

TPG

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THE PROFESSIONAL GEOLOGIST

MAR/APR 2006



AIPG 43RD ANNUAL MEETING

“SUSTAINABILITY”

Saint Paul, Minnesota
September 23-28, 2006

HOSTED BY THE MINNESOTA SECTION OF AIPG

“Minnesota Rocks in 2006”

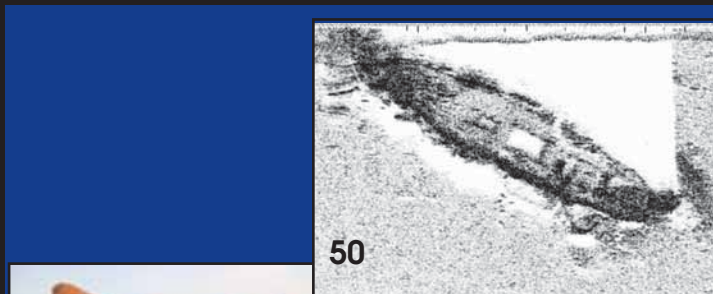
Join us September 23-28, 2006, at the historic St. Paul Hotel in downtown St. Paul, MN, our Capitol City. Downtown St. Paul is a blend of historic stone buildings worthy of a walking tour and an exciting modern entertainment district oriented to the Mississippi River and including the Science Museum, the Minnesota History Center, the Fitzgerald Theater (home of a Prairie Home Companion), and Xcel Energy Center (home of the Minnesota Wild). And, of course, not far away is the Mall of America. Experience what “Minnesota Gneiss” —oops, make that “Minnesota Nice,” is all about.

The theme of “Sustainability” includes natural resources, the geologic profession and its role, and science and society in general. Minnesota is a state rich in natural resources including ground and surface water and metals. It is also rich in geologic features like the Glacial Lake Agassiz, the Iron Range, and the Forest City Basin. Exploration and exploitation are transforming into sustaining and retaining.



Be a Minnesota rock star along with Bob Dylan and Prince and come to St. Paul after the heat of summer and before the snow flies (although we can not guarantee that).

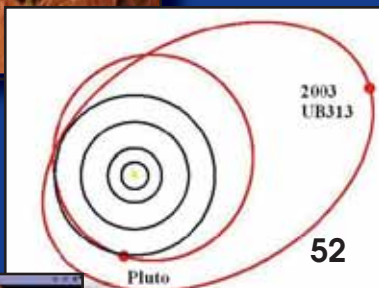
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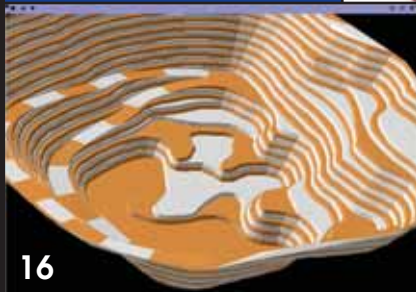
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ON THE COVER — View looking west across Cloud Peak Lake in the Bighorn Mountains, Wyoming. See article in this issue of TPG by Rahn et al. Photo by Perry H. Rahn, CPG-03724.

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For AIPG news and activities go to www.aipg.org.

EDITOR'S CORNER



**Ray Talkington, CPG-07935,
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I have just returned from the ExComm Meeting in Tucson and feel thoroughly refreshed, at least for a week or so! We had a great meeting at the Convention Center that was the host location for the Tucson Gem and Mineral Show. Our meeting was held in the ballroom that was decorated for a function for the Canadian contingent. It was decked out in red maple leaves (not oak leaves). We were gone before the Canadians arrived, too bad for us!

We have challenges and changes facing us this year. For example, how do we best mesh the mission of AIPG with the roles and functions for each state that has licensure? Do we require an examination (i.e. ASBOG or equivalent) as part of the CPG application process because so many states require passage of this exam as part of their license process? Read further in this issue of TPG to get a sense of the happenings for this coming year.

Oh, do not forget that all new CPG applicants who start their application process on or after July 1, 2006 must participate

in the continuing professional development (CPD) program. I encourage all CPG members to visit the CPD information and tracking form on the AIPG web page and fill it in with your continuing education information. You do not know how to log in or forgot your login and password – call AIPG Headquarters at (303) 412-6205 and speak to Cathy or Wendy. Try this out and send me any comments or suggestions.

We should all be getting ready for the Annual Meeting in St. Paul, Minnesota this fall. Check out the notices in this issue of TPG and participate in what is sure to be a great meeting in a great state.

We are always looking for articles, member information, photographs to grace the cover of TPG, and all other comments from you. Please send them to Wendy Davidson (wid@aipg.org) or me (rtalkington@geospherenh.com).

I hope you enjoy this issue. Did you notice any changes?

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.

ARIZONA

Fall 2005 Field Trip: On November 12, 2005 AIPG Arizona Section members and guests met in Tucson for a field trip to the Tucson Mountains. The trip was guided by Dr. David Kring, geology professor at University of Arizona. A book written by Dr. Kring on the geology of the Tucson Mountains titled “Desert Heat-Volcanic Fire: The geologic history of the Tucson Mountains and Southern Arizona”, was used as a guide. We met at the Gates Pass parking lot and climbed up for a view of the western portion of the mountains and a discussion of the Cretaceous Tucson Mountains caldera and surrounding Paleozoic sedimentary rocks. The caldera has a central core of Amole granite, and associated volcanic deposits of welded tuff and chaotic breccia. The breccia is most impressive for the size range of the sedimentary clasts introduced during collapse of the caldera walls: some clasts are up to ½-mile long (see photograph). A 1½-mile hike up to an overlook of Gates Pass and the mountains gained us a perfect spot for lunch.

Following lunch and concluding remarks by Dr. Kring, we hiked back to the parking lot. Tucson geologist Bob Scarborough then guided us north to the Sus Picnic area in Saguaro National Park. Bob showed us the contact between Paleozoic limestones and the Cretaceous Amole granite, and discussed in detail a skarn deposit formed by contact metamorphism of the limestone. We examined large chunks of magnetite and garnets close to the contact and coarse marble at a greater distance from the contact. As sunset approached the trip concluded with a brief stop for some guests at a petroglyph site. Many of us met at Lil Abner’s restaurant north of Tucson for dinner and drinks to end a wonderful field trip. This was one of our best-attended field trips in a couple of years; 25 members and guests participated in the hike (see photograph) and 16 met for the evening dinner.

The next meeting of the Arizona Section includes a social event and dinner at Guadalajara Grill in Tucson on February 10, and a business meeting on February 11, at the Arizona Geological Survey office, followed by a visit to the Tucson Gem & Mineral Show. Everyone is invited to attend.



AIPG SECTION NEWS (continued)

HAWAII

Some new photos with captions courtesy of the USGS Hawaii Volcano Observatory website.



2 December 2005 - East Lae'apuki and Pu'u 'O'o. Closer view lava spilling from tube and flowing down fan created by the stream. Note that stream flows into a new tube that is being created by cooling of the surface of the lava. 1023.



Incandescent hole at MLK vent at southwest base of Pu'u 'O'o. Hole is 1-2 m across. 1201.



16 December 2005 - Growing lava delta and collapsing Pu'u 'O'o. Aerial view looking west at new East Lae'apuki lava delta, built in scar left after collapse of original delta and adjacent old sea cliff on November 28. 0915.



Slump blocks on south rim of Pu'u 'O'o's crater. Most of the south rim of the cone is badly cracked and waiting to fall, and gaping cracks also cut the south flank of the cone below the rim. 1048.



22 December 2005 - East Lae'apuki and Pu'u 'O'o area. Long-shore view of East Lae'apuki lava delta, looking east. Almost all of this delta has been rebuilt since the collapse of November 28. 1249.



Low-level fountaining in East Pond Vent on floor of Pu'u 'O'o. Image taken through thick fume, which enhances red color. 1329.

Mark W. Rogers, CPG-08926

NEVADA

2005 Year in Review: The 16th annual AIPG Exploration Round Up was held at the Holiday Inn in Reno on December 13, speakers from Bravo Resources, Miranda, Newmont, Agnico Eagle, AuEx, New West, and Nevada Pacific gave presentations. Eklund Drilling was our sponsor and Mark Stock, Global Hydrogeologic Services, providing door prizes.

The address given by Eric Seedorff at the GSN meeting in October concerning the declining state of Economic Geology at our major universities was timely and provident, especially given the rise in commodity prices over the last year.

Education is the key to reversing this trend, and the GSN/AIPG sponsored K-12 Earth Science Field Trip Grant program is a step in that reversal. Last year, teachers from 23 different Nevada schools led over 2000 students in 32 separate field trips, supported by the \$6,662.00 grant. Field trips included the Hazen diatomite mine, Spring Mountain Ranch Park, Red Rock Canyon, Nevada

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Sate Museum, Sand Mountain, Mono Lake, Mt Gilead, the William Keck museum and the Coloma gold mining education center, to name just a few. D. D. LaPointe, who serves on the GSN education committee, advises me that this year, there have been requests from 33 schools for grants. This program is certainly popular and the continued, demonstrable success of the program should attract a corporate sponsor when the three-year commitment of AIPG funding expires.

The Nevada Section of AIPG sponsored a fall Career Days at UNR. Leslie Rumph, Coordinator of Student Services at UNR, and Jon Price provided the logistics. Speakers included Mark Stock, Debbie Struhsacker, Kel Buchanan, Earl Abbott, Chet Lide, Opal Adams and Geotemps. The program was excellent; the turnout of students could have been better.

After June 30, 2006, the AIPG will require all applicants who wish the CPG title to submit proof of continuing education. This requirement will not affect present members of AIPG, but if you know someone who is considering joining, you may wish to hurry them along. As long as you get your sponsors lined up and get your application in before that date, you come in under the old rules. For grandfathered members, the requirement is voluntary; the web-site has been reworked and is very user friendly.

Kel Buchanan, CPG-06058

NEW MEXICO

Ray DeMark, owner of the Blanchard Mine, Ginger McLemore, CPG, New Mexico Bureau of Mines and Geology, (and photographer Bill Siok) on November 29, 2005. These geologists were at the Blanchard Mine in Bingham, New Mexico to collect more than 300 pounds of mineral specimens to be used as handouts to K-12 students at the 2006 Tucson Gem and Mineral Show at which AIPG staffs an educational exhibit in conjunction with Arizona Section members. Ray Demark generously accompanied McLemore and Siok to the mine, admitted them to the most productive areas, helped to mine the specimens, and donated his time and the minerals to AIPG.

KENTUCKY

Greetings colleagues and associates. The first thing I would like to do is extend a hearty thank you to all of you who contributed to making the 2005 AIPG national meeting a success. Hosting the event was much more labor intensive than we imagined, and I can assure you that we could not have pulled it off without the help of those of you who supported our cause.

Although I have been practicing geology in Kentucky for a little over 15 years, I have only become active in AIPG in the past 5 years or so.

In that time period I have served two consecutive terms as treasurer and am currently ending my tenure as president-elect. I have been elected president for the Kentucky Section of AIPG for 2006.



Top photo: Ray DeMark is in the Blanchard Mine, Bingham, New Mexico. Photo above left is Ginger McLemore, CPG, standing at the entrance of the mine and the photo on the right is outside of Blanchard Mine.

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

NEW POLO SHIRTS! - Port Authority, 7-ounce heavyweight pique, 100% cotton, garment washed, welt collar and cuff, double needle stitched, side vents, and horn tone buttons. Colors: Seafoam Green and Black with AIPG lettering with pick and gavel. Sizes: XS-6XL. Price: \$29.00 (XS-XL) / \$31.00 (2XL-6XL)



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Accepting this position is a little out of the norm for me, as I typically maintain a low profile. But since I have become active in AIPG, the importance of having an organization such as this has become more apparent. As most of you know, AIPG serves the geologic community by promoting professionalism, ethics and integrity. AIPG is charged with preserving and promoting geology by way of monitoring, and when necessary, influencing legislation and promoting professional awareness. Our section also provides scholarships to college students to help further their education, and serves as an intermediary between members of the profession the public, and in some cases, regulatory and governmental agencies. I envision AIPG as being one of the protectors of the profession of geology.

An "outsider" might wonder just how many organizations any given profession should have. An "insider" knows that although there are several, each plays an important role in promoting the practice of geology. It is important that we recognize that the whole is the sum of its parts, and realize how important it is for each part (organization) to work toward common goals intended to promote geology. Geology is composed of many areas of specialty, much as a chain is composed of many links. The chain, as you well know, is only as strong as its weakest link. This is why geologists need to pool resources and to form a strong front that will protect our profession and ensure the continued competency and professionalism of those employed in our field.

An example of professionals coming together to accomplish a common goal is the (relatively) recent passage of Senate Bill 141: the Geologist-in-Training (GIT) Bill. This was a great accomplishment indeed. But we need not stop there. Monitoring legislation is a never-ending process and the more "watchful eyes" that we employ, the better. Sadly, however, only 10 to 15 percent of our members are currently active within our section. While we recognize that all members may not be able to attend every meeting, the marvels of modern technology make it very easy for us to communicate in ways that were not available a decade ago. I would like to encourage all of you to attend meetings whenever possible. If you are not able to attend the meetings, please feel free to submit comments and suggestions to any Executive Committee member, using one (or more) of the meth-

ods of communication that technology has afforded us. We are always glad to see new faces and welcome any comments and/or ideas that you feel need to be addressed. I look forward to meeting more of our members and anticipate a year that will have many challenges, and, I hope, many more accomplishments. I would like to challenge each of our members and associates to take pride in our profession and take charge of your future. AIPG serves as your voice and offers us a way to institute change.

Be a part of it!

Tim L. Crumbie, CPG-10433

MICHIGAN

CMU Student Chapter

Greetings all - I met with the President of the CMU Student Chapter of AIPG. They are really looking to invigorate the section this year and want our help. They are specifically looking for 2 things:

- 1) Field trip opportunities; and
- 2) Technical/professional speakers for meetings.

On field trips, these could fall in one of 2 categories:

- a) A localized day trip in mid-MI to a site of interest or where there is some drilling/wells/investigation going on.
- b) A more "significant" site which they may plan a more formal "field trip" to, such as a quarry up in Leelanau.

AIPG SECTIONS

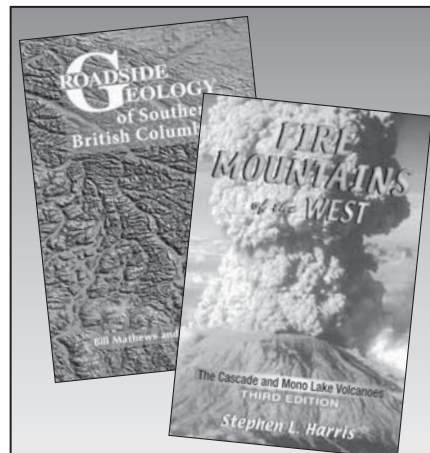
Send in your sections news to be included in TPG. Others sections are interested in what you are doing. Please include the AIPG Headquarters office when sending out your section newsletter.

THANK YOU

For presentations, the students want to have some working professionals come in and talk about some interesting projects or experiences. The Section has its meetings on Thursday evenings.

Please give these areas some consideration and let me know if you can help out. For presentations, please let me know topic and commit to a date and I will coordinate with the students. Same for field trips - place, date and activity.

Eric E. Wallis, CPG-09518



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Comments on Michael J. Urban's "Setting the stage for disaster: A look at the conditions surrounding Katrina's landfall in New Orleans" in AIPG TPG, Jan/Feb 2006

I am a former USGS Texas District hydrologist and stream gauger, University of Arizona Water Resources Research Center urban hydrology researcher, and ICLEI climate change and urban heat island consultant, Texas floods and hurricanes landfall survivor, USAID-contractor environmental advisor for the December 26, 2004 tsunami reconstruction in Aceh (Sumatra, Indonesia) and Sri Lanka, and attendee to the National Building Museum symposium on "Building in the Aftermath: Housing in the Wake of Katrina and Other Disasters." I have loved working and recreating in New Orleans and Southern Louisiana, and I have great respect for the people and culture of Louisiana and the many geologists and other professionals and technicians who have worked so hard for so many decades to make New Orleans physically sustainable. As such, I was pleased to see Perry H. Rahn's "Floods in Rapid City vs. New Orleans" and Michael J. Urban's "Setting the stage for disaster: A look at the conditions surrounding Katrina's landfall in New Orleans," TPG, v. 43, n. 1, JAN/FEB 2006.

The August 2005 Katrina Hurricane was the costliest, most destructive, and worse natural disaster in the U.S. It was long predicted by geologists, architects, engineers, planners, FEMA, and laypersons, ranking with the two-top U.S. disaster predictions (an earthquake in San Francisco, a terrorist attack on New York City). New Orleans, averaging several feet, but several yards in some places, below sea level in the only U.S. city built or evolved within a dynamic delta. I concur with Urban that "The two primary reasons New Orleans was particularly affected by Katrina are: 1) the Gulf of Mexico was unusually warm allowing the hurricane to intensify as it approached the coast of Louisiana, and 2) the geographical and geological setting of New Orleans is conducive to flooding." In addition, contributing factors include: 1) geological sinking of the delta and barrier islands (due to the weight of deposited sediments and alterations of barriers) and erosion of its coastward wetlands and barrier islands (by storms, salt-water intrusion, oil-field and road development); 2) global climate change or other mechanisms which apparently warm up the Gulf; 3) a large, dense, year-round population in New Orleans resulting in human-induced adverse consequences; and 4) lack of a well-organized, communicated, tested, and practiced emergency evacuation plan.

For decades, the fundamental engineering question for New Orleans, The Crescent City, has been, "How big should the levees be and where should they be?" New Orleans' levees (originally dredge spoils, soil and riprap to protect agricultural land), complex canals for drainage control, and large de-watering pumps to drain lake and canal overflows have helped keep the City afloat and generally dry, but they have not been enough. More is needed than thinking levees, canals, and pumps alone would protect this "fool's paradise." These are several recovery options: 1) appropriate and prudent landuse planning, zoning, and enforcement; 2) engineering solutions; 3) geomorphic solutions; and 4) weather modifications. Perhaps there are others as well.

Landuse planning and zoning include: staged resettlement as areas of the city becomes engineered for flood protection; non-resettlement of the most flood-prone areas; judicious siting and construction standards for power plants, refineries,

industries, and infrastructure; better management of industrial and human wastes; improve building and other structure standards; and design, implementation, and training and awareness of emergency evacuation plans with appropriate open routes and transport. Engineering solutions include: monitoring, surveillance, and maintenance and repair and upgrading of flood control measures, buildings, and other structures; internal and external redundant and reinforced concrete levees on suitable foundations; internal and external steel seawater walls and flood gates; rerouting drainage and upgrading canals and pumps; installation of permeable pavements to reduce runoff; and runoff reduction, harvesting, storage, treatment or reuse and disposal. Geomorphic solutions include: monitoring and restoring fragile wetlands and offshore barrier islands; and build up the land surface to reverse the earth's fastest disappearing landmass. Weather modifications include: weather monitoring and communication (which is already well done but can be improved for accuracy); research in artificial Gulf cooling (ice, dry ice, liquid nitrogen); research in hurricane identification, tracking, and artificial control; and research in reversing climate change (carbon sequestering by reforestation, wetlands restoration, capturing and pumping ambient carbon dioxide for agricultural use or deep groundwater injection, increasing the solubility of carbon dioxide in sea water by adding iron) and urban heat island mitigation (lightening of urban surfaces, tree planting and maintenance, reduction of greenhouse gas emission).

