penalty that a peer-review organization can impose is expulsion. Licensing boards may be able to add a fine to a license revocation, but neither organization has the power to send an offender to jail; this requires a criminal proceeding. However, the evidence collected and the conclusions reached by the professional organization may assist a criminal prosecution. One of the case histories presented later in this paper is an example of such assistance.

Finally, the professional organization should provide a means of informing the public that it fact takes action when appropriate cases are brought to its attention. Publication of enforcement actions in the organization’s newsletters or on its website are the most common means of public notification.

Review of AIPG’s Disciplinary Procedures

AIPG’s Disciplinary Procedures (2004) are published on AIPG’s website, www.aipg.org, under “Ethics.” They can be summarized as follows:

- Initial allegations against a member or applicant received by AIPG are reviewed by the Ethics Committee Chairman who can:
  - dismiss the allegation for lack of evidence or for lack of violation;
  - request that more information be provided by the person making the allegations; or
  - initiate an investigation on behalf of AIPG by appointing one or more investigators, who report the findings of the investigation to the Ethics Committee Chairman for review. Normally, the member or applicant against whom the allegations are made is informed of the investigation, the name(s) of the investigator(s), and the Disciplinary Procedures, and the member’s assistance in providing relevant information is requested. The member or applicant is informed that no formal charges have been brought and that no finding of alleged violations has been made.
- If the evidence does not support a finding that a violation of AIPG’s Code of Ethics has occurred, the allegation is dismissed.
- When warranted by the evidence initially provided and additional evidence and witness statements obtained during the investigation, formal charges alleging violation of the AIPG’s Code of Ethics are drafted. These formal charges and the supporting evidence and witness statements, if any, are:
  - reviewed by AIPG counsel before being formally brought by AIPG;
  - brought on behalf of AIPG by the Ethics Committee Chairman;
  - must cite the specific provisions of the AIPG Code of Ethics that have been allegedly violated and why; and
  - include the evidence supporting the formal charges. At this point, the respondent member or applicant has charges to which he or she can respond.
- Due process is critical for the protection of both AIPG and the respondent member or applicant to avoid conflicts of interest, including internal AIPG conflicts by separating the prosecutorial, jury/hearing, and appellate roles within AIPG.
  - The prosecutor is the Ethics Committee Chairman assisted by the investigator(s).
  - The hearing body, the Adjudicatory Board, is appointed by the Ethics Committee Chairman, usually from among past AIPG Presidents. However, the respondent is given the opportunity to object to the appointments to eliminate any perceived conflicts of interest.
  - The appellate body is the current AIPG Executive Committee unless individual members of the Executive Committee have a conflict of interest, in which case, they are recused.
- The sanctions available to AIPG are:
  - a private letter of reprimand,
  - termination of national or sectional office or position, if relevant and applicable,
  - suspension of membership or rejection of the application for membership, which may be include specific activities to be completed prior to lifting the suspension or acceptance of the application,
  - expulsion from AIPG, and
  - informing the other professional organizations having Codes of
Ethics or Conduct and to which the respondent belongs and/or applicable licensing boards of AIPG’s imposition of a disciplinary sanction.

At any point in the process prior to the Adjudicatory Board’s adoption of finding of fact and conclusions regarding the alleged violation(s) of the AIPG Ethics Code, the respondent member can resign his or her membership or an applicant can withdraw the membership application, thus terminating the process with no findings of fact or conclusions regarding the alleged violations having been reached. This is the most common conclusion to proceedings in which violations appear to have occurred. Resignation or application withdrawal prior to the formal findings of fact and conclusions regarding the alleged violation(s) means that the other professional organizations with Codes of Ethics or Conduct to which the respondent belongs and/or applicable licensing boards cannot cite the AIPG’s actions as grounds for their own disciplinary actions.

Each year, the Ethics Committee Chairman prepares a summary of the disciplinary proceedings occurring during the previous year that is published on AIPG’s website under “Ethics.” The summary generically describes the character of the allegations and what actions were taken (i.e., dismissal; formal charges; resignation; sanctions imposed, if any; etc.).