Barney P. Popkin, CPG-06547
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Media, Myths and Editors

When Harry Bryden and two colleagues reported in the December 1, 2005, edition of the British journal *Nature*, that they had detected a general warming in the oceanic circulation in the North Atlantic (the Gulf Stream) which was leading to a slowing of the current, the discussion among geoscientists and others also warmed up. That global warming could lead to global cooling was postulated in *Discover* magazine over two years ago, when it was recognized that rapid fresh water melt from the Arctic may have slowed the Gulf Stream conveyor belt, causing the "little ice age" between 1350 and 1850. Jane Smiley fictionalized the effect of such cooling in her novel *The Greenlanders*.

When the American Geophysical Union met in San Francisco 6 days later on December 6, some of the 12,000 international scientists at the Moscone Center were speculating about icebergs off Bermuda by 2010. What seemed of most concern to the European contingent, of course, is that with a lessening warming effect of the Gulf Stream, the continent will undergo some devastating changes in agriculture and living standards.

The science of thermohaline circulation will be debated for years. What is of more immediate concern to me is how various outlets of the print media can take a nationally syndicated story such as this, and by means of précis or omission, change the entire meaning of the story.

As an example, the *Los Angeles Times* ran a featured December 1 story summarizing the British study. The story ran sixteen paragraphs and was picked up in its entirety by the San Francisco Chronicle. If a reader were to read only the first eight paragraphs of the story, one would see the following quote: "The result is alarming, wrote Dieter Quadfasel, a climate expert at the University of Munich..." The findings provide "worrying support for computer models" that could disrupt the way the planet regulates heat. The eighth paragraph concludes "Scientists did not expect to see such changes so soon." By reading only the first eight paragraphs, the reader would come away with the impression that the authors have concluded that catastrophic events may be in the offing.

The ninth paragraph starts "Scientists differ on the potential effect." Indeed the

next quote by Quadfasel states: "My guess is that there would be no overall cooling, just a slowdown in the warming". The article concludes by discussing measurements taken by the Bryden at England's National Oceanography Center, which show that while the northward flow of warm water in the Gulf Stream has not changed, the return of cold water south has slowed by 50 percent and more water is now recirculating towards the Bahamas instead of flowing north to make a full circuit of the current system.

Media outlets are at liberty to print what they like and some stories have to be shortened because of available space. Certain print media, such as *Reader's Digest*, are very good at shortening the story without changing the meaning. In the above case, however, the San Francisco Chronicle chose to run the full Los Angeles feature; the Reno Gazette Journal chose to run just the first eight paragraphs of the story. A reader with access to only the Reno newspaper would have come away with a far different view of the situation in the North Atlantic, a view that reinforces the disaster scenario.

Those in the scientific community do need to be aware of is this type of misleading reporting professional organizations should monitor stories such as these and correct them by bringing pressure on the editorial boards of offending newspapers. If you see an article that strikes you as wrong, perhaps it is. There is little point for professional organizations to pursue geologic education for the public good, if the story is distorted. Beware, however; remember, no good deed goes unpunished, and even finding obvious evidence of chicanery has to be presented in a such a way as to promote change, not to make enemies.

**Kel Buchanan, CPG-06058
Reno, Nevada**

Oil Rant

While I appreciate Mr. Shumaker's efforts to inform the general public on matters of oil and gas supply and demand and recognize that the "rant" was not intended to be a professional work, I still have to take exception to a number of statements regarding "ANWR".

He is confusing the 1002 area of ANWR with ANWR. The 1002 area is the only portion of ANWR that is considered for potential exploration and comprises

approximately 1.5 million acres of coastal plain lying east of the Canning River and west of the Aichilik River and extending from the Beaufort Sea on the north to the approximately 1000' elevation contour on the south. The ANWR area itself contains approximately 19 million acres, with the 1002 area representing 8% of ANWR. ANWR does contain mountains. The north flank of the Sadlerochit Mountains form much of the southern boundary of the 1002 area and are thus easily visible from within the 1002 area. While there are no trees within the 1002 area of ANWR there are large tracts of forest on the southern flanks of the Brooks Range, portions of which lie within ANWR, and valleys as far north as Ignek Valley (the valley on the south side of the Sadlerochit Mountains) contain small patches of forest.

While I am a staunch supporter of planned and environmentally sensitive exploration and development within the 1002 area, I also support the descimation (sic) of accurate data, so that the opposition cannot use inaccuracies against the industry and exaggerate the "radical" position of development supporters.

Your disclaimer at the close of the article should have been expanded to point out these errors or misstatements for the uninformed among your readership and the general public.

Incidentally, the author is Daniel Yergin.

Thank-you for your consideration of these comments.

**David M. Hite, Ph.D., CPG-08506,
Anchorage, Alaska**

Response

Mr Hite is correct. I did make the geographic error that he has pointed out. I regret the error, especially since mistakes can be intentionally misunderstood as radical opinions. ...my opinions are my own, and are in no way intended as any policy of my employer.

**Matt Shumaker, CPG-07319
Glendale, Arizona**

MEMBERS IN THE NEWS

David Glater, CPG-06583, P.E., has been named a principal at the Denver office at CTL|Thompson (CTL|T), a consulting firm specializing in geotechnical, materials and environmental engineering and testing.

Before becoming a principal, Glater was an associate geological engineer leading business development, technical reviews, group leadership, client services, and mentoring staff. In the past eight years at CTL|T, he has specialized in pre-development geologic and geotechnical investigations, geologic hazard evaluation and mitigation, and geotechnical investigations for foundation design.

A registered geologist in Wyoming and registered engineer in Colorado and Kansas, Glater holds a bachelor of science in geological engineering. He is also a certified professional geologist from the American Institute of Professional Geologists.

Glater is currently involved with a number of associations and boards. He is the Colorado Section Board Secretary with the American Institute of Professional Geologists, a member of the Association of Engineering Geologists and a member of the American Society of Civil Engineers. He is also a past president of the Colorado Association of Geotechnical Engineers.

Over the past 34 years, CTL|Thompson has built a reputable firm known regionally for its expertise in geotechnical, materials and environmental engineering and testing. CTL|T has offices in Denver, Colorado Springs, Pueblo, Glenwood Springs, Crested Butte; and Fort Collins, Colorado; and Dallas and Austin, Texas.

Mark Howell, L.P.G., Appointed to Indiana Board of Licensure for Professional Geologists

Indianapolis, IN - Mark Howell, CPG-09563, has been appointed by Governor Mitch Daniels to serve on the Indiana Board of Licensure for Professional Geologists. The Board ensures competency and integrity in the public practice of geology through the administration of Indiana Code.

Mr. Howell is a Senior Geophysicist at Earth Exploration, Inc. in Indianapolis, where he is responsible for the development and implementation of geophysical services

for engineering and environmental applications. He graduated with B.S. and M.S. degrees from Wright State University in Dayton, Ohio. Mr. Howell is a Licensed Professional Geologist in Indiana and a Registered Professional Geologist in Kentucky. He has served as President of the Ohio Section of the American Institute of Professional Geologists.

Earth Exploration, Inc., is an Indianapolis-based small business that provides geotechnical engineering, construction monitoring, materials testing and exploratory field services.

AET acquires GME Consultants

American Engineering Testing, Inc. (AET) of St. Paul, Minnesota, and GME Consultants, Inc. (GME) of Minneapolis, Minnesota, have entered into an agreement to purchase certain assets of GME. Combining both firms will result in additional expertise, market sectors, and geographic presence, setting the stage for continued growth and success.

Terry Swor, CPG-04097, PG, president of AET, and William Kwasny, PE, president of GME, announced that the positive synergies created from the combined staff will result in significant technical capability and professional talent to fulfill the growing demand for geotechnical, environmental, materials, and forensic services. AET, which has been built on the concept of providing senior professional staff to meet client needs, views the influx of GME staff as a perfect complement to meet the challenges in today's marketplace. For professional service firms, the quality of staff, their dedication to clients and commitment to providing a consistently high level of technical service have a direct impact on the success of the company.

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

SCIENCE IN THE NEWS

from *Sigma Xi*,

The Scientific Research Society

Behind Bush's New Stress on Science, Lobbying by Republican Executives from the New York Times

SAN FRANCISCO, Feb. 1 - President Bush's proposal to accelerate spending on basic scientific research came after technology industry executives made the case for such a move in a series of meetings with White House officials, executives involved said Wednesday.

In his State of the Union message Tuesday evening, Mr. Bush called for a doubling within 10 years of the federal commitment to "the most critical basic research programs in the physical sciences."

The president's science adviser, John H. Marburger III, said Mr. Bush would request \$910 million for the first year of the research initiative, with a commitment to spending \$50 billion over 10 years. <http://tinyurl.com/7ldp5>

"Tenth Planet" Found to be a Whopper from Nature News

The recently discovered 'tenth planet' of our Solar System is substantially larger than Pluto, astronomers have found.

For many, the discovery that object 2003 UB313 is about 3,000 kilometres across will remove any doubt that it deserves to be called a planet.

"Since UB313 is decidedly larger than Pluto, it is now increasingly hard to justify calling Pluto a planet if UB313 is not also given this status," says Frank Bertoldi, an astronomer at the Max Planck Institute for Radioastronomy in Bonn, Germany, and part of the team that reveals UB313's size in this week's Nature. <http://tinyurl.com/9wxak>

Conflicting Claims on Global Warming and Why It's All Moot from LiveScience

A widely reported study last week said 2005 was the warmest on record. But headlines failed to note that the results were not concrete and a new study out this week challenges the findings.

Whatever the outcome, scientists say it is all moot: Last year was surprisingly warm and the record will fall soon enough.

The latest result came Monday from the National Climatic Data Center (NCDC), which is part of the National Oceanic and Atmospheric Administration (NOAA).

These are the folks that run the National Weather Service. Their study concludes that the global temperature in 2005 can't be statistically distinguished from the record set in 1998. <http://tinyurl.com/b2fud>

Two Firms Receive National Ground Water Association Remediation Project Awards

CDM of Kansas City (MO) and Haley & Aldrich of New York have received National Ground Water Association (NGWA) Outstanding Ground Water Remediation Project Awards.

The awards recognize outstanding science, engineering and/or innovation in the area of cleaning up groundwater and soil.

The \$22 million CDM project competed against others that fell above the median cost for all project entries. The \$2.4 million Haley & Aldrich project competed against others that fell below the median cost for all project entries.

CDM was retained by the city of Wichita to design a system to clean up ground water contamination across a six-mile-wide area that threatened human health, the environment and the local economy.

The resulting Gilbert Mosley Project uses 13 wells and 5.3 miles of piping to extract contaminated ground water for treatment, and "air stripper" technology to effectively treat 1.2 million gallons of ground water a day. Air strippers expose the water to air so that the contaminants - in this case volatile organic compounds including tetrachloroethene, trichloroethene, dichloroethene and vinyl chloride - can escape into the air, where they are vented away.

The project also included construction of the Wichita Area Treatment, Education, and Remediation Center (WATER Center). In addition to housing the water treatment equipment, the center uses the treated ground water in fountains, aquariums, a meandering creek, and irrigation system and other water attractions.

The project was initiated in 1991, and final completion was approved early this year.

"This is an extraordinary project that has deservedly earned much national recognition. Not only have more than 1 billion gallons of contaminated ground water been cleaned to date, this project has the added value of educating the public about the vital role that ground water plays in their lives," said NGWA's Awards Subcommittee Chair Loyd Watson.

The Haley & Aldrich project involved removing the gasoline derivatives MTBE (Methyl tertiary butyl ether) and TBA (tertiary butyl alcohol) from ground water in the area of North Hollywood (CA). The contamination had emanated from a former gasoline station site.

In addition to the challenge of cleaning the ground water in an area that is densely populated and developed, Haley & Aldrich sought to eliminate the contamination with-

out reducing the quantity of water in the aquifer. The site is located within the San Fernando Groundwater Basin, which is the source of the municipal and domestic water supply for the city of Glendale and the Crescenta Valley Water District.

Haley and Aldrich developed a treatment system that:

- * Removed contaminated water from the aquifer.
- * Treated it in bio-activated carbon beds with indigenous organisms.
- * Reinjecting the treated ground water back into the aquifer.

Previously, a lack of confidence in the ability to reliably treat contaminated ground water prevented its beneficial reuse in California. The Haley Aldrich project bucked this trend by getting approval to return treated water to the aquifer.

"This project used ingenuity to tackle a contamination problem and help people in need drinkable ground water. There is no higher calling than that in our industry," Watson said.

For more information, contact Cliff Treyens, National Ground Water Association, 800-551-7379, ext. 554, or ctreyens@ngwa.org.

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AIPG WEBSITE SPOTLIGHT

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 the page. The picture below is what the AIPG website looks like when it first opens with 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:

- Advertisers
- Advertising
- Annual Meetings
- Application Forms and Information
- Associate Editors
- Author Article Instructions
- Awards
- Benefits of Membership
- Bylaws
- Calendar
- CEU Program
- Code of Ethics
- CPD Program
- Corporate Members

- Corporate Membership
- Courses Online
- E-Newsletter
- Earth Science Week
- Ethics Issues
- European Federation of Geologists
- Executive Committee
- Fact Sheets
- Federal Agencies
- Geo. Salary Survey Links
- History of AIPG
- IET Web Resources
- Insurance
- International Reciprocity
- Job Board
- Job Postings
- Links to Other Associations
- Member Website Links
- National Exec Comm
- National Committees
- Policies and Procedures
- Position Statements
- Publications
- Reciprocity Agreements
- Rental Car Discounts
- 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:

- CPD Program - add activity
- 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 wjd@aipg.org. Your comments and suggestions for improving the website are always welcome.

AIPG Competence... Integrity... Ethics...

Home | Directory | Events Select & Go! Member Login | Non-Member Sign up | About Us | Contact Us

About AIPG
Annual Meetings
Benefits
Bylaws
CEU Program
CPD Program
Ethics
How to Join
Job Board
Logo
Policies
Procedures
Sections
Store

Click on the top right drop down menu or the left side index to find the items you are looking for on this website.
Members need to login to use the online directory, pay dues, vote, or view the latest issue of TPG.

The American Institute of Professional Geologists (AIPG) was founded in 1963 to certify the credentials of practicing geologists and to advocate on behalf of the profession.

AIPG represents the professional interests of all practicing geoscientists in every discipline. Its advocacy efforts are focused on the promotion of the role of geology and geologists in society.

Engineering and Environmental Geology Factors and the Rebuilding of New Orleans

In the aftermath of the catastrophic natural disaster resulting from Hurricane Katrina and the ensuing destruction of the city of New Orleans and the Gulf Coastal Region, the American Institute of Professional Geologists (AIPG) invites its members and members of its sister societies and of the geological community at large, to submit articles to be published on the above-referenced title. In specific:

1. What needs to be done to rebuild the City, surrounding communities, and Gulf Coastal Region to provide a safer environment?
2. Ideas for a General Redevelopment Plan to address geologic hazards?
3. What options are available?
4. How do we effectively communicate this information to the proper authorities?
5. What can we do to ensure that the best and recommended practices are implemented?

The AIPG urges its members and affiliates to address this critical topic and to do whatever is possible to reduce or eliminate the impacts of a natural disaster of this magnitude to ever recur in the affected area. Geologic hazards are natural geological processes, but they do not necessarily need to become a human disaster! Let us unite and use our special training and knowledge to prevent a future tragedy like the one we have witnessed in recent days.

Robert Fort
AIPG 2005 President

KATRINA JOB RELIEF
Job Opportunities

Many people have had their lives disrupted by the terrible tragedy caused by Hurricane Katrina. We hope this service can connect those people to new employment opportunities, whether they be full-time, part-time, or temporary; whether they be in Louisiana, Mississippi, Alabama, or elsewhere. This is a FREE service to both job seekers and employers, which is supported by many associations, publishers, and chambers of commerce throughout the country.

AIPG 43rd ANNUAL MEETING

“SUSTAINABILITY”

SAINT PAUL, MINNESOTA

September 23-28, 2006

www.aipg2006.org

CALL FOR STUDENT POSTERS

We cordially invite geology/geoscientist students to share your research and experiences in a poster display.

Participants are encouraged to present exhibits related to our theme of “Sustainability”, however, alternative geological topics will also be accepted.

Some likely topics to be addressed at the meeting include:

- Sustaining the professional and science in general;
- Geologic resources as a foundation for society;
- Disruptive redistributions of geologic materials in the environment;
- Interactions of natural hazards with the human population;
- Education and public policy.

Undergraduate and graduate student Poster Exhibits are welcomed. Travel grants are available (see www.aipg2006.org for application forms and more information)

To submit or discuss poster, contact:

Kate Kleiter, CPG – Exhibits and Posters Chair
651-659-1319 or kkleiter@amengtest.com



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Lawrence C. Weber, CPG-07120

Greetings to All,

Having just returned from a week out of the county – a too brief vacation to the islands – I am reminded of 2 things. One is how fortunate are those who live in a country like the United States of America where there are abundant resources, a vibrant and free economy and a dedicated, diverse work force. Secondly, travel renews my awareness of the grandeur of geology and of the fascination that most people have with the substance of our science. I will not belabor the first observation; after all, Americans should know they have a good thing going compared to the struggles of small island countries. However, with respect to the second, I must ask myself and you as members of AIPG, why is it with the appeal of geology being strong and widespread, that we have difficulty in growing professionally. With the repeated attention to natural disasters, the popularity of dinosaurs, the beauty of mountains, the awesome power of volcanoes, and the critical importance of energy and petroleum, you would think everyone would be quick to recognize, and highly regard, the geologist. Indeed, geologists are, and should be, key players in charting and preparing for the future of our life on this planet. However, we fall short of assuming a prominent role in policy making; we could do a better job of promoting ourselves and positioning ourselves as leaders. There are so many issues affecting our way of life for which geologists are well prepared to soundly address and give guidance, and I am convinced that the public would be quick to support the notion that geologists are both capable and critically needed to assess these all important issues. AIPG has an important role in this regard and must continue to actively promote geology as a profession and to support and

strengthen the role of the professional geologist.

I hope you enjoyed the last issue of TPG, the student oriented issue, as much as I did. Our editor, Ray Talkington, and our Staff at headquarter (Wendy Davidson does most of the TPG layout and preparation) simply outdid themselves. It was a great publication and an indicator of the capability of AIPG to deliver timely, interesting and relevant information to the readers of TPG. We can thank Ray and Wendy most effectively by providing them with things to publish. Here is where every member, student member and/or interested bystander can help by submitting quality material for publication. Of course, please recognize that we are a professional organization and some discretion in content is necessary. Keep the jokes relatively clean and the political or religious material not too offensive, please.

The last strategic planning session for AIPG was conducted in 2001, and we will undertake an initiative to go through that process again this year. During my involvement at the national level with AIPG over the last 10 years or so, I have noticed that we are always talking about AIPG being in a critical stage of transition, or that we are seeking to find new relevance or purpose. With the onset of professional licensing of geologists, some say that AIPG and the CPG are less useful. Some argue over the prospects of requiring examinations for new CPG candidates. There are discussions about academic qualifications for geologists applying for CPG, just as geology departments are becoming less traditional in their course offerings and degree programs. There is increasing fractionalization of our profession and of the professional societies, with the result being less powerful associations

and greater threats of competition being internalized within the profession. We will seek to delve into these and other issues in a planning session that will help solidify the goals and purposes of our institute. While I cannot be sure of the outcome at this time, I am convinced of the following: that the AIPG is here to serve the membership and the profession – not the other way around. We, as individuals, serve the profession and help each other through our service to AIPG. AIPG is not in competition with its sister societies; each worthwhile organization should have a role in the development of professional geologists and we must strive to strengthen our relationships in that regard.

Remember that great things are not done by masses or committees. It is the persistent individual that accomplishes much. Be a leader, make something happen, go find a new member and support AIPG.

Best wishes to all.

Larry

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.



William J. Siok, CPG-04773

AIPG On-Line Reporting System for CPD Activities

Recent AIPG Bylaws amendments establish compulsory participation in the AIPG Continuing Professional Development (CPD) program for those who begin the Certified Professional Geologists application process after July 1, 2006. This new provision has been under consideration for years.

To facilitate easy reporting of compliance, an on-line system is now available on the AIPG website. It is not ominous. In fact, it is a pleasure to use and will make the tracking of professional development activities a breeze.

The CPD program and its details have been described numerous times within the pages of TPG and are always available on the AIPG website. The objective here is not to regurgitate that information, but merely to encourage *all* members, not only the post July 1, 2006 CPGs, to use the reporting system to create a permanent record of all professional continuing education activities. The cost to members for use of the reporting system is zero. As the features of the system are refined to fit the requirements of all practitioners (not only AIPG CPGs), the AIPG Executive Committee expects to make it available to non-members as well.

For the moment, access to the system is limited to AIPG members. Please keep in mind that this system is provided as a service to members. It is straightforward and simple. You are invited and encouraged to begin recording your activities there now. Use of the system is not required, but those who wish to have an up-to-date, easily retrievable, printable, and certifiable record of continuing education activities now have those features available.

It is important to emphasize that the on-line reporting system is not intended for use solely by new CPGs, who will be required to participate. It is intended to be used by any and all practitioners requiring an on-going, certifiable record of CPD activities.

If you have not yet tried the system, please do. You need only go to the AIPG website, select "**CPD Program**" from the left-hand column of the drop-down list on the upper right corner, login, and record your continuing education activities.

For the present, the approved activities are those which satisfy the intent of AIPG Bylaws. Because the AIPG Executive Committee intends to make this system available to all, the list of approved activities will be expanded in the near term to include other requirements as defined by various state boards for maintenance of geologic licensure.

Having a reporting system with such ease-of-use should be an incentive to

use it. If you have constructive comments pertaining to simplification or improvement of the system, please advise AIPG headquarters with particulars.

Members currently using the system are reporting that it *is* a convenience. Only if you log-on and use the system will you also appreciate its simplicity. Members, and non-members in the near future, will find a service here which will diminish the everyday drudgery of keeping track of CPD activities.

Test Your Knowledge

Questions for this issue are:

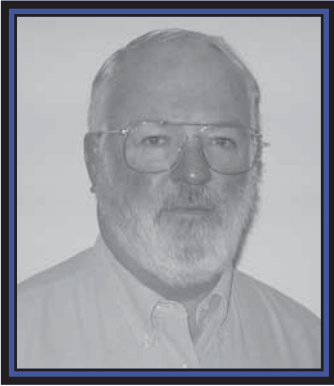
- 1) A basic principle in electrical logging concerns the ability to calculate electrical resistivity (ρ) based on a knowledge of the current input (I), the potential difference (V) and the electrode spacing (r_1 and r_2). Which of the following equations effectively demonstrates this fact?
 - a) $\rho = 4 \pi (V/I) [r_1 r_2 / r_2 - r_1]$
 - b) $\rho = 2 \pi (V/I) [r_1 r_2]$
 - c) $\rho = 2 \pi (V/I) / r_2 - r_1$
2. Which of these minerals would be best to mine to eventually yield brass and bronze?
 - a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 - b) CuFeS_2
 - c) Al_2O_3
3. You are concerned about potential natural disasters involving an enclosed bay area surrounded by massive rock slopes. Which of these would you worry about?
 - a) monadnock
 - b) boudinage
 - c) seiche

Answers on page 42.

AIPG Section Websites

AIPG Section Website links are on the AIPG National Website at www.aipg.org. Click on the top right drop down menu and click on Section Websites.

If your section does not have a website contact AIPG Headquarters to get one setup (wjd@aipg.org). AIPG Headquarters will maintain a website for your section. Several sections (AZ, CA, CO, GA, HI, IL Chapter, NM, OK, PA, and TN) are examples of websites hosted by AIPG National.



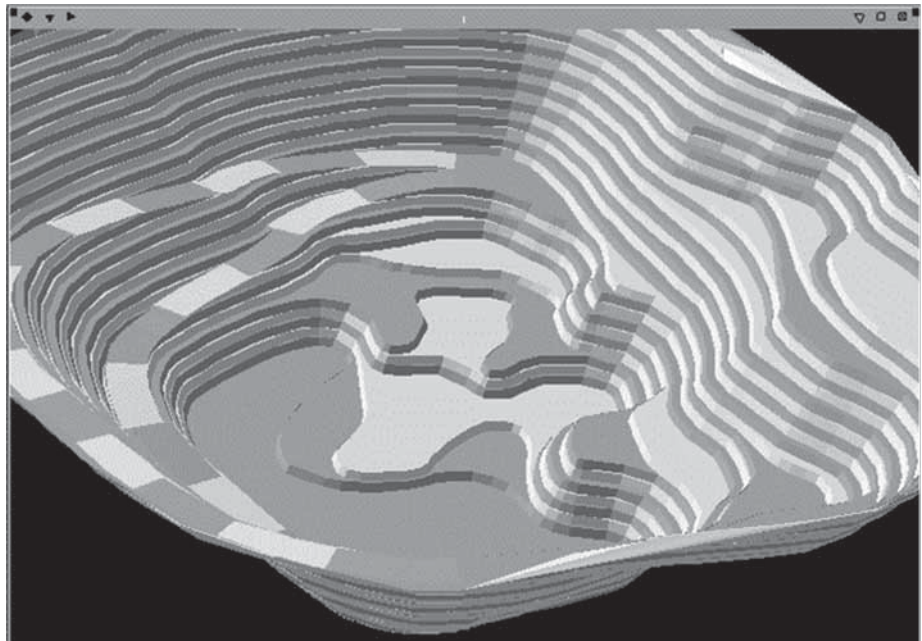
Compiled by David M. Abbott, Jr., CPG-04570,
2266 Forest Street, Denver, CO 80207-3831,
303-394-0321, fax 303-394-0543, dimageol@msn.com

Engineers vs. Scientists

Jan Horbaczewski's (CPG) article, "Engineers vs. scientists," in the Jan/Feb '06 TPG provided an excellent summary of the differences of approach between engineers and other scientists like geologists. If you did not read the article, I recommend that you do so. As Horbaczewski points out in various ways, engineers are trained to supply answers to questions that solve problems. The engineering profession's fascination with equations is a natural result. This contrasts with geologists who are trained to deal with uncertainties and inhomogeneities. There are good and bad aspects of both approaches, but, as Horbaczewski points out, because engineers provide answers, and usually simple ones, they tend to fare better in the commercial world.

There are times I think geoscientists, at least some, suffer from engineer envy. I am reminded of this when I look at the sample questions in the "Test Your Knowledge" feature in each issue of the TPG. Almost all the questions require computation of one sort or another. I suppose computed answers are beloved by test question writers because the answers are unique, but my sense is that too many students and recent graduates today believe that the computer can solve all problems. It cannot, as illustrated by the following open pit mine design, which a colleague of mine downloaded from the website of a firm that creates and sells mine design software.

What is wrong with this mine design? Since most AIPG members are not mine geologists, I would not make you go to another page for the answer. There is at least one, and possibly several, apparently active benches with no haul road access, which is critical if you are going



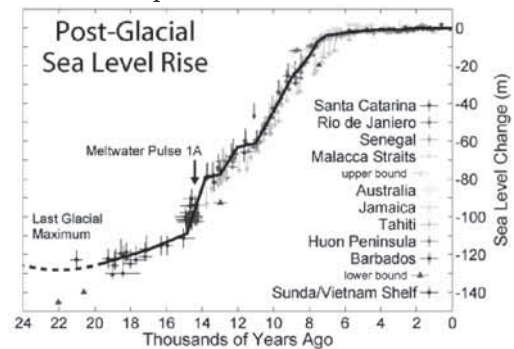
What is wrong with this mine design?

to produce from the bench. The white bench that is the second from the bottom of the pit is the most obvious bench with no access. There are several benches above this one also lacking access roads. While we would need to have the ore blocks shown along with the pit design to know which benches indeed have inaccessible ore, the shape of the benches suggests that there may be several.

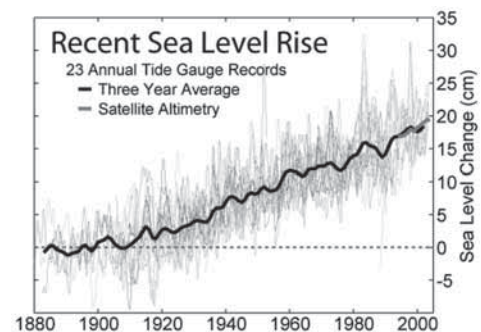
Lies, Statistics, and "Spin" ¹: Sea Level Rise

Thom Fisher, MEM, knows of my interest in examples of the misuse of statistics and alerted me to an example in an article on sea level rise he found in wikipedia.org, http://en.wikipedia.org/wiki/Sea_level_rise (downloaded 12/30/05). Wikipedia, for those of you who are not familiar with it, is an on-line encyclopedia to which anyone can contribute. Until fairly recently, there was no attempt to review the contributions made to ensure that the contributions were accurate. A deficiency that is true of a great deal of material on the web.

This particular article on sea level rise contains two graphs illustrating the article's contention that global warming is causing a rise in sea level. The graphs are reproduced below.



Changes in sea level since the end of the last glacial episode.



Measurement of recent sea level rise from 23 long tide gauge records in geologically stable environments.

1. I have addressed this topic with different examples three previous columns (25, Dec '97; 32, Jul '98; & 33 Aug '98).

Fisher pointed out that the difference in the vertical scale on these two charts differs significantly. The top chart, showing the sea level rise since that last ice glaciation is in meters while the bottom chart of tide gauge data is labeled as being in centimeters. If the bottom chart were included in the top chart, there would be no discernable sea level rise in recent years compared the period from about 20,000 to 7,000 years ago.

The other issue with these two graphs is that tide gauge data does not exist for the past 20,000+ years. The use of two different types of measurement always raises the comparison of apples and oranges question. Can the two data sources be validly compared? What are their respective accuracy and precision? What are the relevant means and standard deviations? But these questions require one to think about data analysis, something few people bother to do, which is why casinos and state lotteries make money.

Lies, Statistics, and “Spin”: Mining Law Reform—Patenting Fee

A proposal to amend the General Mining Law of 1870 prompted a lot of press during the last couple of months of 2005. While I do not want to get into a discussion of the relative merits and faults of the specific bill (which did not pass)—I know a couple of AIPG CPGs who were heavily involved in the proposed bill and comments thereon—I do want to address a false and oft repeated complaint by environmental groups that was widely reported, namely the idea that the proposed bill would have permitted anyone to purchase a patent to mining claims for a specified sum. The falsity of this oft repeated claim is the suggestion that all anyone has to do to patent a mining claim is to stake an unpatented claim and then pay the fee. This is not true. Before a claimant can patent a mining claim, the claimant must first demonstrate that reserves exist on the unpatented claim (or group of claims), a very expensive process (tens to hundreds of millions). The deception involved in these assertions about patenting fees is the failure to include disclosure about the predicate discovery of reserves on the claim before the fee payment becomes an issue. Regardless of your views on mining law reform, or any other issue, I hope that you will insist on honest discussion of the pros and cons of

the issue and a willingness to point out the lies and deceptions promulgated by either side.

Conflict of Interest: Working For and Later Against a Client (or Vice Versa)

The Wall Street Journal of January 3, 2006 carried a story about an attorney who for many years represented boxers suing boxing promoter Don King but who has recently switched to representing King in a case against one of his former clients. The article noted that this side switching was viewed as at least ethically dubious. While this column is not about legal ethics, the situation intrigued me as an interesting conflict of interest question for professional geoscientists. If a geologist were to testify as an expert against a firm or government agency in one case, would it be ethical to testify as an expert for that same firm or agency in another case?

If the fact situations were different and a period of time elapsed between the two assignments, and the parties involved are aware of the previous case, then I expect that most of us would conclude that either there was no continuing conflict of interest or that the disclosure to the parties resolved the issue. However, if as in the case reported, the two sides in the matter were the same and the fact situation was the same, or very similar, would disclosure of the conflict be enough to resolve the issue?

Has anyone faced such a situation? How was it resolved? Assume that the side switching resulted from newly acquired or discovered data of sufficient weight to warrant a change in the geoscientist's conclusions about the subject for which the expert opinion was sought? What difference would this make in your view?

Protecting the Public's Health, Safety, and Welfare—But Does the Public Want Protection?

Standard 2.4 of the AIPG Code of Ethics states, “Members should promote public awareness of the effects of geology and geological processes on the quality of life.” And Standard 2.3 states, “Members should participate as citizens and as professionals in public affairs.” But does the public always

want to be protected, particularly when protection has a financial cost, either to individual members of the public or through the expenditure of public funds? The answers are commonly “No.” and “Why don't you Chicken Little's go away?” A presentation to the Colorado Section, Jill Fredston's *Snowstruck—in the grip of avalanches*, and a *Geotimes* article all included variations on these common answers.

Jon White of the Colorado Geological Survey (CGS) and Ty Ortiz of the Colorado Department of Transportation gave an excellent presentation, “Rockfall hazards in Colorado: a land-use and transportation perspective” to the Colorado Section in December. That western Colorado has a lot of rockfall hazard areas is no surprise to geologists. As White and Ortiz pointed out, the best hazard mitigation is avoidance of the hazard in the first place, but this is not realistic in many cases. Colorado's mountain towns are usually located in valleys that are often bounded by steep slopes down which rocks periodically fall (and landslides and mudslides occur). The need to get from point A to point B by a reasonably straight route necessarily means that many of Colorado's highways traverse rockfall hazard areas (along with avalanches, mudslides, debris flows, and landslides).

While buildings need not be built in hazard areas, they all too frequently are due to limited amounts of non-hazardous lands. The Vail, CO area provides a prime example of homes and condos built at the bottom of, or uncomfortably near rockfall, snow, and mudslide chutes. Glenwood Springs, CO, the site of the 2003 AIPG Annual Meeting, also has rockfall problems. As White pointed out, in 1994 the CGS identified a very hazardous area on the edge of town. In 1995, a 12-foot boulder hit the main access road in the area and bounced into a developed area downslope from the road. Nevertheless, in 1998, a residential development in the area received city approval and the city staff was instructed not to seek further review from the CGS. So homes were built and in 2004 and again in 2005 rocks fell damaging homes. As White concluded, because (1) residential structures imply permanently occupied space, (2) rockfalls are potentially lethal, and (3) homeowners insurance does not cover earth movements of any kind, including rockfalls, “risk tolerance should be very, very low for residential development.” As the

pull quote from a local newspaper summarized it, "Real economic pressures exist to ignore or downplay hazards and reduce or eliminate risk management." Banning development on a tract of land means that the owners have lost economic value through a government action and governments are usually unwilling to pay for this loss.

Jill Fredston's 2005 book, *Snowstruck—in the grip of avalanches*, is her story of her involvement in avalanche study, forecasting, and safety training in Alaska since 1982. She primarily tells her story through a variety of case histories, beginning with an avalanche that destroyed a number of homes and killed one man at the 5.5 Mile settlement east of Cordova. Towards the end of the book, she expresses her increasing frustration that years of training efforts have not resulted in a significant reduction in avalanche deaths by those engaged in winter recreation activities. Her final chapter focuses on the avalanches that threaten much of Juneau and the reluctance of the city government, developers, and individual residents to acknowledge or deal with the resulting past and future property destruction and potential deaths. Fredston's reflections on why individual and public attitudes regarding avalanche hazards are what they are provide a sufficient reason for reading her book. Intellectual knowledge is not enough. Group dynamics, thrill seeking, "it can't happen to me," and other problems get in the way of making rational decisions. Fredston provides some excellent case histories to illustrate her points.

The La Conchita, California landslide on January 10, 2005 destroyed 30 homes and killed 10 people and followed by not quite 10 years another slide in La Conchita on March 19, 1995. According to a report by Gail Gallessich of the University of California Santa Barbara (UCSB), www.ia.ucsb.edu/93106/2005/December5/study.html (accessed 1/10/06), both the 1995 and 2005 slides are small parts of a much larger slide. Although UCSB geologists have suggested that La Conchita be abandoned as a community, with fair compensation to property owners, and converted into beach park, the residents are reluctant to leave. In a November 2005 *Geotimes* article, "Watching for Landslide Weather in California," Raymond Wilson and Richard Pike note that, "The 2005 La Conchita debris-flow tragedy is a painful reminder that a warning system

only addresses half of the problem. Once a warning is issued, how do we encourage people to take action? U.S. residents are not in the habit of simply dropping whatever they are doing and seeking refuge elsewhere, as evinced by the recent hurricane disasters in the Gulf states. Despite warnings, many people remain in dangerous situations out of inertia, denial, or fear of abandoning property. Anxiety is accompanied by a strong instinct to stay close to home and loved ones, even if home itself is threatened. A warning received only on an intellectual level may not be sufficient to override this basic instinct.

"People have even been reluctant to evacuate in the face of an approaching wildfire, but smoke and flames are powerful motivators. While a large fire is undeniable, even from a distance, debris flows declare themselves only when they pounce. Warning signs—small ground fissures, sudden gushes of muddy water—are easily overlooked. Besides, mud seems so benign. Fire is a primal threat; mud is merely a mess. Who runs from mud?"

Geologists have been viewed as Casandras for pointing out such hazards without providing solutions to the problem. Part of the problem is that the only sure, and generally unacceptable, solution for major hazards is avoidance. Fredston and Wilson & Pike note that intellectual knowledge is not enough.



Rock in a Glenwood Springs living room, 2004. The owner of this home had built a relatively small rockfall barrier above the home. The rock entered the home from the right side of the picture. Colorado Geological Survey photo.