Review of AIPG’s and AusIMM’s Experiences in Enforcing their Codes of Ethics

The cumulative annual summary of AIPG’s disciplinary actions provides a basis for evaluating AIPG’s enforcement activity from 1995 through 2004. During this 10-year period, AIPG:

♦ received 16 allegations of misconduct;
♦ took action in 7 cases:
  • 2 ended in member resignations;
  • 1 application was withdrawn; and
  • 4 letters of private admonition were issued.
♦ 7 cases were dismissed for lack of violation or insufficient evidence provided to determine whether action was warranted;
♦ 1 case was dismissed following legal review due to evidentiary problems; and
♦ 1 case was “not proved” (a Scots judgment) although the evidence acquired suggested questionable activity probably occurred.

Don Larkin, the AusIMM CEO presented a talk, “Enforcing and Revising Ethics and Complaints Requirements in the AusIMM,” to “Professions Australia Ethics and Complaints Requirements in Action Workshop,” Wednesday 24 March 2004, that provided similar information for AusIMM for 1995 through 2004. The AusIMM data are:

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The following case histories illustrate some of the types of ethics code violations that have been determined. In considering violations of a code of professional ethics or conduct, one must keep in mind that not all violations are of equal severity or involve similar levels of actual or potential harm to the public. The first three case histories illustrate this point.

Case Histories

The following case histories illustrate some of the types of ethics code violations that have been determined. In considering violations of a code of professional ethics or conduct, one must keep in mind that not all violations are of equal severity or involve similar levels of actual or potential harm to the public. The first three case histories illustrate this point.

Failure to have a required license:
from time to time an AIPG member has been found by a state licensing board to have violated that state’s licensing provisions by living in or practicing in a state that requires a Professional Geologist’s license (or its equivalent) without having that license. Where the resulting state action involves only the failure to have the license and does not include any allegations of unprofessional or unethical practice, AIPG’s practice has been to issue a letter of private reprimand reminding the respondent of the Ethics Code provision that members should comply with all applicable laws and regulations. Because no actual harm to the public has been alleged, the applicable sanction should not be great. Repeated

2. I obtained a copy of Larkin’s PowerPoint™ presentation off the web, but it is no longer available. Those wishing a copy can get one by writing me at dmagede@msn.com. Larkin informed me that his data was valid through the end of 2004 although his presentation was made in March 2004.
offenses of this type could warrant more severe sanction.

Disputes involving interpretations: a couple of AIPG cases have involved disputed interpretations between two or more professionals, and in one case, included allegations that one party called into question the professionalism of the other and vice versa. Disputes over interpretations, when each is based on acceptable data, do not constitute an ethics violation. However, calling the other party’s professionalism into question can be a violation of AIPG’s Code of Ethics.

Failure to pay trade bills: an AIPG member complained that another AIPG member had failed to pay subcontractors’ bills and that the member in question had reputation for failing to pay trade bills. Contracting for work without the intention of paying for it is dishonest and therefore clearly unethical. Billing disputes and/or late payments unfortunately are not uncommon and the circumstances of individual cases vary widely. As a result, establishing the intent to not pay, which is an ethical violation, is quite difficult. In this case, the complaining member was unable to provide sufficient support for his allegations that the member complained about routinely failed to pay his trade bills, and, therefore, no formal action was taken.

The AusIMM enforcement summary cited above also noted that some commercial-type disputes had resulted in allegations that AusIMM’s Ethics Code had been violated. Like AIPG, AusIMM is not a forum for resolving most commercial disputes.

Falsified time sheets on a job led to criminal conviction and expulsion from AIPG: an AIPG member was convicted of overcharging a client by more than $100,000 through submission of false time sheets. Expulsion from AIPG was based on Standards 1.1 and 2.2.

False statements about gold reserves: an AIPG member was president of two small mining companies that had sold investments in gold to investors from a number of states in violation of state securities laws. Thirteen states issued Cease & Desist Orders against the member and the companies. The AIPG complaint alleged that the member’s geologic reports contained unwarranted claims, omitted telling investors about the various state securities actions, and omitted to tell investors of the criminal convictions of two of the member’s associates. Among other representations, the member told investors that the properties contained gold reserves while at the same time telling the County Assessors in the counties in which the properties were located that there were no reserves to avoid paying ad valorem taxes to the counties. Either the reserves existed or they did not; the member could not have it both ways. The charges were presented at a hearing, which concluded that the member had violated Sections 2.1, 2.5, and 2.6 of the Code of Ethics and recommended expulsion from AIPG. Subsequent to AIPG’s expulsion, the member was criminally charged and convicted in connection with these activities.

Copying a former employer’s report and submitting it as new work: an AIPG associate member copied a report prepared by a former employer and submitted it as the associate member’s own, new work. The associate member resigned following the filing of formal charges.