Lots of geoscientists live in the San Francisco Bay area. How many of them have earthquake and landslide insurance to deal with the hazards in their area? I do not know the answer, but suspect the answer would be disappointing. The re-building of New Orleans ensures us of another hurricane disaster there because the area continues to sink due to compaction of the underlying sediments.

So, what can we, as a profession, do to solve these problems?

Topical Index to the Professional Ethics and Practices Columns

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

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Universal Features of Geology

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INTRODUCTION

The new Geologic Map of North America (G.S.A., 2005) is mounted and hanging in my office (at home) and I am surely coming to grips with its huge content of what is instantly apparent and of all of the layers of revelation that it offers when closely inspected. In fact, I made some additional financial investments just to make me face the huge positive potential of “dealing with” this magnificent presentation.

First of all, I had the map laminated to bring its two sheets together and to protect its third sheet, the vast stratigraphic legend. Next, I went to a tradesman friend who has boundless talents for fashioning what is needed but not available. This chap fit the map into the retractable mechanism of a former projector screen, and, finally, he mounted “drop” lights to illuminate the geologic map. Then, I got a comfortable stool and also hung the printed Explanation (Reed et al, 2005) in a handy document jacket.

When in Rolla, I brew tea early in the morning and pause a while to inspect the map, sometimes using a magnifying glass. I search the map to extract new levels of personal understanding of that magnificent riddle that is regional geology. And while I firm up these suspicions, I now know truly that what I have seen and encountered in North America, repeats itself somewhere else in the world, mainly

New worlds of geologic understanding open up to me!

“UNIVERSAL FEATURES OF GEOLOGY”

Developing personal concepts of geologic phenomena and features has been a longtime intellectual commitment to

me, actually bordering on an affliction of sorts. Put in words, this concept can be defined as:

“It stands to reason that the fundamental processes of geologic origin of the various rock types, and their structural and stratigraphic arrangements and character, fall from a higher order of earth forces and chemistry that tend to repeat themselves around the world, wherever the continental masses have floated.”

Of course, this late message is just what my UCLA physical (visiting Professor Dr. Donald Lovejoy) geology professor wanted to get across to me in 1956. “So late we learn and so soon we grow old”, according the familiar bastardized German phraseology!

But, of course, those were the days of the elusive “orogenies,” episodes of “mountain building” that explained the greater features of the geologic and topographic landscape; just but years away from the revelations of acceptance of Wegner’s 1928 heresy of continental drift (plate tectonics).

Now it all is “so clear

LEVELS of GEOLOGIC UNIVERSALITY

Given the new geologic map of North America, and Elsevier’s new Encyclopedia of Geology, both published in 2005, I can now see clearly that there are “levels” of universality that we can come to expect in the transfer of what is familiar in our own physiographic provinces, to what we may encounter in world travels, or even in watching our motion picture producers cobble-up geologic reality by blending cheap remote filming areas with what may not match with our knowledge.

Here is how I see those “levels.”

- 1) The master level of drifted and merged plates and accreted terranes;
- 2) Interplate tectonic displacements and non-matching terranes;
- 3) Hot spots, rifts, subducting plates and all of their volcanic provinces;
- 4) Batholiths and metamorphic belts;
- 5) Major sedimentary basins;
- 6) How Cretaceous and later strata are “weak” rock;
- 7) Lithologies point the way to associated engineering susceptibilities;
- 8) How karst features may be vastly old or active today;
- 9) Quaternary modifications of erosion and soil formation;
- 10) The site characterization chaos that underlies formerly glaciated terrane.

NATURAL REGIONAL GEOLOGIC CAVAETS COME to MIND

A little geologic thought brings forth visions of geologic and topographic map signals and remote image features and patterns that now speak loudly to us in calling our attention to the fact that geologic form and anomaly truly are the red flags of cognizance and recognition.

We all know them!

- 1) When we see plutonic rock, we ask “where’s the rhyolite;”
- 2) Expect potential structural damage to rock in the contact zone and strong anisotropic geologic properties and/or characteristics;
- 3) Sight of metamorphism brings to mind the question of aureoles and bands of greater or lesser intensity, as well as the search for the ultimate heat and pressure source;

- 4) Linear features of all kinds evoke the thought of faults and their displacements;
- 5) Circular features call attention to concentrations of interior or exterior force;
- 6) Island masses hovering near by continents or to larger islands draw us to look for submerged connections;
- 7) Metallic ore values are tied to ancient tectonics and mainly to ancient structural damage and displacements;
- 8) Recoverable petroleum hydrocarbons still lurk at great depth in great sedimentary basins;
- 9) Great thrust sheets have and will continue to cover and conceal terranes that harbor great stores of valuable natural resources, and
- 10) We are at the cusp of geologic predictive understanding of the recurring natural mechanisms producing the natural earth hazards that maim and kill people in vast numbers.

DEALING with the CRETACEOUS and TERTIARY SYSTEMS

Generally speaking, the Cretaceous and Tertiary Systems, save for the drama of it being the “stage” from which the dinosaurs disappeared, has an unglamorous and unexciting reputation among geologists. Having said that, however, I consider these rock units to be potentially dangerous “sleeper” when projecting on geologic possibilities of territory with which I have not had direct field experience (Table 1).

SUM TOTAL of QUATERNARY MODIFICATIONS to LANDSCAPE

We should all pause to consider what may meet us in physiographic regions in which we have not practiced. The thrust of my remarks in this article is that each of us has the ability to predict much of what we might expect to encounter. In fact, the ideal mechanism for projecting our developing assessment is that of the “Conceptual Geological Model,” in which expected “Geologic Possibilities”

are melded into a vertical cartoon of the “Geologic Profile” or “Geotechnical Profile” or “Geoenvironmental Profile” that we might expect to encounter.

If we grant that geologic maps on grand scales (such as the new *Geologic Map of North America*) provide gross insights into ten levels of caveats, we should now pause to consider how Quaternary processes tend to modify the landscape about which we are making predictions enroute to our landing on that foreign shore! Table 2 presents a basic accounting of how we might expect certain potential effects on the land brought about by geologic processes of the Quaternary epoch.

SOME UNUSUAL GEOLOGIC “POSSIBILITIES”

Aside from these rules of thumb, there remain a class of “geologic possibilities” that may occur somewhat unexpectedly, regardless of other more formal geologic associations. Some of those that have beset the author are listed in Table 3.

**Table 1
Typical Associations Related to Cretaceous and Tertiary Geologic Systems**

Cretaceous Association	Typical Concerns	Practical Implications
Fluvial Units	Only rarely do these remain in place, as other than buried valley fill, as the former is susceptible to erosion	Only the most coarse conglomerates remain, and then only when sufficiently thick
Alluvial Fan Deposits	Only rarely do these remain in place, as other than buried with valley fill.	Generally present only where rates of uplift exceed those of erosion and climatic influences have notched them with significant river valleys.
Marine Sedimentary units of Near-Shore Depositional Character	Tends to exist in fairly broad and thick (deep) sedimentary sequences Frequent lateral changes 1) Facies 2) Turbidite structural anomalies 3) Cut-and-fill channels aligned perpendicular to the original shoreline Does not present strong geophysical structural and/or stratigraphic anomalies Almost always weak rock with marginal engineering properties and/or characteristics for many land uses	Difficult to establish meaningful stratigraphic interpretations for many geologic evaluations 1) Ease of excavation 2) Relatively poor slope behavior 3) Short-distance stratigraphic variations due to flysch effects Land development, tunneling and site modification, and groundwater control measures
Volcanic Regimes	Tend to remain largely in place and not totally removed by erosion	Blanket the ground with typically complex and often massive blankets of weak to moderately hard rock units so as to obscure the underlying terrane.
Batholiths and Larger Plutons	May have one or both of their original lithologic partners present 1) Rhyolite caprock 2) Metamorphic country rock as roof pendants	Time of emplacement plus nature of erosion may have been insufficient for removal of either rock type
Metamorphic Terrane in General	Surviving bodies tend to be gneissic and/or migmatitic, as resistant to forces of erosion	Fine-grained and less massive types tend not to survive physical erosion and/or warm-climate soil forming processes

Table 2
Geologic Processes of the Quaternary Epoch, as Regional Geologic Modifiers

Process	General Modification	Practical Implications
Soil formation	Has two potential thrusts: 1) Obscures earlier strata and/or structure 2) Creates potentially unstable slope masses susceptible to becoming water-logged and then dislodged by earthquake ground motion	Greatly accelerated by Pleistocene or Holocene humid and tropical climatic conditions; more likely to accumulate than to erode; and then to become subject to slope failures during times of prolonged rainfall and/or earthquake ground motion
Fluvial Geomorphology	Meandering rivers produce a complex array of bars, spits, plugs, and other geomorphic features that place materials of variable consolidation characteristics in close proximity	Causes great potential for unacceptable differential settlement for roadbed and support piers of linear projects crossing floodplains
Loess	The wind-blown silt blanket that is found to cover thousands of square kilometers downwind from the original farthest extent of glaciation	Obscures underlying geologic features, but even more problematic is its general tendency to fail back to near verticality when exposed in fluvial or construction cuts, as well as to be susceptible to volumetric collapse upon soak-wetting
Soils of Shrink or Swell Potential	Quasi-unstable soils have internal framework-structures that are highly influenced by one-time changes in moisture	1) With more than a few percent of swelling clay minerals 2) Collapsible internal fabric originating in air-entrained mudflows 3) Certain marine clays when leached of some saline content and then shaken by seismic or construction-related ground motion
Glaciation	Has two potential thrusts; either of which create site characterization anomalies: 1) Removes expected strata 2) Replaces with strata of contrasting engineering and/or hydrogeologic characteristics	1) Has considerable potential for modification of groundwater flow for site development projects 2) Has the capacity for creating stratigraphic anomalies that defy prediction and which stretch your geologic capacity to explain
Volcanism	Ash tends to dominate the usual selection of deposits	Obscures underlying geology as well as having large water storage capacity

SUMMARY

Close reflective familiarity with our own regional geology leads us to realize the many close similarities of geologic associations around the world, where

only the secondary effects of climate and glaciation are likely to bring about some variations in the way these geologic conditions impact our professional consultation.

Resolve to obtain a copy of the new Geologic Map of North America, and while you are it, have the folks at GSA send it, in the tube-rolled option, over to the nearby Boulder Map Gallery. Call

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Thank you.

Table 3
Some “Geologic Possibilities” that may Come as Surprises
in Regional Geologic Terranes

Possibility	General Origin or Source	Practical Implications
Buried karst systems, occurring at depth below a land surface devoid of such evidence	A “once-upon-a-time” regional groundwater flow gradient in a wet climate	<ol style="list-style-type: none"> 1) There may be a potential regional groundwater transport system that is driven by slight physical anomalies but controlled by an ancient distribution network 2) Unanticipated settlement at the ground surface 3) Unanticipated failure of ground support causing structural damage or loss of impounded special wastes
Geologic constraints to engineered land-use development of natural resource recovery	Slight off-balances in hillside or mountain-slope stability, as based on slowly-degrading engineering properties or characteristics	<ol style="list-style-type: none"> 1) Amplified when urbanization or other development encroach on previously undeveloped land 2) Becomes more susceptible to seismic ground motion when adjacent slopes are modified
“Bad ground” to be encountered in the course of tunneling or other underground construction	Fault zones, often more broad and disintegrated than exhibiting grand displacement	<ol style="list-style-type: none"> 1) Loss of ground 2) Mixed-face conditions 3) Loss of standup time 4) Excessive inflow of groundwater
Anomalous inflows of perched water bodies, to sites of underground construction	Previously unassessed remote-image indications of zones of structural weakness and possible groundwater pathways	<ol style="list-style-type: none"> 1) Water-logged overburden when in close proximity to the back of tunnels or underground openings 2) Transmissive fault zones holding large quantities of perched water under high hydrostatic head
Unacceptable engineering properties or characteristics of project borrow material or excavation spoil or muck.	<ol style="list-style-type: none"> 1) hydrothermal deterioration via cation exchange 2) volumetric swelling on absorption of water 	<ol style="list-style-type: none"> 1) Unacceptable physical or chemical behavior for secondary design usage 2) Undesirable leaching character when placed in final disposal

the owner, Pat di Ciccio (303-444-1406) and ask him to give it the lamination treatment that he gave me and then to ship it off to you by courier. Pat will know what to do, and you might remind him to place brass grommets at the corners and mid-edge, to facilitate hanging, with wall screws and brass washers, that is, unless you want the deluxe treatment of retractable mounting, which is something that I am still trying to work out!

Now the real fun begins! Learning those deeper and broader levels of geology that your undergraduate geology professors always hoped you would seek! And for we older practitioners, I can say that if and when I wind up in some sort of assisting living space, as a truly old codger, that map is going to be there with me

REFERENCES:

Elsevier Publishers, 2005, Encyclopedia of Geology: Oxford, England, ed. By Richard C. Selley, Robin M. Cocks and Ian R. Plimer: Elsevier, Oxford, five volumes.

Geological Society of America, 2005, Geologic Map of North America: Scale 1:5,000,000, in three sheets (39 x 74 inches, with 28 p. text.

Reed, J.C., Jr., Wheeler, I.O., and Tucholke, B.F., 2005: Geologic Map of North America – Perspectives and explanation: Geological Soc. America, Boulder, CO, 28 p.

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.

Client Selection and Negotiation and Contracts



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In my last column, I discussed how the non-technical issues of communication and project team capabilities can cause or exacerbate a professional liability claim. In this column, I will review how the non-technical issues of client selection and negotiation and contracts can impact your professional liability. The data for this column comes from a study by XL Design Professional entitled “Risk Drivers 2005” examined these non-technical issues. This study looked at over 24,000 closed claim and pre-claim files over a 13-year period. The study examined 12 major non-technical areas; however, it was found that four areas were present in 80% of the cases: Communication (27%), Project Team Capabilities (24%), Client Selection (16%), and Negotiation and Contracts (13%).

Client Selection

Client selects contractor by low bid rather than Qualification Based Selection (QBS) (22%): I am always reminded of the old joke about NASA astronauts sitting in a space capsule designed by the lowest bidder. Not an overly comforting feeling. Almost every client is cost sensitive. You have to beware of the ones who are cheap because when something goes wrong on the project both the owner and the contractor who underbid the job are going to look to your firm to make them whole.

Client has history of claims and litigation (16%): There are some clients out there who will file suit no matter what. Many view the purchase of a

\$2,000 Phase I ESA report as the purchase of a \$1,000,000 insurance policy. Your insurance policy is going to help pay for whatever remediation might be needed in order for them to complete their development project. There is no magic way to find out a client’s litigation history, but in some jurisdictions you can check court filings on-line. You might want to ask colleagues at other firms if they have had any experience with a specific client. Be cautious if you are being asked to replace another consultant on a project. This is usually an indicator of a problem client.

Client was not knowledgeable or educated in the project type or design process (16%): These are the clients that expect every aspect of the project to go perfectly. There will not be any delays in the weather; the driller will not have equipment breakdown or slow drilling conditions; there will not be any delays from the regulatory agencies. Part of your role is to educate the client and make sure that they understand what problems may crop up. There is an old saying “When you are up to your waist in alligators, it’s hard to remember that your original intent was to drain the swamp”. You have to make sure the client knows about the alligators.

No formal review of client (10%): You need to know who your client is. Having a formal review may give you key information about their litigation history, their level of knowledge, or how they select contractors. You also want to look at the company’s structure. Are they an LLC? If so, be cautious because

there may be nothing but a shell company which can spell trouble for your company when something goes wrong down the road.

Client not paying design/contractor fees (10%): When a client is not paying, you have a number of concerns. It might be an indicator of poor financial condition. It might be an indicator of a client who is just simply going to skip on paying you. You are not in the business of doing charity work. You need to get paid. Even if the project work is the most interesting of your career, at the end of the day you and your company are in business to make money.

Client in poor financial condition (10%): This brings up several concerns. The first is whether you are going to get paid. As I have stated, your firm is a for-profit operation (hopefully). The second is that this client is probably going to look toward your professional liability policy in order to help their financial condition.

Negotiation and Contract Issues

Did not evaluate project or assess risk before contract signed (30%): This is like walking across a street without looking both ways. Some days you might get away with it because there is no traffic or traffic is gridlocked like the 405 at rush hour. But one of those times you might get pancaked by a tractor trailer. Not every project is the same. You need to evaluate the client, the geographic issues, the political issues, etc. Sometimes the best projects

are the ones you do not get. I know, as an underwriter, some of my best accounts were the ones I did not write because I would not agree to certain policy terms or extremely low pricing.

Unclear or inappropriate scope of services (20%): The scope of work is key to managing your client's expectations. By clearly stating what you will be doing on the project and more importantly clearly stating what services you will not be providing on the project, helps the client understand exactly what they are getting. Imagine going to a car salesman who tells you "I can sell you a car with power brakes, air bags, and four tires for \$30,000". That might fit in your budget especially with your imagination telling you that you just got a great deal on a Mercedes-Benz. Imagine your surprise when he delivers a Hyundai with deployed air bags and four flat tires. The better and clearer that you spell things out the better off you will be.

No construction phase services (12%): This is an area where you should try to convince the client that your services are needed during the implementation phase of your design. Who better to make adjustments in the field than your company with your intimate knowledge of the design. I worked on a foundation study in a karst area in central Pennsylvania where we had recommended to the client that we have a representative on-site during installation of mini-piles. The client opted to use a local company who did have the regional knowledge but had no prior experience with mini-piles. The local

company was smart enough to realize the potential for liability problems when the rock in some areas turned out to be of poorer quality than expected. This brought the client back to us and we would up drilling smaller diameter air-track holes to determine the expected socket depth/length for each individual pile. We took this approach because on some of the pile groups we had 20 or more feet of difference in socket depth between individual piles. Being able to do this protected us from major problems later because without our intervention the mini-piles would probably have been improperly installed and the foundation would have failed. As a note, this was a client who had pretty much cheaped the field investigation phase as well. In hindsight, this was probably a client we should have stayed away from. The client never did file a claim but looking back on it, I do not know how we did not get involved in one because of the increased field costs.

Client contracts not reviewed by senior management (8%): Most professionals do not have a background in contracts. Hopefully senior management does and that expertise should be used when dealing with client generated contracts. Many times your client representative does not know why certain clauses are included in the contract. The client's legal department are the ones who put the wording together. Make sure your company has clear guidelines dealing with contracts and who has signature authority. You may also be able to use your professional liability

insurance broker as a contract review resource. If your professional liability carrier provides a contract reference guide, be sure that you have a copy. Some of you may have a copy of the ASFE Contract Reference Guide that AIPG co-sponsored several years ago. It is an excellent book that explains contract language for laypeople.

Contract not in place before work began (8%): Do you really want to depend on your client's memory as to what was agreed upon? Get the contract in place with a clear scope of work. Starting work without the completed contract puts you at risk as the client's interpretation of what you were supposed to do may be completely different than yours.

Contract not firm's own/reviewed by counsel/based on industry standard (8%): If you are using your contract form, you are hopefully using a contract that gives you various protections that you have built into the form. Client generated contracts are not written to protect you but are designed to protect the client.