The surreptitious insertion of blank samples during a sampling program: this case history illustrates that some situations require careful ethical analysis in reaching a decision. A mining claim holder complained that BLM geologists had surreptitiously inserted blank samples into the sample group being sent to the claimant’s chosen assayers. This was alleged to be dishonesty, a violation of the principal ethical provision in science (Abbott 2001, 2002, 2004). Inquiry into the matter concluded that the insertion of unidentified standards, duplicates, and blanks into a sample stream is required to verify the adequacy and accuracy of a sample program. The ethical analysis of the situation was (Gert, 1998, 2004):

- The ethical rule being allegedly violated was “do not deceive” or dishonesty.
- The harm done by the alleged violation was increased analysis costs
- The harm avoided by the alleged violation was eliminating the unknown reliability of sampling and analytical processes. The insertion of standard, duplicate, and blank samples in a sample stream is a recommended professional practice used to ensure the reliability of sampling and analytical results. Although the identity of the standards, blanks, and duplicates should be hidden, their existence need not be.

The investigation concluded that the BLM geologists had acted in a professionally acceptable manner by inserting blank samples that were not identified as such in order to determine if the analytical results were reliable. It turned out that the assay results proved that the claimant’s assayers could not produce reproducible or reliable results.

References


Larkin, Don, 2004, Enforcing and Revising Ethics and Complaints Requirements in the AusIMM, a PowerPoint™ presentation made to “Professions Australia Ethics in Action Workshop, Wednesday 24th March, 2004, Old Parliament House, Canberra: I obtained a copy from the worldwide web, but it is no longer available.


Reviewed by L. Graham Closs, CPG-07288 and Sue Abbott, AS-001.
Differentiation of Water Sources using Analytical Water Chemistry Data

Derek Morris, John Bryant CPG-09926, and Michael Gehrig

Abstract

Assessment of the groundwater regime at a site can often be at the heart of determining subsurface conditions, especially those related to geotechnical and geological problems. Furthermore, the sources of such groundwater can be more complex than is generally thought, particularly in an urban setting, where additional sources can also be present from man made construction and water leaks of various kinds. A simple and relatively cost-effective tool for analyzing such problems, can be to analyze the water and ground-water chemistry around a site. Three case histories are presented where this procedure has been utilized.

Introduction

In the standard hydrologic cycle assumed by most textbooks (e.g. Wurbs & James, 2002) rainfall and its concentration into surface water is generally assumed to be the source of most groundwater. However in the modern constructed environment, human activity generates additional complications. Furthermore, the movement of the groundwater can also affect the water quality characteristics, even for short travel paths. In areas of the South-West where moderately expansive clays are present, further problems can arise with residential houses built on slab-on-grade foundations. Quite small non-uniformities in groundwater in expansive soil can cause foundation and structural distress, since the standard maximum allowable foundation differential movement is 40 mm. (1.5 in.) for the entire slab length (Ballast, 1994).

The complex nature of groundwater chemistry has been known for some time (Freeze & Cherry, 1979), although initial study in this area was driven by contamination studies, rather than by geotechnical engineering considerations. However, the percentage amount of any chemical present in water samples collected from groundwater, tapwater, pools, and storm drains will have measurable amounts of minerals, which can sometimes differentiate the source, especially as certain amounts of trace elements are usually added to tap water for public health reasons.

Chemical Analysis

Groundwater can be viewed as an electrolyte solution because nearly all its dissolved constituents are present in ionic form. The major constituents are calcium, chlorides, magnesium, sodium, sulfates and carbonic acid. The total concentration of these six major ions normally comprises more than 90% of the total dissolved solids in the water.

The primary reference source of water used for comparison purposes is usually the local drinking tap water. Indeed in many cases the approximate percentage of the various constituents may already be known. For instance in the Dallas metropolitan area, the table above lists the levels of trace chemicals detected in 2000, compared with the amounts allowed by state and federal law, where applicable.

However, at a particular site, tap water may be totally absent as a source of groundwater. Also the concentrations of the constituents are liable to be modified by the geology through which the water has passed, as well as possible mixing of water from various sources.