If you are developing a new form or are being asked to sign a client-generated contract you may want to use outside counsel to review to make sure that you are being properly protected.

Lack of mediation clause in client agreement (4%): Anytime a claim is filed and things wind up in court, the defense costs alone are going to be extensive. That is why many times, it may be wiser to settle a claim for some amount rather than go to court and spend all that money on legal fees. By inserting a clause requiring mediation before escalating things to court, you have the potential to save a significant amount of money on the claim. Mediation by its nature is typically less adversarial than a court action.

Send comments to: Martin Andrejko, CPG-08512, Senior Underwriter, XL Design Professional, 520 Eagleview Blvd., Exton, PA 19341, (610) 321-9227, Fax (610) 458-8667, e-mail: martin.andrejko@xlgroup.com.

HAVE YOU SIGNED UP A MEMBER LATELY?

REQUIREMENTS FOR GENERAL MEMBERSHIP (Postcard size application on page 33.)

EDUCATION: 30 semester or 45 quarter hours in geological sciences*

with a baccalaureate or higher degree

SPONSORS: 1 required from a CPG or Member

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

ANNUAL DUES: \$60 plus Section dues

APPLICATION: Available on website www.aipg.org

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

What Do You Really Do for a Living?

By Duane Carey, CPG, MBA

You had a rock collection as a kid. You have a rock collection as an adult. You are a geologist. You bristle when clients refer to you as their “engineer”.

When you finished school and entered the real world, you had minimal client contact, but had plenty of time to hone your geological skills while collecting data, constructing maps, and drawing cross-sections. After you gained some experience, you had more contact with clients, and as a scientist among lay people, you were shocked by the level of scientific ignorance among the decision makers. The guys writing the checks didn’t know their excavations from a hole in the ground.

When you finally got the chance to expound on the fine points of your science, you let them have it. You talked about potentiometric surfaces, aquitards, and head differentials. On the other side of the table, eyes glossed over, heads became heavy, and thoughts drifted far away. But you did not notice; you were on a roll. You were talking about geology and it was important, dammit. Big mistake.

Although we all have geology degrees, we are not in the business of geology. We are in the business of customer service.

The truth is, clients could not care less whether you are a geologist or a furniture salesman. They do not care where you went to graduate school, and they do not care about your grade point average. They care about getting their problem solved, and they hired you to solve it in the most efficient manner possible. The consultant who does that best will win more follow-on work and referrals, often without competitive bidding.

How can it be a mistake to delve into the details of the analysis that led to your conclusions? After all, how can the client make reasoned decisions without understanding *how and why* you reached your conclusions? The answer is fairly

straight-forward. Good customer service (the business we are all engaged in) requires rapport. Good rapport requires you to understand what the client really wants; indeed, a common definition of rapport is “a relationship of mutual understanding and trust”. Is it possible for you to have a *mutual trust* with your clients? Of course, but it is very unlikely for you to have *mutual understanding* about the technical aspects of the work. Most clients just don’t have a clue about the Earth Sciences. So the most effective way to build rapport with most clients is to form a mutual understanding of *their* perspective – it is much easier for you to relate to their business perspective than it is for them to relate to your science perspective.

Here are some key practices to help you build rapport:

- Listen, and let them do most of the talking;
- Empathize; and
- Use your scientific skills to solve their problem: remember that you are a geologist by training, but a consultant by practice

Follow these practices. Remember that the client needs his problem solved more than you need to write another dissertation. If you do, I promise you will not have to take a weekend job selling furniture.

A Note About This Column

This is the first of a new series of columns dealing with marketing for consulting geologists. The series will focus on the Four P’s of marketing, including Product, Price, Place, and Promotion. This issue’s column dealt with product, inasmuch as a consultant’s “product” includes your expertise and service, and the delivery of those intangibles to the client. Deliver your product ineffectively, and the growth of your business will suffer. But if you provide your product



(service) at a reasonable price with attention to the client’s needs, you can not help but prosper.

It is common for business people to equate marketing with advertising, which can be very costly and have sometimes dubious results. In reality, advertising is just one component of the overall marketing strategy and may not even be appropriate for many businesses. Therefore, this column will feature a wide variety of topics designed to maximize your corporate growth with minimal investment. Future topics will include public relations strategies, techniques to optimize your web site for search-engine recognition, networking, blogging, writing effective ads, direct-mail techniques, and newsletters, just to name a few.

The goal is to stimulate thought about the business side of being a geologist; even if you disagree with the opinions, I hope that you will gain some helpful insights. I welcome your comments, criticisms, and suggestions for future columns. You can reach me at 410-312-0081 or duane@MilkYourMarketing.com

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

Searching for the Right Graduate School

Nancy Price, SA-0382

As your time as undergraduate dwindles, you are faced with the uncertainty of life after receiving an undergraduate degree. This could mean entering the “real world” to find a job and start a career, but each year a greater number of undergraduates are choosing to obtain a graduate degree first. A few focused students may enter their final year as an undergraduate knowing exactly where they want to go and what person they want to work under. Of course, for the rest of us the decision is not made as easily.

Chances are that if you are looking into graduate schools, you fit into one of two categories: either you have a firm idea of what field you want to work in or you have a number of fields that interest you and are not really sure what you want to do. The method of searching for a graduate school is virtually the same regardless of which category you fit into, but the qualities of a school that are important are different depending on where your interests lie.

For those that are fairly certain of a field, it is important to look for a school that is strong in that field and hosts a healthy research group. There should be more than just one professor representing study in your field so that you can have a variety of people around you to learn from. Also look for a functional and up-to-date laboratory with research equipment that you can use while working on your thesis. If the laboratory is not present on campus, does the institution work in partnership with another school or laboratory where you can work? Do the professors have fairly recent publications in journals characteristic of your field? What about the reputation of the school and professors? Are they respected? Do previous graduate students continue on to become valued contributors to your field? Do they offer the classes you may need to fill any gaps in your education or specialized classes

valuable to your field? Are the professors getting the grants necessary to fund the type of research that you do? If you do your research right, you should end up with a couple of good schools from which to choose that keep popping up over and over again under all the above mentioned points.

On the other hand, if you have a variety of interests and really do not know what you want to do, you should look for a school that is strong in a variety of fields. These schools tend to be those notorious for an all-around good geology department with a wide range of research interests. The goal is to find a school with a couple of fields that interest you so that you have the freedom to change to a different field without having to change schools. You also want a school that offers a variety of different classes so that you can gain a little more experience in many different areas. For those that have a number of different interests, schools that have a varied department may feature a shared research project that spans across a number of fields allowing you to experience all aspects of a wider and more varied problem. In an all-around good department, you do not have to know exactly what you want to do when you apply. Just be sure that a couple of the research projects interest you and you can figure out the details once you are there.

Once you have narrowed down your list to only a few of your top choices, be sure to visit the school, talk to the graduate students, and see the facilities. You will want to see things for yourself and make your own decisions. Most importantly, and I cannot stress this enough, you will want to talk to any and all potential advisors to be sure of compatibility. You have a unique personality and way of learning just as



professors also have their own advising style and personal quirks, and there is no guarantee that you will get along. You want to work under someone to whom you can feel comfortable going to ask even the stupidest of questions. An advisor should not make you feel inferior or uncomfortable. No matter how brilliant an advisor may be, if you do not have a good advisor-student relationship then you may not learn anything at all in spite of their intelligence. Figure out what you expect an advisor to be like and find someone that fits to your needs and specifications. This may mean passing up a chance at a top school if you do not like the professors that work there, but, in my opinion, it is not worth the stress

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

STUDENT'S VOICE – COLUMN 13

of working under someone that does not work well with you.

Finally, there are other personal factors that can influence your decision as well. When choosing a graduate school, you are also choosing the town or city the school is located in. If you are particular about the local culture and values of the town you will be living in, you may want to choose a place that fits your personality and interests. Granted you probably will be too busy to really notice all the little idiosyncrasies of the town, but graduate school is hard enough without having to deal with living in a place you where you are not happy.

Just remember that with all the different criteria you will be considering when making your decision, you are making the decision for yourself and you are the one that will have to live with that choice. Do not let someone else make it for you. Sit down, take the time, and give it some honest thought. If you really work through it, the decision can be an easy one.

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.

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STUDENT APPLICATION FORM

American Institute of Professional Geologists 1400 W. 122nd Ave., Suite 250, Westminster, CO 80234 303-412-6205 • Fax 303-253-9220 • aipg@aipg.org • www.aipg.org		Date received: _____	Member #: _____
		Amount paid: _____	Date approved: _____
<small>For Headquarters use. Do not write above this line.</small>			
Application for Affiliation as a Student Adjunct			
Complete ALL sections. Read the Bylaws and Code of Ethics. If applying between November 1 and June 30, the application fee is \$20; if applying after June 30, the fee is \$10. Please PRINT or TYPE.		Current academic standing: <input type="checkbox"/> Sophomore <input type="checkbox"/> Senior <input type="checkbox"/> Junior <input type="checkbox"/> Masters Candidate <input type="checkbox"/> Doctoral Candidate <input type="checkbox"/> Post-Doctoral	
Last Name: _____	First Name: _____	Middle Initial: _____	
College/University: _____		Geological Degree: <input type="checkbox"/> BA <input type="checkbox"/> BS <input type="checkbox"/> MA <input type="checkbox"/> MS <input type="checkbox"/> PhD <input type="checkbox"/> None Year: _____	
Address: _____		City: _____	State/Zip: _____
School Phone: _____	Home Phone: _____	E-mail: _____	
ATTESTATION: I attest that I meet the requirements for AIPG Student Adjunct (currently enrolled in a geological science degree program) and agree to abide by AIPG Bylaws and Code of Ethics.			
Applicant Signature: _____		Date: _____	
Have your faculty sponsor complete the statement below before submitting OR AIPG will contact your sponsor (complete name & ph. #)			
Faculty Sponsor's Statement			
I certify that I am a member of the faculty of the _____ department at _____, with the rank of _____, and that the statements made by the applicant in this application are true to the best of my knowledge or belief. I am ___/am not ___ the applicant's faculty advisor.			
Name: _____		Phone: _____	
Sponsor: Signature: _____		Date: _____	

NEW APPLICANTS AND MEMBERS (11/11/05 - 02/06/06)

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

Application for Certified Professional Geologist

CO-Kenneth J. Balleweg

309 Iowa Dr., Golden, CO 80403-1335

Christopher A. Gellasch MEM-0071

CMR 415, Box 3161, APO AE 09114

OH-Jason G. Grecco

4579 Edgewater Dr., Stow, OH 44224

NV-Steven R. Grusing

102 Rolling Hills Dr., Elko, NV 89801

NV-Lewis B. Gustafson

5320 Cross Creek Ln., Reno, NV 89511

CO-Susan M. Hall

P.O. Box 26, Morrison, CO 80465

ON-Kenneth H. Henderson MEM-0431

1074 Parkview, Windsor, ON N8S 2X7 Canada

OH-Scott T. Hershberger

Emerald Envir., Inc., 1621 St. Clair Ave., Kent, OH 44240

MI-Tammy F. Rabideau MEM-0518

3776 Cedar Lake Rd., Howell, MI 48843

HI-Troy N. Rosenbush MEM-0739

95-1061 Puulu St., Millilani, HI 96789
November 30, 2005 – February 6, 2006

New Certified Professional Geologists

NM-Bruce W. Furst CPG-10943

P.O. Box 2805, Corrales, NM 87048

AZ-Bradley D. Ross CPG-10945

3452 E. Marco Polo Rd., Phoenix, AZ 85050-7925

NJ-Daniel J. Goetz CPG-10948

2032 Basswood Ct., Toms River, NJ 08755

WV-Steven R. Ball CPG-10949

98 Agronomy Farm Rd., Morgantown, WV 26508

MO-George H. Davis CPG-10951

1201 Haven Rd., Columbia, MO 65202-1843

Ronald D. Luethel CPG-10952

Calle Monte Rosa N° 271, of. 7B, Urb. Chacarilla Del Estanque, Lima 33, Peru

CO-David W. Rowe CPG-10953

P.O. Box 2708, Crested Butte, CO 81224 USA

AK-William A. Sears CPG-10954

Apt. 1, 732 O Street, Anchorage, AK 99501

SD-Larry D. Stetler CPG-10955

SD School of Mines & Tech, Dept of Geol, 501 E. St. Joe, Rapid City, SD 57701

New Members

HI-Michael K. Hiu MEM-0844

731 Kalanipuu Street, Honolulu, HI 96825

NV-David L. Emmons MEM-0845

5326 Mountcrest Lane, Reno, NV 89523

AZ-Kendall J. Cole-Rae MEM-0847

Barrick Gold Corp., 760 Pusch View Ln., Ste. 100, Tucson, AZ 85737

NY-Ron Taylor MEM-0849

6 May St., Huntington Station, NY 11746

VA-Randall C. Orndorff MEM-0851

U.S. Geological Survey, MS 908 National Center, Reston, VA 20192

VA-Lora C. Livingston MEM-0852

1824 Blenheim Rd. SW, Roanoke, VA 24015

GA-Mark D. Mitchell MEM-0853

Genesis Project, Inc., 1258 Concord Road, Smyrna, GA 30080

MN-Harvey Thorleifson MEM-0854

Minnesota Geological Survey, 1011 5th St. SE, Minneapolis, MN 55414

HI-Thomas R. McManus MEM-0855

AMEC Earth & Envir., 3375 Koapaka St., Ste. F251, Honolulu, HI 96819

AZ-David E. Peterson MEM-0856

1017 E Grandview Rd., Phoenix, AZ 85022

VA-Karla Westfall Hunt MEM-0857

5724 White Oak Rd., Sandston, VA 23150

MN-Wendy M. Tindall MEM-0858

Envir. Strategies Consulting, LLC, 123 Third St., Ste. 706, Minneapolis, MN 55369

WI-Staci L. Goetz MEM-0859

Earth Tech, 4135 Technology Pkwy, Sheboygan, WI 53083

NV-Deborah H. Schneider MEM-0860

Schneider & Schneider Assoc., 980 Robin St., Reno, NV 89509

NJ-Paul G. Probasco MEM-0861

GSC Kleinfelder, 1 AAA Drive, Ste. 203, Hamilton, NJ 08691

CO-Steven D. Craig MEM-0862

12201 West 2nd Pl. Apt # 3-101, Lakewood, CO 80228

New Student Adjuncts

GA-Dawit Yifru SA-0860

3700 Buford Hwy, Apt. 23, Atlanta, GA 30329

CO-Jessica A. Schleissinger SA-0861

1500 Illinois St., Golden, CO 80401

NC-Gordon H. Box SA-0862

1327 Hamlin Rd., Durham, NC 27704

New Associate Members

MI-Eileen F. Bullen AS-0034

50 Robertson Ct., Clarkston, MI 48346

State Geologist

The Georgia Environmental Protection Division is soliciting resumes to fill the position of State Geologist. This position requires an advanced degree in geology and a minimum of 10 years of professional experience in the field of geology. While the State Geologist will be expected to be proficient in all aspects of geology, most work will involve hydrogeology. The person selected for the position of State Geologist must be a registered professional geologist in Georgia or registered in a state having comity with Georgia.

All interested persons should submit a detailed resume and a Georgia Merit System application to:

Jim Ussery, Assistant Director
Georgia Environmental Protection Division
Floyd Towers East, Suite 1152
2 Martin Luther King Jr. Drive, S.E.
Atlanta, Georgia. 30334

The Georgia Merit System application may be obtained at <http://www.gms.state.ga.us/agencyservices/forms.asp#employment>.

Applications received by 4:30pm eastern time on March 15, 2006 to be considered.
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AIPG Membership Totals

	As of 02/22/05	As of 02/17/06
CPG - Active	3,760	3,680
CPG - Retired	477	468
Member	585	588
Registered Memb.	16	14
Associate Memb.	19	22
Student Adjunct	418	494
Honorary	22	23
Corporate Member	5	4
TOTALS	5,302	5,293

AIPG 43RD ANNUAL MEETING

“SUSTAINABILITY”

Saint Paul, Minnesota

September 23-28, 2006

www.aipg2006.org

CALL FOR PAPERS

We cordially invite geologists/geoscientists from all walks to share your research, experiences, and inspirations related to our theme of “Sustainability.” We are not seeking knee-jerk responses to a buzz word, but rather the concerted deliberation that these times and our professional ethics warrant so that we may choose the paths ahead before they choose us. Some likely kernels to be addressed at the meeting include:

- Sustaining the professional and science in general;
- Geologic resources as a foundation for society;
- Disruptive redistributions of geologic materials in the environment;
- Interactions of natural hazards with the human population;
- Education and public policy;
- And the list goes on.

At this stage, we welcome fully-formulated abstracts (up to 250 words) as well as nascent ideas for presentations you wish to under take. We seek a breadth of material related to different aspects of the topic, whether it is rooted in completed research or informed speculation. This is an opportunity to explore together the different meanings that “sustainability” can hold for professional geology and those who practice it. It is our hope that this collective assessment of the topic will offer AIPG some timely opportunities to incorporate this theme into our future endeavors.

To submit or discuss abstracts, contact:

Charlie Tiller, PG, CPG - Technical Program Chair
651-659-1302 or ctiller@amengtest.com



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Publications & Insignia

Publication Title	Price	Qty	Line Total	Publication Title	Price	Qty	Line Total
<u>Issues and Answers Series</u>				Pen, blue ink, laser-engraved w/AIPG Logo			
Home Buyer's Guide to Geological Hazards	\$3.50			Contour Pen, blue ink, AIPG phone # & URL imprint	\$1.50		
Petroleum	\$7.50			Gold Lapel Pin/Tie Tack	\$12.95		
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Professional Geologist as Expert Witness	\$5.50			AIPG Decal Sticker, 3"	\$0.50 (includes shipping)		
Appraisal of Construction Rocks - 2 nd Edition	\$5.50			AIPG Bookmark	\$0.50 (includes shipping)		
***Organization and Content of a Typical Geologic Report	\$1.50						
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Citizen's Guide to Geologic Hazards-Black & White	\$24.00			Plaque, walnut, for 8.5" x 11" certificate	\$18.95		
Citizen's Guide to Geologic Hazards CD ROM - Color	\$20.00			(certificate sold separately)			
Citizens' Guide to Geologic Hazards Book with CD	\$36.00			**Self-linking Stamp	\$39.00		
Geological Ethics and Professional Practices 1987-1997	\$15.00			**Steel Die Embosser	\$45.00		
A Correlated History of the Earth -Laminated Wall Chart	\$25.00			Circle emboss position: Left, Right, Bottom			
A Correlated History of the Universe -Folded Map includes "A Correlated History of Earth & Matter"	\$25.00			**For CPGs only			
History of AIPG 1963-2003	\$80.00						
Hard Cover	\$45.00						
Soft Cover	\$15.00						
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Credit Card Number: _____ Expiration Date: _____ Cardholder's Signature: _____				Orders over \$30.00 add \$8.00			
				If weight of order exceeds 10 lbs., additional postage will apply.			
				Express and international orders are subject to additional shipping charges.			
				GRAND TOTAL \$			

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Accepted Forms of Payment: **Check/Money Order, Visa, MasterCard, American Express**

Credit Card Number: _____ Expiration Date: _____ Cardholder's Signature: _____

Mining Safety Expert Tells Senate of New Safety Technology and Training Commission

Washington, D.C. — A mine safety expert told a Senate subcommittee today that a new commission headed by a prominent academic will examine how technology and better procedures can accelerate the pace of safety progress in the nation's underground coal mines.