Table 1: North Texas Tap Water Averages

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Average</th>
<th>Range</th>
<th>Maximum Allowed</th>
<th>Possible Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total hardness</td>
<td>131 ppm.</td>
<td>108 - 179</td>
<td>Natural (calcium)</td>
<td></td>
</tr>
<tr>
<td>Total alkalinity</td>
<td>77 ppm.</td>
<td>48 - 106</td>
<td>Natural (CO₃ &amp; HCO₃)</td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>28 ppm.</td>
<td>8 – 39</td>
<td>Natural</td>
<td></td>
</tr>
<tr>
<td>Chlorine residual</td>
<td>3.15 ppm.</td>
<td>2.8 – 3.6</td>
<td>Water treatment</td>
<td></td>
</tr>
<tr>
<td>Fluoride</td>
<td>0.67 ppm.</td>
<td>0.2 - 1</td>
<td>4</td>
<td>Public health additive</td>
</tr>
<tr>
<td>Nitrate</td>
<td>0.6 ppm.</td>
<td>0.12– 0.80</td>
<td>10</td>
<td>Fertilizer/septic tanks</td>
</tr>
<tr>
<td>Barium</td>
<td>30 ppb.</td>
<td>14 - 46</td>
<td>2000</td>
<td>Drilling additive</td>
</tr>
<tr>
<td>Copper</td>
<td>7 ppb.</td>
<td>0 - 21</td>
<td>1300</td>
<td>Plumbing corrosion</td>
</tr>
<tr>
<td>Lead</td>
<td>4 ppb.</td>
<td>3 - 51</td>
<td>15</td>
<td>Older plumbing</td>
</tr>
</tbody>
</table>

Figure 1
Analysis of a Groundwater Mound under a Residential Structure

The first case history shows a house that had developed diagonal cracking, as shown in Figure 1, to an extent that remedial repairs were being contemplated. The foundation was being adversely affected by a noticeable heave in one corner of the slab foundation, as shown on Figure 2. A number of things could have been responsible for this problem. From a legal point of view, the most important of these was the possibility of an underground water line leak, which state law would require the home-owner’s insurance to cover, and also a pool leak which would be covered by the appropriate warranty.

In order to address the possible causality, some simple water sampling holes were drilled around the property, to obtain water samples for comparative analysis. Table 2 below shows the results from water samples obtained with a standard baler at a depth of around 10 feet, which was sufficiently deep to be in native soil and below any foundation fill.

Resistivity was also lower than either pool or tap water, indicating prolonged contact with fine-grained soils; and the pH was a little less than mains water, indicating some possible mixing with rainwater (which is almost always more acid than groundwater).

In this case, it was recommended that the domestic water lines be tested, and a slow leak was found a short distance away, but linked to the ground water mound by the plumbing trench. Expansive clay soils were also found to be present under the relevant corner of the house, which had evidently been activated by the additional water. Since this eventuality was covered by the homeowner’s insurance policy (including the cost of foundation and structural repairs), the client was unusually pleased with the outcome of this investigation.

Table 2: Trace Element Observations, Case 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Tap Water</th>
<th>Pool</th>
<th>Downspout</th>
<th>Monitoring Hole</th>
<th>Yard Hole</th>
<th>Pool Hole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride (mg/l)</td>
<td>0.67-0.72</td>
<td>0.42 - 1.03</td>
<td>&lt; 0.3</td>
<td>0.81</td>
<td>1.01</td>
<td>0.65-0.87</td>
</tr>
<tr>
<td>Chlorine (mg/l)</td>
<td>1.6 - 3.13</td>
<td>2.5 - 18.0</td>
<td>0.02</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Dissolved Solids (mg/l)</td>
<td>264.0-288.0</td>
<td>599.0 - 720.0</td>
<td>--</td>
<td>944.0-1152.0</td>
<td>684.0</td>
<td>384.0 - 400.0</td>
</tr>
<tr>
<td>Chlorides (mg/l)</td>
<td>46</td>
<td>123.5-134.5</td>
<td>--</td>
<td>122.5-194.5</td>
<td>--</td>
<td>73.5-68.5</td>
</tr>
<tr>
<td>Resistivity (ohm-m)</td>
<td>22.2-22.7</td>
<td>9.3 – 10.9</td>
<td>--</td>
<td>5.05 -5.34</td>
<td>12.2</td>
<td>15.4 – 15.9</td>
</tr>
<tr>
<td>Alkalinity (mg/l)</td>
<td>176.2</td>
<td>50.6 – 85</td>
<td>7.03</td>
<td>703.6-710.0</td>
<td>--</td>
<td>117.6-162.6</td>
</tr>
<tr>
<td>pH</td>
<td>7.85-8.02</td>
<td>7.78 - 7.81</td>
<td>7.03</td>
<td>7.16-8.35</td>
<td>7.50</td>
<td>8.53 - 9.21</td>
</tr>
</tbody>
</table>