"Through this hearing, the work of the new commission and the official investigations, we can learn how to do a better job, to do better what we've tried hard to do well," said Bruce Watzman, vice president for safety and health for the National Mining Association (NMA), at an oversight hearing before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education and Related Agencies.

Watzman said a new Mine Safety Technology and Training Commission will study, and recommend by mid-year, new ways that safety and rescue technology can be more readily adapted to the specific needs of the nation's underground coal mines.

The commission will be chaired by Dr. R. Larry Grayson of the University of Missouri-Rolla and will be comprised of mine safety,

rescue and technology experts drawn from academe, public safety agencies and the industry - all of whom will be named within a month.

Although the industry just completed its safest year on record, said Watzman, "the number of lives saved understandably pales before the names of those lost" in West Virginia.

Since 1990, Watzman explained, U.S. mine injuries have declined by 51 percent and fatalities by almost 67 percent. Last year was the safest ever recorded for both the nation's coal mines and West Virginia's coal mines. Watzman attributed the industry's safety gains in recent years to better training and technology.

Watzman said recent tragedies compel the entire mining community to exhaustively review its safety procedures in light of what is learned from investigations. "Out of this will emerge better ideas, still greater cooperation and safer mines," he said.

Press Release - January 23, 2006
National Mining Association
Carol Raulston, (202) 463-2610,
craulston@nma.org

Value of Nation's Mineral Production Still on the Rise in 2005

The value of U.S. non-fuel mine production rose last year to \$51.6 billion - a 13 percent increase from 2004, the U.S. Geological Survey (USGS) announced today. Strong demand from China continued to drive up prices for metals and some industrial minerals, and led to increased production of some commodities, according to the annual USGS report "Mineral Commodity Summaries 2006," which was released on the Internet today.

"The demand for metals and minerals from emerging industrial giants China and India continues to drive the world economy," said USGS Acting Director Pat Leahy, whose agency is the sole federal government provider of scientific information and objective assessments on mineral resources, production, consumption, and environmental effects.

The estimated value of domestically processed non-fuel mineral materials totaled \$478 billion in 2005. This is an increase of about 8 percent from the previous year. Mining of copper, iron ore, molybdenum, and aggregates (crushed stone and sand and gravel) increased, according to the report. Cement, pig iron, and steel manufacturing also increased. The 188% increase in the value of mined molybdenum significantly raised the ranking of several mining states. China's increasing steel production provided strong demand for molybdenum. High molybdenum prices have encouraged higher output from molybdenum mines and the preferential mining of copper ores containing byproduct molybdenum.

"The USGS evaluates these materials because they are used to make all kinds of manufactured products and, therefore are an important part of the economy and our national security," said Leahy. "Mining is the first step in building or manufacturing nearly everything, so these statistics are also an indicator of how the global minerals economy will affect our nation's economic future."

The report provides detailed information about events, trends, and issues in the domestic and international minerals industries during 2005. It summarizes minerals industry trends for individual mineral commodities and provides an outlook for domestic mineral industries in 2006. Separate chapters include production, trade, and resources statistics for about 90 mineral commodities.

The USGS collects, analyzes, and disseminates data on current production and consumption of about 100 mineral commodities, for the U.S. and about 180 other countries.

"Mineral Commodity Summaries 2006" is available on the USGS Web site at <http://minerals.usgs.gov/minerals/pubs/mcs/>. Hardcopy will be available in March 2006 from the Government Printing Office, Superintendent of Documents. Call 202-512-1800 (1-866-512-1800 toll free) or visit its Web site at <http://www.gpoaccess.gov/index.html> for ordering information.

USGS - Released 1/24/06
Lucy McCartan, lmccarta@usgs.gov
703-648-6905

Business News Briefs

Eight companies still in running for oil shale research 20 January 2006

The Bureau of Land Management (BLM) has announced the names of eight applicants whose proposals for oil shale research development and demonstration leases have been judged eligible for continued consideration. The oil shale program is part of the BLM's ongoing effort to provide the Nation with secure, reliable, affordable energy sources by boosting domestic energy production.

The companies that filed the eight applications are Chevron Shale Oil Co.; EGL Resources; ExxonMobil; Oil-Tech; Oil Shale Exploration; and Shell Frontier Oil & Gas, whose three separate nominations were all judged eligible for further consideration.

The eight proposals were among 20 nominations the BLM received in response to a call for proposals published in the Federal Register in June 2005 for 160-acre RD&D leases on public lands in Colorado, Utah, and Wyoming.

Shell and Electromagnetic Geoservices sign agreement 19 January 2006

Shell International Exploration and Production BV and Electromagnetic Geoservices AS (emgs) have concluded a one-year agreement, with the option to extend another year, to collaborate on expanding the capabilities of emgs' proprietary marine electromagnetic surveying technique, which is known as seabed logging.

Under the terms of the agreement, emgs will receive funding for conducting research, testing concepts, and developing software. Shell backing will secure access to emgs' software resources and computers, and the participation from the emgs organization and the key individuals needed to achieve common objectives. In addition, Shell will fund exclusive seabed-logging surveys.

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Mining Leader Comments on State of the Union Address

National Mining Association (NMA) President and CEO Kraig R. Naasz issued the following statement in response to the President's State of the Union Address:

"The U.S. coal industry applauds the strong emphasis the president placed on the role of domestic energy for improving the nation's competitiveness and security, specifically his plan to increase investments in clean coal power.

"The United States is becoming increasingly dependent on foreign energy to fuel its economy, precisely when rising energy costs, heightened global competition for energy supplies and greater political volatility are raising the risks of such dependency.

"In this era, we should make greater use of abundant domestic fuels such as coal and lessen our nation's dependence on foreign energy sources. The same technological innovation that has made coal increasingly clean will eventually lead to a near zero-emissions coal-fired plant, the FutureGen project, as championed by the president this evening.

"Technology can also make coal increasingly useful and safe to produce — not only for electricity generation, but for industrial use and as a liquid fuel for transportation.

"We are encouraged by the president's vision of the future and technology's role in making our economy stronger and our citizens more secure. We look forward to working with Congress and the administration to ensure coal's utilization to bring this about."

Press Release - January 31, 2006
National Mining Association
Carol Raulston, (202) 463-2610,
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The “I” in Business Ethics

Scott W. Tinker, CPG-10564

Ethics are about you and me. Stay ethically toned, and you will make decisions that you can live with for a long time. We are taught from an early age, “Do good.” “Do what is right.” Sometimes the choices are simple and clear. Other times, the answer is not so clear cut. Consider the following cases:

- A friend asks you to tell him what is on the test that you took a day early. Should you tell him?
- You are working in the stockroom of a grocery store, and there is an open carton of chewing gum packs. Is it okay to take a pack?
- You are trying to win a subcontract with the city, and the city planner tells you that you will get the job if you hire his cousin to help with the work. Should you hire her?

If you are struggling, think back to kindergarten where the lessons in these right-versus-wrong cases were taught; we should not cheat, steal, or take bribes.

Let us add some complexity:

- Your friend takes a test in the same class that you will be tested in the next day and starts telling you, without your prompting, what is on the test? Is it okay for you to listen?
- You are working in the stockroom of a grocery store, and there is a carton of damaged chewing gum packs that will be thrown away the next day. Many packs are not damaged. Is it okay to take a pack?
- You are trying to win a subcontract with the city, and the city planner mentions that he has a cousin in the business who has been out of work for several months. Should you consider hiring the cousin in order to win favor with the city planner?

Did you struggle a bit more on these cases of right versus “sort of wrong”? If so, perhaps you need to fine-tune what you probably already know: do not cheat, do not steal, and do not engage in bribery.

Let us make it a more complex still:

- You study for a test with a friend who has an older sibling who took the same course a year earlier, and he has a

copy of the prior year’s test. Is it okay to use it as a study guide?

- The stockroom manager tells you to dump the carton of partially damaged gum in the dumpster. Is it okay to take it to the high school who is preparing care packages for soldiers overseas?
- You hire a subcontractor to work for you on a job with the city and find out later that the subcontractor is a cousin of the city planner. What should you do?

A few more examples:

- A girl is pressured by a school administrator to divulge something her best friend told her in trust. Should she respect authority or honor her friend’s trust? What if the friend’s secret is that she is considering suicide? Does the content of the secret alter the ethical parameters?
- A scientist realizes his medical research could also lead to weapon construction that could kill thousands. Does potentially saving lives outweigh potentially taking lives?

Welcome to the world of gray, where dilemmas are neither wholly right nor wholly wrong and laws may not help much. Laws treat the easier stuff, the stuff we learned as kids, the right versus wrong. Many folks have written excellent books about right-versus-wrong ethics. Although it would be convenient if we could refer to an “ethics playbook” of some kind, certain kinds of “plays” simply do not have a right-versus-wrong solution. These tough cases, these dilemmas that have no one right answer, are the most difficult to consider, but perhaps the most important to address.

When I was first asked to be the AAPG Distinguished Ethics Lecturer, I had several reactions:

- 1) **Amazement:** Did someone put something in my iced tea?
- 2) **Panic:** A lecture on business ethics is certainly not one that I have in my PowerPoint® grab bag.
- 3) **Philosophical:** An American lecturing globally on business ethics—that ought to go over well!
- 4) **Sobering:** Those who lecture on ethics often end up in prison.

Those who hit the lecture circuit on very personal issues often have experience to share that makes them worth listening to and highly entertaining:

- Baseball great Pete Rose on gambling;
- Home entertaining maven Martha Stewart on investing,
- Former WorldCom CEO Bernie Ebbers on leadership (now via prison telecon); and
- Former homerun ace Barry Bonds lecturing on steroids—I mean lecturing about steroid use!

Former Enron Chairman Ken Lay might be a very interesting ethics lecturer, but he would probably want \$25k for his expertise!

Let me begin with a few framing thoughts:

- 1) It might be nice, although quite boring, if the world were black and white. My experience says most of the difficult ethical conflicts are painted on a gray canvas.
- 2) Businesses, societies, organizations, institutions, and the like do not have ethics; people do.
- 3) If a little bell sounds in your head: “warning, moving into ethics gray zone, ice getting thin,” listen to it! Try to do what is best, given the situation you face. If you blow it, consider the advice of the *Cowboy’s Guide*, which tells us: “The easiest way to eat crow is while it’s still warm. The colder it gets, the harder it is to swallow.” In other words, do not keep digging! I am reminded of the excerpts purportedly taken from actual performance evaluations in which one employee’s less than stellar contribution is summarized, “Since her last report, this employee has reached rock bottom, and started to dig.”
- 4) When you really need ethical guidance, professional advice, and experience tailored to meet your specific needs, there is probably only one place to look—and that is right in the mirror.
- 5) When in doubt, consider two timeless “universal” principles:

- a. Greatest good; and
- b. Golden rule: Do unto others as you would have done unto you.

Dr. Carter McNamara, an expert in Action Learning, suggests that ethics involves learning what is right or wrong, and then doing the right thing. Sounds easy enough! Unfortunately, there seems to be no shortage of ways to be wrong in this complex world. In an outstanding book titled *How Good People Make Tough Choices*, Rushworth Kidder describes many cases of right versus wrong, and lumps ways to be wrong into three categories:

- **Violation of law.** Breaking the law is not a good idea, but one should not confuse laws with ethics.
- **Departure from truth.** Truth is not always easy to determine, as it often involves multiple perspectives (and clever people).
- **Deviation from moral rectitude.** This presumes a set of values that according to Kidder is "so widely shared that it defines the difference between right and wrong." For example, German theologian Hans Kung finds five basic commands of human beings common to all of the major world religions:

1. Do not kill;
2. Do not lie;
3. Do not steal;
4. Do not practice immorality; and
5. Respect parents and love children.

Kidder offers his own ethics list based on interviews he conducted with 24 recognized ethical thinkers from around the globe:

1. Love;
2. Truth;
3. Fairness;
4. Freedom;
5. Unity;
6. Tolerance;
7. Responsibility; and
8. Respect for life.

Instead of a "Thou shalt not" approach, Kidder offers global guidelines for positive ethical behavior. Can the global nature really be tested? Kidder suggests an exercise that he learned from Professor Ron Howard at Stanford called the parachute test. Parachute into any

country in the world, and as soon as you land run up to the first person you see and take whatever he or she is holding and run away. Then see what happens. Perhaps some things are universal, at least at this time and at this place in history.

With that as a prologue, let's examine some ethics situations, beginning with a few black-and-white, right-versus-wrong examples. According to the *New York Times*, the leaders of the major cigarette companies have engaged in "seven pillars of fraud":

- Denied the damaging health effects of smoking;
- Financed what they described as independent research;
- Denied that smoking was addictive;
- Denied that cigarette makers manipulated the level of nicotine;
- Promoted cigarettes that were called "less hazardous," against scientific evidence that they were not;
- Marketed to children as young as 12; and
- Suppressed evidence to keep documents out of the public realm.

Pretty clear cut so far? How about a historical example? In Bill Bryson's *A Short History of Nearly Everything*, we learn that in 1923, GM, Du Pont, and Standard Oil of New Jersey formed the Ethyl Corporation. Ethyl (lead) is known to cause blindness, kidney failure, cancer, convulsions, and other health problems, but it was still widely used in paint, pesticides, gasoline, and beyond. As recently as 2001, Ethyl Corp., still alive and well, continued to contend that "research has failed to show that leaded gasoline poses a threat to human health or the environment."

One more ripe tomato: Enron. A number of top Enron executives have been charged with securities, wire, and mail fraud. There have also been accusations of money laundering and conspiracy.

Michael Kopper was the first former Enron executive to be convicted, after pleading guilty to charges of money laundering and wire fraud. Kopper's confessions and other evidence point to an elaborate system that concealed debt, made millions for insiders, and eventually ended in bankruptcy for the company and many of its employees.

Were the principal players inherently unethical? Were these folks just born bad? I believe that very few are born with a complete lack of ethical

compass. McNamara tells us that good people can take bad actions, particularly when stressed or confused. Stress and confusion are not excuses for unethical actions—they are simply explanations. Somewhere along the line, the captains of the Enron ship went off course. How?

- Greed must have weighed in.
- Perhaps a feeling of being above or out of reach of the law masked some warning signals.
- Some process of justification to believe that stockholders' interests were being served—at least served up to the point that the leaders cashed out first—may have been a factor.
- Bad advice, complex global climate, stress, and the like undoubtedly played a role.

If these Enron officials were not born bad, it must then have been a progressive change that guided their behavior. An apt anecdote told by McNamara says, "If you put a frog in hot water, it immediately jumps out. If you put a frog in cool water and slowly heat up the water, you can eventually boil the frog." Can "progressive boiling" happen to leaders when it comes to ethics? It must.

Dr. Stephen Hicks, Chairman of the Philosophy Department at Rockford College, in his *Foundations Study Guide: Business Ethics* says, "Of the institutions that have contributed to the quality of human life, business ranks with science, art, and education. Business has created the wealth that has given unprecedented numbers of individuals financial control of their lives. . . . It has broken down countless centuries-old barriers of racial, sexual, religious, and ethnic prejudice. And it has been the vehicle for countless numbers of individuals to develop their fullest potentials in achieving their dreams."

Wow! So why the heck is such a noble institution plagued by such intense suspicion of immorality? Business ethics, many would quip, an oxymoron!

McNamara suggests that as commerce became more dynamic, organizations realized they needed guidance to ensure that their dealings supported the common good—and so business ethics was born. According to McNamara, attention to ethics in the workplace can do several things. A few examples:

- Help ensure that leaders and managers retain a strong moral compass;
- Require that we face reality;

THE “I” IN BUSINESS ETHICS

- Help avoid acts “of omission;”
- Increase credibility of the decision process by reducing suspicion of bias; and
- Support greater consistency in standards and qualities.

Often the process of paying attention to ethics in business results in the development of a code of ethics. Here, for example, are some excerpts from the AAPG Code of Ethics:

I. General Principles

Each member shall be guided by high standards of business ethics, personal honor, and professional conduct.

II. Relation of Members to the Public
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Members shall not use or divulge any employer’s or client’s confidential information without their permission and shall avoid conflicts of interest that may arise from information gained during geological investigations.

IV. Relation of Members to One Another

Members shall freely recognize the work done by others, avoid plagiarism, and avoid the acceptance of credit due others.

That is quite a lineup of high ideals, and I have little doubt that if it were adhered to closely, we would all be better off. Undoubtedly, the process of ethical reflection is beneficial to those who develop it. Unfortunately, since very few are commonly involved in creating the code, one may wonder correctly, does it serve any real purpose?

In order to serve the greater good, some argue, an ethics code must be monitored, enforced, and have real consequences for violations—much in the same way the legal system behaves when considering cases of right versus wrong. However, as we have discovered, it is not the right-versus-wrong cases that are the difficult ones.

In considering this article, I went back to a book I had read in my undergraduate years at Trinity University titled *Situation Ethics: The New Morality*, by Joseph Fletcher. The retrospective

exercise was fascinating. In rereading those fluorescent highlights, I often found it difficult to recall what it was I thought was so important in certain passages. On the other hand, looking back after 25 years, I realized that some of what I had read in that book still influenced my thinking today.

Fletcher described a case in which the suicide of a major businessman indicated that various business holdings had become worthless. One American brokerage firm used its inside knowledge of the suicide to sell its shares and those of its clients to the uninformed public.

- If you were invested with this brokerage firm, would you not want them to use their savvy and knowledge to protect your investments? Of course you would, so perhaps it showed a proper concern for client welfare?
- What about the poor saps that were invested in the same, now worthless, businesses and lost all owing to lack of inside knowledge?

I read a news magazine story a while back about a small-town doctor who, in order to save the life of a teen who had been shot by a gun, administered blood transfusions without first screening the blood for various things. He saved the boy’s life, while at the same time risking his own defensible legal position. The doctor was portrayed a hero, and I see him as such myself.

There was not an afterword to the story, but for sake of exercise, let us paint a less rosy ending. What if the boy had lived but contracted a blood-borne disease and later died, causing the doctor to lose his license to practice medicine and many more people in the small town that depended on him to suffer? Can ethics really be judged by the end result? How would an application of the Golden Rule treat this case? How about the Greater Good?

It is not so easy, is it? These are cases of judgment, and regardless of the action, some will benefit, and others will not. The *Cowboy’s Guide* tells us: “Good judgment comes from experience, and a lotta that comes from bad judgment.” In other words, in gray cases, decisions must be made about choices that are neither wholly right nor wholly wrong, and given the chance to do it all over, one might choose differently. The point is we all learn from experience, and decision paralysis for fear of negative outcome is a very poor alternative.

The words of Teddy Roosevelt may provide us with some fortitude. “It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood”

Let us add some more black paint.

Fletcher described a situation in Monsarrat’s novel *The Cruel Sea* in which the commander of a destroyer must either drop a depth charge to sink a U-boat on the sea floor lying in wait to destroy other following ships, or not drop the depth charge because it would surely kill hundreds of comrades struggling in the icy waters of the North Atlantic. A no-win!

The commander might benefit from the “greater good” logic professed by Spock in *Star Trek*: “The needs of the many outweigh the needs of the few . . . or the one.” What about the Golden Rule, which of course would depend on whether you were a seaman in the water or one in a following ship?

Life-or-death situations are dramatic because the impact of the decision has extreme consequences. Although ethical conflicts in business do not often involve life-or-death choices, some parallels might exist. For example, during times of financial crises, a leader might face the difficult decision of layoffs as a means to “right size” the company: sacrifice a few to save the many. Layoffs are reasonably well protected by laws, accepted by stock analysts and boards as a way to affect the bottom line, and in many cases make business sense.

Do layoffs present an ethical dilemma, or are they simply a strategic business decision? That depends. Although laws may not be broken, ethics might be involved if (1) the decision makers are conflicted by personal gain resulting from layoffs; (2) there is a viable alternative or mitigating steps that were not taken prior to layoffs; (3) the rules did not apply to everyone fairly.

It is not so easy, is it? These are cases of judgment, and regardless of the action, some will benefit, and others will not. The layoff example foreshadows one of the more difficult questions in business ethics. Is something legal always ethical? Are there conditions in which ethics supersede laws? Consider the classic line Fletcher recalls from T. S. Eliot’s play *Murder in the Cathedral*, “The supreme

treason is to do the right thing for the wrong reason."

I saw a television special called *Touching the Void* in which Joe Simpson and Simon Yates conquer the supposedly unattainable West Face of Siula Grande in the Peruvian Andes. The two men gained the summit, but on the descent, while negotiating a precarious incline, Simpson fell several feet and broke his leg. Yates attempted to lower Simpson down the mountain by using two 150-foot lengths of climbing rope tied together. When the full length of rope was reached, Simpson would off weight, and Yates would climb down to him. Bad weather set in, and Simpson fell down an embankment and ended up dangling in mid-air off an ice cliff. He could not off weight and could not climb up. Under the full weight of his climbing partner and without knowing the situation below, Yates is stuck, and the pair are frozen in time and space.

The "law" of climbing requires that one never cut the rope between partners. An absolute. If the law had been followed, the two men would most certainly have both died on the mountain. One option would have been for Simpson to cut the rope above him and fall into blackness, but he did not or perhaps could not, leaving Yates faced with an impossible situation. After great mental anguish, and beginning to slip, Yates finally decided to cut the rope and save himself.

Simpson miraculously survived his fall into a crevasse below him. He managed to climb farther down and then sideways out of the crevasse into the daylight and then literally crawled over an exhausting period of three-and-a-half days down the mountain to the base camp, where Yates was preparing to leave, thinking his friend dead. Both men survived, even though the fundamental law—*never cut the rope*—was broken.

Can ethics really be conditional? Fletcher says: "The situationist, cutting himself loose from the dead end of unyielding law, with its false promises of relief from the anguish of decision, can only determine that as a man of goodwill he will live as a free man, with all the ambiguities that go along with freedom." Ethics, Fletcher concludes, is the process of *making* decisions, not *looking up* an answer.

Many scoff at situational ethics as a great way to justify any action, no matter how selfish or extreme. Hey, I had to do it, the conditions demanded it! In

fact, some legalists will argue that the freedom to make decisions on the basis of the facts and conditions is more than most people can muster.

Criticisms of situational ethics in cases of right versus wrong are well founded. In his excellent book titled *Winners Never Cheat: Everyday Values We Learned as Children (But May Have Forgotten)*, Jon Huntsman argues that "Gray is not a substitute for black and white. You don't bump into people without saying you're sorry. When you shake hands, it's supposed to mean something." Huntsman, of course, is right.

Huntsman discusses cases of gray: right versus sort of wrong. He says, "We are aware of the right and wrong of situations" and holds that those of us who believe we can "cruise in gray areas with impunity so long as we don't drift into what is demonstrably illegal behavior" are, in fact, "deluding" ourselves. He continues, "The rationale that everyone fudges, or that you have to cheat to stay competitive is a powerful lure, to be sure. The path to perdition is enticing, slippery, and all down hill." Huntsman has lived a life that backs his words with actions, and even in the cases of right versus "sort of wrong," he is no doubt correct.

Perhaps it is the conflict between the conditional and the legal, the gray versus the black and white, that gave birth to business ethics. In business, rules and regulations, if taken to the extreme, may provide a legal and defensible means to do the wrong thing, or worse, the decency of the individual may be overshadowed by the needs of the corporation.

For example, consider the corporate "mergers" so prevalent in the oil and gas industry. In the 1980's mergers commonly took the form of takeovers or acquisitions. Recall T. Boone Pickens and the "corporate raiders" of the 1980's. In the 2000's, more sophisticated mergers occurred such as the BP-Amoco-ARCO-Vastar series, which resulted in an ever-decreased retention of staff with each successive acquisition.

What if negotiations for a merger proceeded in good faith as a coming together of equals, with open compromise on both sides. Then, at the zero hour, Company A presented clever and perfectly legal language to Company B showing that in fact Company B was actually acquired, not merged. Because no legal wrongdoing occurred, many might question the business acumen of the leaders of Company B: "If you are ignorant enough to not

read the fine print, you get what you deserve." Ethics, however, might lead us to examine the underpinnings, however clever, of the leaders of company A. What is legal may not always be ethical.

Kidder offers an approach to help frame the ethical decision-making process and recognize the cases of right versus wrong:

1. Recognize that there is a moral issue;
2. Determine the actors;
3. Gather the facts; and
4. Test for right versus wrong.

Enron, the cigarette companies, the Ethyl Corporation present clear-cut cases of right versus wrong, and although quite destructive to those who were wronged, do not present great ethical dilemmas.

Unfortunately, but undeniably, there remains a space outside of the right-versus-wrong envelope where complex ethical dilemmas occur, cases squarely in the ethical gray zone where alternatives that are "neither wholly right nor wholly wrong" reside. Kidder describes these as cases of "right versus right" and lumps them into four categories:

- Truth vs. loyalty;
- Individual vs. community;
- Short-term vs. long-term; and
- Justice vs. mercy

Kidder offers guidelines to deal with these very difficult right-versus-right cases:

- Apply the resolution principles—greatest good, golden rule—to guide thinking;
- Investigate "trilemma" options—a way around the dilemma in which there do not have to be winners or losers;
- Make a decision; and
- Reflect.

The resolution principles are a good place to start but can themselves be in conflict. What is in the interest of the "greatest good" may not be what one would like "done unto" oneself.

The concept of a trilemma, or compromise, is very powerful. Although some view compromise as a sign of weakness, my experience indicates quite the opposite. The most effective and ethical leaders I have encountered are those who have the

- confidence to recognize that they do not have all of the answers,

THE “I” IN BUSINESS ETHICS

- commitment to seek true (not solicitous) input, and
- wisdom to guide a compromise solution whose sum is greater than the parts.

With an effective trilemma resolution, there are usually no outright winners or losers, but rather an equitable, ethical solution to a very difficult right-versus-right problem. One might hear words from all involved parties such as, “I can live with that” or even better “That was brilliant, and I never would have thought of that solution.”

With that as a framing context, let me offer a few basic tenets to help guide ethical decision making at the level of the individual using situations drawn largely from my own experiences.

Tenet 1: Honor your promises

This sounds simple enough. We all believe that we honor our promises.

You are in charge of recruiting for a mid-sized oil company, you have one position to fill, and after visiting the University of Mudville you make a promise to one bright young geologist that she will receive a job offer from you in less than a week. Lo and behold, after a visit later in the week to the University of Waterville, you meet an even better candidate.

The organizational objectives are to get the best person for the company, and you are an agent of the company. The organizational objectives are also to keep its promises. These are in conflict.

- Can the integrity of the organization be separated from that of the individual?

Tenet 2: Consider the spirit of the law

In many cases, it may be possible to meet the letter of the law and still have an ethical conflict. It is perhaps best to seek the spirit of the law.

You are working for an environmental firm, and your firm is representing a client being sued for environmental damage near a municipal park. You have been asked to sample waters around the park and see if they can be tied to the alleged source of the contamination. After lab work, you determine that waters in the area are below regulatory limits of the bad stuff and report accordingly. Your client is cleared of charges in the suit. Six months later, while doing work for a different client in the region, you discover records that you had not seen before indicating a plume of bad stuff that seems

without question to be sourced from the site of your original client.

- What does the letter of the law require?
- What does the spirit of the law require?
- Should letter or spirit drive your ethical action?

As I attempt to bring these ideas together, permit me to share an observation, based in part on the experiences I have had from the good fortune of extensive travel. I believe that individuals around the world are remarkably similar and fundamentally decent. It is when individuals organize as groups that differences are introduced and conflicts between groups arise. No collection of individuals—society, culture, business, religion—owns the ethical high ground. If an ethical high ground exists, it is at the level of the individual. This places an intimidating, perhaps overwhelming, burden of responsibility on the individual.

Tenet 3: Determine the context

Context allows for fair consideration. Fletcher offers four observations to help frame the context:

End: What is wanted; what is sought?

Means: By what means will one seek the end?

Motive: What is the reason for the wanting?

Consequences: Given the situation, what are the effects?

You are showing an oil prospect to a potential client. The *end* you seek is for the client to drill the prospect and for you to secure an override. The *means* you use to sell the prospect are integrated interpretation and mapping of log, core, cutting, and seismic data from the prospect region. Your *motive* for showing the prospect is to help put your kid through college. The *consequences* of drilling a successful well are increased energy for the region and profit for the client and yourself. The *consequences* of an unsuccessful well are large capital outlay by the client and nothing for you.

You have shown all of the known reliable data to the client, but in the middle of the meeting your “hand-held” buzzes in your pocket. On a break, you read the e-mail from your scout telling you that the rig drilling in the section updip has been moved off location and it looks like it is a “duster.” You have always had questions about whether this well was

testing the same zone, or is even in the same fault block.

- Do you have an obligation to disclose this new, as-yet-non-public information?
- What if you hold back the information and the prospect is successful?
- Does the end justify the means?
- What if you disclose the new information and your good prospect never is drilled?

Tenet 4: Reflect before deciding

It is wise to reflect before deciding. Does my decision show compassion for those involved? Do I mind others’ knowing what I have decided? Whom will my decision hurt? Would those affected consider my decision fair?

A key employee has announced her departure from your consulting company. She is critical to securing funding on a large two-year project that will start the following month.

- Should her departure be disclosed immediately to the client that will fund the project, or is it okay to wait until after the deal is signed?
- Would you mind the client’s finding out later that you knew of her departure before the deal was signed? Would the client consider your decision fair?
- Would the ethical framework change if the key employee were willing to stay for as long as six months to help ensure a smooth transition and, in addition, there is another less senior but very capable employee who you believe can accomplish the goals of the project?

Tenet 5: Compromise

There is a school of leadership that treats almost every situation as a battle to be won or lost—with me or against me—as if compromise were a sign of weakness. Unflinching confidence in one’s position is not necessarily a sign of strength and is perhaps quite the opposite. How often have you left a meeting and heard words such as:

- “It was a tough call, but the right call” from the winners;
- “What a bunch of &*#%” from the losers; and
- “That’s politics” from the winners and the losers!

Such emotions commonly result when a difficult dilemma is mishandled as a right-versus-wrong case with a win-versus-lose approach. Compromise is

often required to address a true ethical dilemma—to find the trilemma solution, as it were. And compromise indicates a respect for the position and opinions of others.

Huntsman described his time in the White House working for Bob Haldeman, whose management style “solicited only the type of information that would win grudging approval.” No staffer said “Wait a minute, Bob. This is wrong.” Haldeman selected subordinates who would be unquestioning in their service and predetermined what that service would be. Huntsman concludes, “those who never want to hear bad news also never want to know when they are off course.”

Compromise takes another form. We have all encountered situations in business in which we are faced with compromising personal ethics. Although we would all like to be as strong as Howard Roark in Ayn Rand’s classic novel *The Fountainhead*, it is a work of idealistic fiction. There will be many times when, by way of well-intentioned compromise, you enter into your personal ethical gray zone. To the best of your abilities, avoid crossing into that zone. I have found that most superiors will understand that zone and respect it. Those who do not are probably not worth working with.

There is a comic by W. B. Park that sums this up nicely. It shows a CEO standing at the head of a boardroom table saying: “We’ve got to draw a line on unethical behavior and then get as close to that line as possible!”

Tenet 6: Accept responsibility

One of the costs of “freedom to decide” is accountability for the outcome. This is not hard if things work out well, and as an aside, it is always a good idea to share credit for positive results with others.

The greater challenge is not to “duck and cover” if things do not work out well. Perhaps one of the more lonely aspects of leadership at any level is to accept responsibility for a decision in the face of a not-so-successful outcome. In many of the more visible ethics cases in the news today, the business leaders, politicians, and the lawyers that represent them look silly in their relentless pursuit to place blame elsewhere.

In 1988, my father told me that John Bookout was retiring as President of Shell. I remarked that Bookout would leave a big hole. My dad did something that has stuck with me to this day. He put his finger in a cup of coffee, pulled it out, and said, “It will take about that

long to fill the hole.” This remark had little to do with Bookout but was instead an observation that leaders have only so much impact on the strategic and financial health of major corporations. Well-designed organizations can often withstand even the poorest of leaders, and changes in leadership, even of good leaders, are usually very healthy.

In my job as Director of the Bureau, I like to believe that I have an impact on the financial and strategic aspects of the organization, but in reality, that is a team effort. I have little doubt that when I leave, just like the hole in the coffee, the hole I leave will be filled, and it is my job to mentor those to take my place, and celebrate when they do the job better than I have done.

Ethics are different. For better or worse, my actions set the ethical tone of the organization. Why? Because it is difficult for a subordinate to challenge the ethical behavior of her boss. It is safer to avoid ethics conflicts and simply go along. Of course, if standards are set high at the top, employees will breathe a sigh of relief and follow gladly and proudly.

The Cowboy’s Guide reminds us, “If you’re ridin’ ahead of the herd, take a look back every now and then to make sure they’re still with ya.”

Tenet 7: Stay Ethically Toned

As with physical exercise, the better conditioned you are, the better you will perform. Keep ethically toned. It will serve you well. You are more likely to anticipate and recognize ethical situations, and react to them in a way that you do not later regret. A good starting point is the resolution principles.

1. Strive to achieve the greatest good.
2. Do unto others as you would have done unto you.

Laws and rules result from historical compilations regarding what seems to work in a given societal framework, and as such, they serve as well-founded guidelines for decision making in the black-and-white, right-versus-wrong cases. But laws and rules should not be used to provide protective cover to do the wrong thing, any more than individuals should run from accepting responsibility for the impact of their decisions.

Most difficult dilemmas are not black and white, right or wrong. Choices are rarely simple, or easy. Guidelines may help frame decision-making approaches:

- (1) Honor your promises;

- (2) Consider the spirit of the law;
- (3) Determine the context;
- (4) Reflect before deciding;
- (5) Compromise; and
- (6) Accept responsibility.
- (7) Stay ethically toned.

In the end, business ethics is not really about business. The best we can do, perhaps, is to consider a framework for decision making that is somewhat common at the level of the individual. Business merely reflects the actions of you and me. We are the “I” in business ethics.

As we struggle individually to find common ground and do what is right, some measure of comfort might be found in the simple, eloquent words of Nkosi Johnson. Nkosi was the 11-year-old South African boy who campaigned against, and later died of, AIDS. His courageous story is told in Jim Wooten’s *We Are All the Same: A Story of a Boy’s Courage and a Mother’s Love*.

Nkosi said:

Do all you can

With what you have

In the time you have

In the place you are.

Acknowledgment: I would like to acknowledge Robbie Gries for her courage to formalize conversations regarding ethics. I also wish to thank Robbie for engaging me in that conversation; it has certainly been an interesting process!

References

- American Association of Petroleum Geologists, 2003, Code of ethics: Constitution and Bylaws amended August 29, 2003, Article IV, <http://www.aapg.org/business/codethic.cfm>, accessed April 2005.
- Bender, Texas Bix, 1992, Don’t squat with yer spurs on! a cowboy’s guide to life: Layton, Utah, Gibbs Smith, 144 p.
- Bryson, Bill, 2003, A short history of nearly everything: New York, Broadway Books, 544 p.
- Fletcher, Joseph, 1966, Situation ethics: the new morality: Philadelphia, Pa., Westminster Press, 176 p.
- Hicks, Stephen, no date, Foundations study guide: business ethics: http://www.objectivistcenter.org/articles/foundations_business-ethics.asp, accessed April 2005.

Huntsman, J. M., 2005, *Winners never cheat: everyday values we learned as children (but may have forgotten)*: Philadelphia, Pa., Wharton School Publishing, 185 p.

Kidder, R. M., 1995, *How good people make tough choices*: New York, Fireside, 241 p.

McNamara, Carter, 1999, *Complete guide to ethics management: an ethics toolkit for managers*: <http://www.mapnp.org/library/ethics/ethxgde.htm>, accessed April 2005.

Monsarrat, Nicholas, 1951, *The cruel sea*: New York, Alfred A. Knopf, 509 p.

Rand, Ayn, 1943, *The fountainhead*: Indianapolis, Ill., The Bobbs-Merill Company, 753 p.

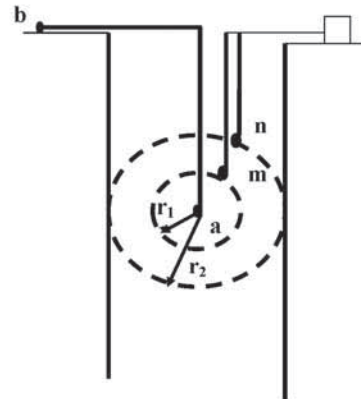
Smithson, John (producer), and MacDonald, Kevin (director), 2003, *Touching the void: Four Film and The Film Council in association with Channel 4 and PBS, a Darlow Smithson production, based on book by Joe Simpson, distributed by MGM Home Entertainment, videodisc (107 min.)*.

Wooten, Jim, 2004, *We are all the same: a story of a boy's courage and a mother's love*: New York, Penguin Press, 243 p.

1. The answer is (a) or:

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

See proof below, where "a" and "b" are the current electrodes and "m" and "n" are the potential electrodes.



Basic relationships:

$$V = I R$$

$$R = \rho L / A$$

The change in resistance across a spherical shell is,

$$dR = \rho dr / 4\pi r^2$$

Then,

$$R = \int \rho dr / 4 \pi r^2$$

$$R = (\rho / 4 \pi) \int dr / r^2$$

$$R = (\rho / 4 \pi) \int r^{-2} dr$$

$$R = (\rho / 4 \pi) [-r^{-1} - 1]$$

$$R = (\rho / 4 \pi) [-1/r]$$

And across radii r_1 to r_2 ,

$$R = (\rho / 4 \pi) [(-1/r_2) + (1/r_1)]$$

$$R = (\rho / 4 \pi) [(r_2 - r_1) / r_1 r_2]$$

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

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

Thus, $\rho = 4 \pi (V/I) [r_1 r_2 / r_2 - r_1]$ or choice (a) gives us the right relationship.