In this locality, drinking water was artificially fluoridated, so that the presence of fluorides, the naturally occurring form of fluorine, excludes rainwater as the sole source of the ground water mound. Likewise the very low concentrations of chlorine largely excluded a leak in the pool liner (although chlorine concentrations will dissipate with time and therefore distance, so that this observation is less conclusive at large distances from a pool). Total dissolved solids were reasonably high, as were chlorides and alkalinity (higher than the water supply), which would be consistent with either groundwater or a substantial travel path of mains water through soils.

In this example, a multi-million dollar house was being threatened by a landslide that intersected the front part of the foundations. This property faced a lake that had been privately constructed, and shortly after construction with standard practice for simple piezometers. Inorganic analyses by ERMI Laboratories to EPA method 200.7 gave the following results in Table 3.

Significant Slope Instability Threatening a Foundation

In this example, a multi-million dollar house was being threatened by a landslide that intersected the front part of the foundations. This property faced a lake that had been privately constructed, and shortly after construc-
Sampled groundwater showed calcium concentrations much higher than water supply values, which tended to exclude a rainwater source. Sodium and chloride concentrations were lower than the water supply, which probably excluded line leaks, but implies that any groundwater would be freely flowing without spending considerable residual time in the ground. Fluorides were present, but again below tap water values, and were therefore probably picked up primarily from the soil mineralogy. No chlorine was detected, therefore no nearby tap water. Hardness and Dissolved Solids much higher than reference, also implying a groundwater source. The pH was low, which would normally correlate to a rainwater source, but in this case one of the local water supplies also provided somewhat acidic water, so that this observation was inconclusive - however it did imply that any detention times in the ground must have been reasonably short.

Overall, these results indicated a groundwater source, but one that originated not very far away, and was reasonably freely flowing with short transit times in the subsoil. Subsequent study of the original ground contours from the grading plans revealed a historic drainage gully through the site, as shown on the adjacent Figure 4. This almost certainly acted as a short underground aquifer conducting a certain proportion of the uphill runoff underneath the property. The significance of this observation in this case, was that the responsibility then transferred from the homeowner to the site developer, who had been responsible for the infilling of the original site contours (probably with poor quality fill from the site of the present-day lakebed), and the matter was then referred to legal counsel for adjudication.

**Perpetually High Standing Water**

The third case history involved a developer that had a problem with recurring wetness in a new development. This was evident every time utility trenches were laid out, as can be seen from Figure 5. The question was whether this was simply due to unusual rainfall, or something more, like a water supply pipe, adverse roof guttering directing rainwater to the wrong places, groundwater or runoff from surface drainage. Again, trace element concentration measurements were taken from the water in question, using inorganic analysis by an ICP (“Inductively Coupled Plasma”) technique, and the following results obtained:

<table>
<thead>
<tr>
<th>Parameter (ppm)</th>
<th>Borehole 1</th>
<th>Borehole 2</th>
<th>Denton Tapwater</th>
<th>Coppell Tapwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>163</td>
<td>3260</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>Sodium</td>
<td>61</td>
<td>82</td>
<td>144</td>
<td>--</td>
</tr>
<tr>
<td>Chloride</td>
<td>59</td>
<td>77</td>
<td>435</td>
<td>--</td>
</tr>
<tr>
<td>Fluoride</td>
<td>0.14</td>
<td>0.16</td>
<td>0.26</td>
<td>0.24</td>
</tr>
<tr>
<td>Chlorine</td>
<td>below 1</td>
<td>below 1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hardness</td>
<td>280</td>
<td>346</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>Total Solids</td>
<td>634</td>
<td>664</td>
<td>234</td>
<td>182</td>
</tr>
<tr>
<td>pH</td>
<td>6.8</td>
<td>6.8</td>
<td>8.2</td>
<td>6.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter (ppm)</th>
<th>Local TapWater</th>
<th>Seepage Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>27</td>
<td>130</td>
</tr>
<tr>
<td>Sodium</td>
<td>12</td>
<td>310</td>
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<tr>
<td>pH</td>
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<td>7.3</td>
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In this instance, chlorine concentrations were below detection in both cases, so this parameter was inconclusive (there was no pool on the property anyway, so this could be excluded as a source). The pH measurements showed it to be significantly more alkaline than rainwater or even local tapwater, thereby excluding local rainwater as a possible source. Concentrations of calcium, sodium, chloride and fluoride were all higher than tap water, so these could really only have come from the soil mineralogy. Likewise levels of hardness, dissolved solids, and alkalinity were also significantly above either tap water or rainfall levels, which again implies substantial leaching through long distances in the soil, rather than short transport distances from surface run-off or water leaks. Further substantiation was shown by the conductivity which was much higher in the sampled water, consistent with considerable transport through permeable media.

As a result, it appeared likely that the explanation was perched water seepage at this site, from subterranean sources. This was later addressed by further hydrogeological studies, which confirmed this assessment. As a result, responsibility could not be placed upon any individual homeowner or builder, and it became necessary to accept that subground seepage resulting in a high water table was simply a generic problem here.

Conclusions

Water chemistry measurements can be a significant help in identifying groundwater sources, both from a geologic point of view, and from an engineering point of view in terms of decision making. In the view of the authors, the technique is significantly under-rated in current practice, as the method is generally not expensive for the most commonly encountered chemical components, particularly if carried out on a routine basis by laboratories which perform water analyses for other purposes. Of course, there are dangers on overly simplistic interpretation of the results - in particular care must be taken to allow for possible changes in the geochemical composition, based on travel path and time. However such analyses can represent a very cost-effective way of addressing questions that might otherwise require a much greater level of exploration.

References


Derek V. Morris, John T. Bryant, and Michael D. Gehrig are consulting geotechnical engineers and geologists at 2033 Chenault Drive # 150, Carrollton, TX 75006. Their website is www.geoneering.com

Peer Reviewed by AIPG Associate Editors: Inge R. Brady, CPG-05029 and Douglas J. Perisutti, CPG-10055.

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2005GIP13 — Potential changes in ground-water flow and their effects on the ecology and water resources of the Cape Cod National Seashore, Massachusetts. Masterson, John P.; Portnoy, John W.

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Researchers at Rensselaer and Australian National University have found new evidence that environmental conditions on early Earth, within 200 million years of solar system formation, were characterized by liquid-water oceans and continental crust similar to those of the present day. The researchers developed a new thermometer that made the discovery possible.

“Our data support recent theories that Earth began a pattern of crust formation, erosion, and sediment recycling as early in its evolution as 4.35 billion years ago, which contrasts with the hot, violent environment envisioned for our young planet by most researchers and opens up the possibility that life got a very early foothold,” says E. Bruce Watson, Institute Professor of Science and professor of geochemistry at Rensselaer.

According to Watson, the research provides important information and a new technique for making additional discoveries about the first eon of Earth’s history, the Hadean eon, a time period for which still little is known. The findings are reported in the May 6 issue of the journal Science.

Watson collaborated with co-author T. Mark Harrison, director of the Research School of Earth Sciences at Australian National University and professor of geochemistry at UCLA. The work was supported by the National Science Foundation, the Australian Research Council, and the NASA Astrobiology Institute.

Watson and Harrison developed a new thermometer that involves the measurement of the titanium content of zircon crystals to determine their crystallization temperature. Zircons are tiny crystals embedded in rock that are the oldest known materials on Earth. Zircons pre-date by 400 million years the oldest known rocks on Earth. These ancient crystals provide researchers with a window into the earliest history of the Earth and have been used to date the assembly and movement of continents and oceans.

“Zircons allow us to go further back in geologic time because they survive processes that rocks do not,” says Watson. “Although they measure only a fraction of a millimeter in size, zircons hold a wealth of information about the very earliest history of Earth.”

In Watson and Harrison’s work, zircons from the Jack Hills area of Western Australia ranging in age from 4.0 to 4.35 billion years were analyzed using the thermometer. The new temperature data supports the existence of wet, minimum-melting conditions within 200 million years of solar system formation, according to the researchers. In the Science paper, the researchers discuss how the thermometer provides clear distinction between zircons crystallized in the mantle, in granites, and during metamorphism, thereby providing consistent information about the conditions on Earth during the crystals’ formation.

Watson describes his research as “materials science of the Earth,” because it involves designing and executing laboratory experiments at the high temperatures and pressures found in the Earth’s deep crust and upper mantle.
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