2. The answer is (b) or CuFeS_2 .

Gypsum or $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is a hydrous sulfate commonly used to generate plaster-of-paris, wallboard, drywall and as an art sculpture medium (alabaster). Chalcopyrite or CuFeS_2 is a copper-iron sulfide commonly used to generate copper for pipes, coins, electrical circuits, brass and bronze. Corundum or Al_2O_3 is an aluminum oxide used as an abrasive powder and gemstones (ruby, sapphire).

3. The answer is (c) or "seiche."

A "monadnock" is an erosional remnant found in a peneplain. "Boudinage" refers to sausage-like structures developing when a competent layer sandwiched by incompetent ones is stretched and thinned finally breaking into distinct sausage-like bodies. A "seiche" is the term that can be used to describe a water wave that may develop as a result of mass wasting, such as the 518-meter-high wave that affected Lituya Bay, Alaska on July 9, 1958.

AIPG 43rd Annual Meeting

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- Sustaining the profession and science in general;
- Geologic resources as a foundation for society;
- Disruptive redistributions of geologic materials in the environment;
- Interactions of natural hazards with the human population;
- Education and public policy;
- And the list goes on.

At this stage, we welcome fully-formulated abstracts (up to 250 words) as well as nascent ideas for presentations you wish to undertake. We seek a breadth of material related to different aspects of the topic, whether it is rooted in completed research or informed speculation. This is an opportunity to explore together the different meanings that "sustainability" can hold for professional geology and those who practice it. It is our hope that this collective assessment of the topic will offer AIPG some timely opportunities to incorporate this theme into our future endeavors.

To submit or discuss abstracts, contact:

Charlie Tiller, PG, CPG - Technical Program Chair
651-659-1302 or ctiller@amengtest.com

The Last Glacier in the Bighorns

Perry H. Rahn, CPG-03724, Charles Michael Ray, and Michael W. Rahn

Abstract

In 1906, N.H. Darton authored a U.S. Geological Survey (USGS) folio describing the geology of the Bighorn Mountains, Wyoming. The folio includes a 1905 photograph of the glacier at the base of Cloud Peak, the largest glacier in the Bighorn Mountains. The Bighorn Mountains were extensively glaciated during the Pleistocene epoch, but today the glaciers have nearly all melted away. On August 5, 2005, we photographed the glacier from the same location. Since 1905, it has shrunk in size from approximately 500 million cubic feet to approximately 80 million cubic feet. We estimate that it will be completely gone within about 20 years.

Introduction

The Bighorn Mountains, located in north-central Wyoming, are part of the "Central Rockies" which formed as Laramide uplift. Precambrian granite is exposed in the core of the uplift and Paleozoic and Mesozoic sedimentary rocks dip outward from the core.

Darton (1906) published a monumental USGS folio describing the geology of the Bighorn Mountains. A portion of the folio contains a description of the extensive mountain glaciation during the Pleistocene epoch, written by Roland Salisbury. He estimated that mountain glaciers once covered about 300 square miles based on glacial features such as cirques and moraines (Figure 1). Salisbury found the glaciers had extended to levels below 10,000 feet elevation.

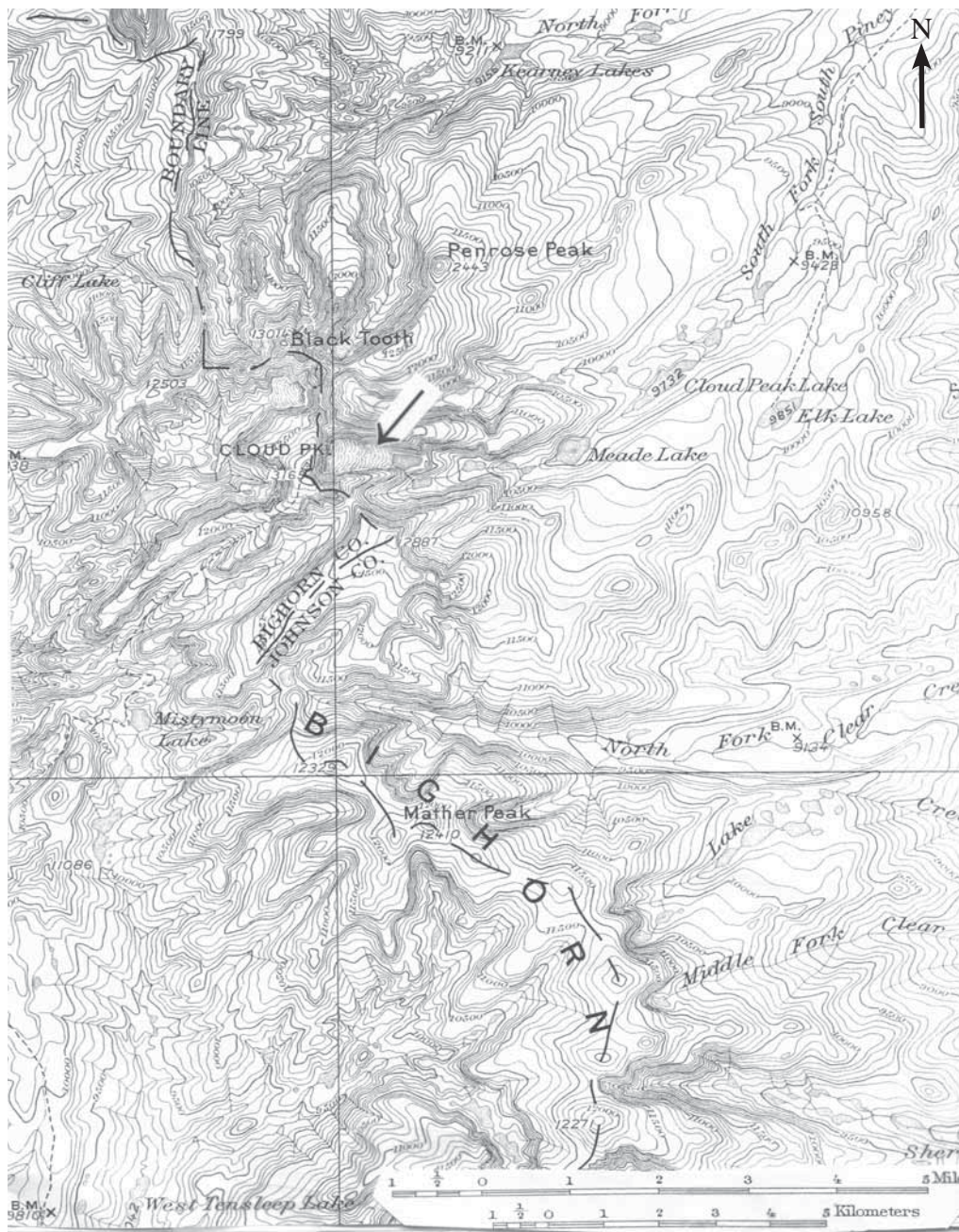


Figure 1. Topographic map of the Cloud Peak Wyoming, quadrangle (from USGS, 1901). Original at 1:125,000 scale. Contour interval 100 feet The arrow shows the location of the glacier on the east side of Cloud Peak.

Along Tensleep Canyon, the glaciers had extended down to 6,600 feet elevation where Wisconsinan terminal moraines include both the Bull Lake and Pinedale stades (Gjere, 1974).

Figure 1 shows the general topography of the Cloud Peak area. Cloud Peak (shown on Figure 1 to be 13,167 feet elevation) is the highest point in the Bighorn Mountains. Pleistocene glaciation is evidenced by the cirques, U-shaped valleys, and pater noster lakes. The col just northeast of Misty Moon Lake shows an unusual example of glacial piracy in that the headwaters of the West Fork of Tensleep Creek were captured by the glacier in the valley of the North Fork of Clear Creek.

Darton's folio contains numerous black and white photographs, including the glacier at the eastern base of Cloud Peak (Figure 2). [We believe this photo was taken by Darton but it may have been taken by Salisbury or Eliot Blackwelder.] This is the largest glacier in the Bighorn Mountains although there are three other smaller ice bodies nearby (Figure 1) that are most likely stagnant ice. The caption for the photo in Darton's folio is "Glacier at the foot of Cloud Peak, Cirque No. 53 on the map. Looking southwest." Based on the sun angle and absence of fresh snow we believe this photograph was taken late in the day during the end of the summer in 1905.

Rephotograph of the glacier

On August 5, 2005 we found the same location of the photo taken by Darton. Figure 3 shows the glacier today. It is considerably smaller than it was in 1905. The 2005 shoreline of Glacier Lake in the foreground resembles the shoreline of the lake in 1905. The water in Glacier Lake is clear, although the extreme western arm of the lake is slightly murky and has a slight green tint. This indicates the glacier is producing rock flour and is most likely still active.

Figure 4 is a detailed topographic map of Cloud Peak and Glacier Lake based on 1966 aerial photography. Cloud Peak is shown as 13,165 feet elevation. We estimate the glacier volumes from this topographic map and the 1905 and 2005 photographs as follows:

- 1905.....506 million cubic feet
- 1966.....205 million cubic feet
- 2005.....78 million cubic feet



Figure 2. Darton's 1905 photo of the glacier at the base of Cloud Peak. The lake in the foreground is called "Glacier Lake."



Figure 3. Photograph taken August 5, 2005. View looking slightly south of due west. Cloud Peak is visible on the left skyline.

These volumes are based on cross-sections of the glacier using 200 feet spacing. Figure 5 shows one of the cross-sections. We did not core the ice to determine its thickness; therefore our estimates may have considerable error. Nevertheless, it is clear that dramatic shrinking of the glacier has occurred in the past 100 years. If this rate of melting continues, we estimate the glacier will be completely gone between years 2020 and 2034.

The Ice Age

Beginning approximately 2.5 million years ago vast ice sheets, up to 3 km thick covered much of northern Europe and North America. Mountain glaciers

also existed throughout the world including the Cordillera of the western United States. Since the last glacial maximum of the Pleistocene Epoch, roughly 20,000 radiocarbon years ago, glaciers worldwide have been receding. Agassiz noticed this in the Alps, leading him to formulate the theory of the Ice Age (Flint, 1957).

Satellite images show dramatic shrinkage of mountain glaciers in the Andes, Himalayas, and elsewhere. The famous glacier on Mt. Kilimanjaro in Africa may be gone in a few decades. There are only a few mountain glaciers left in the continental U.S., mainly in Glacier National Park, Montana, and the Wind River Range, Wyoming.

The melting of mountain glaciers in Alaskan fiords has been photographically documented by Molnia of the U.S. Geological Survey. Some have retreated more than 10 miles between 1909 and 2004 (Sever, 2005). In Colorado, the Front Range glaciers and snowfields could be completely gone in a couple decades, according to Tad Pfeffer of the University of Colorado (Erickson, 2005).

Global Warming

The present worldwide recession of glaciers may simply be due to natural global warming accompanying the Holocene interglacial. Eustatic sea level has risen accordingly. About 20,000 radiocarbon years ago, at the maximum of the most recent glaciation, sea level was 100 to 120 m lower than it is at present (Benn and Evans, 1998; Macdougall, 2004).

If global warming continues, Earth's remaining glaciers will continue to melt. The largest remaining ice sheets are on Greenland and Antarctica. Greenland's ice sheet melted about 60 km³/year between 1993 and 1999; this rate increased to 80 km³/year from 1997 to 2003 (Krabill et al, 2004). If all the planets remaining glaciers were to melt, the world sea level would rise is about 60 m (Macdougall, 2004). Some of this sea level rise attributed to global warming, which causes warmer, less dense seawater. Studies of the Chesapeake Bay indicate sea level in this estuary is drowning at 3.3 mm/year over the past century (Donoghue, 1990). The EPA estimates by year 2100 sea level will rise 1 m (Howard et al., 1985; Geophysics Steering Committee, 1990).

There is considerable concern today about global warming and the possible influence of man. Burning fossil fuels produces CO₂ that causes the "greenhouse effect" (Sagan et al., 1980). This anthropogenic effect may be accelerating the global warming that has been naturally occurring since the Ice Age. The *Third Assessment Report of the Intergovernmental Panel on Climate Change* (www.globalwarming.org) estimated that Earth will warm between 1.4 and 5.8°C by 2100. Ice-core records show that since industrial activities began in the 1780s the concentration of carbon dioxide in Earth's atmosphere has risen from 280 to 380 parts per million (ppm) (Kolbert, 2005). The concentration of methane in this interval has also risen, from 0.78 to 1.76 ppm. The

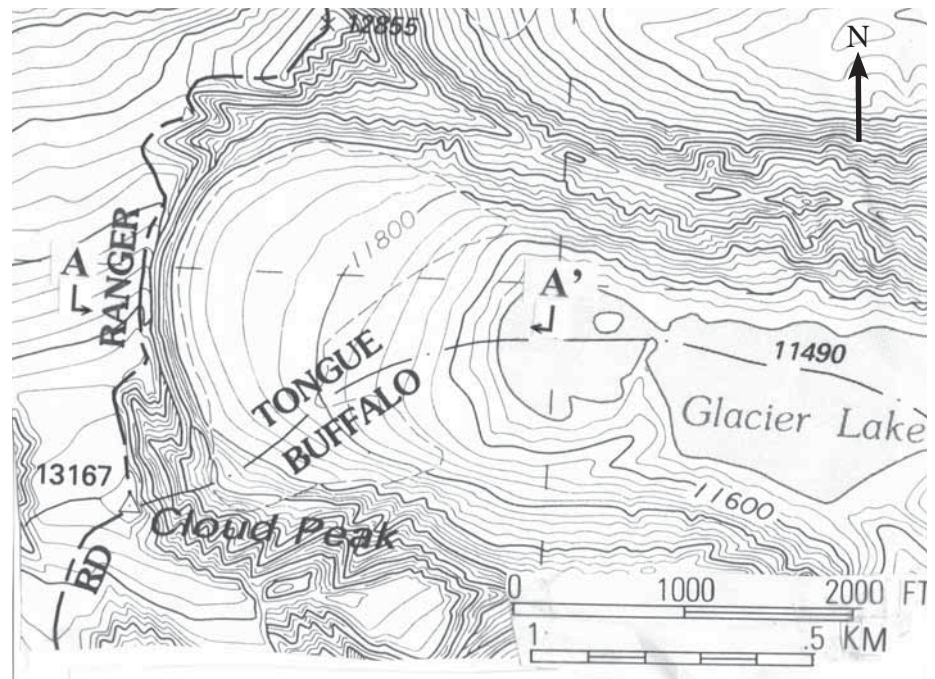


Figure 4. Detailed topographic map (from USGS Cloud Peak quadrangle). Original at 1:24,000 scale. Contour interval 40 feet Cross-section A-A' is shown in Figure 5.

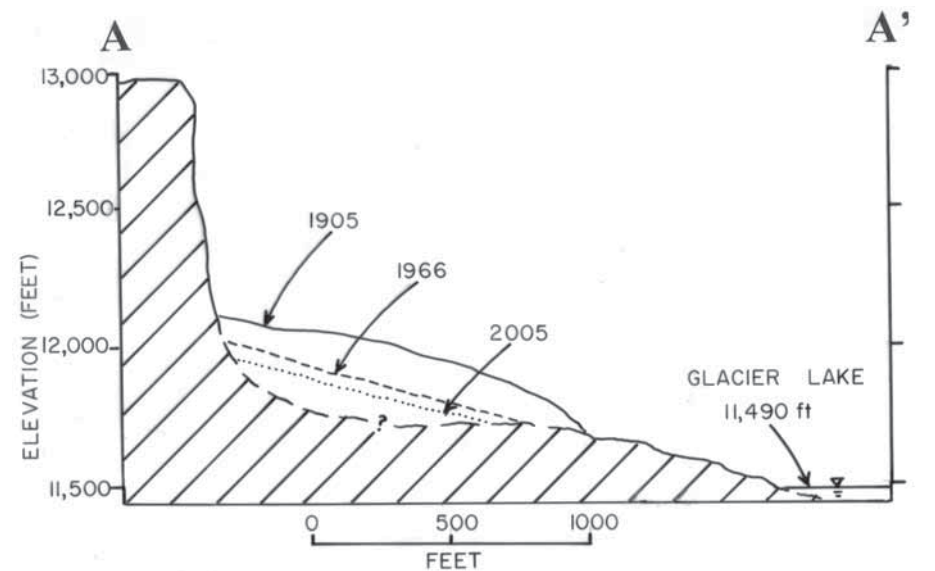


Figure 5. Cross-section A-A', showing estimated thickness of the glacier in 1905, 1966, and 2005.

Intergovernmental Panel on Climate Change offers suggestions for stabilizing the future CO₂ concentration at 450 ppm.

The greenhouse properties of CO₂ are a well-known fact of physics. It is difficult to refute that increasing atmospheric CO₂ concentration would also raise global temperature. President George W. Bush acknowledged the "need to control greenhouse gases" in the June, 2005, speech in Denmark at the meeting of the National Science Academies. The

Academies agreed that global warming is real and "human activity is contributing to it". The U.S. administration, however, is not party to the Kyoto Protocol designed to help cut CO₂ emissions.

Discussion

The glacier at the base of Cloud Peak is shrinking, as are mountain glaciers around the world. This is not surprising because natural global warming has been occurring during the Holocene. The warming during the past 20,000 years has

THE LAST GLACIER IN THE BIGHORNS

not been continuous. For example, Holocene temperatures on Greenland, deduced from isotopes on glacier cores, have fluctuated considerably. The Pleistocene Ice Age culminated after numerous climatic changes. We are currently in an interglacial. One of many that have occurred during the Pleistocene. The cause of these climatic fluctuations may involve astronomical parameters, volcanism, and mountain building, or other unidentified causes.

This study of the shrinking glacier at Cloud Peak confirms global warming, but does not confirm that this warming is caused by man.

References Cited

- Benn, D.I., and D.J.A. Evans, 1998, *Glaciers and glaciation*: Arnold, London, 734 p.
- Darton, N.H., 1906, *Description of the Cloud Peak and Fort McKinney quadrangles*: U.S. Geological Survey, *Geologic Atlas of the United States, Cloud Peak – Fort McKinney Folio No. 142*.
- Donaghue, J.F., 1990, Trends in Chesapeake Bay sedimentation rates during the Late Holocene: *Quaternary Research*, v. 34, p. 33-46.
- Erickson, J., 2005, *Front Range glaciers melting*: Scripps Howard News Service, November 8, 2004.
- Flint, R.F., 1957, *Glacial and Pleistocene Geology*: John Wiley, New York, 553 p.
- Geophysics Steering Committee, 1990, *Sea-level change; Studies in Geophysics*: National Academy Press, Washington, D.C.
- Gjere, R., 1974, *The glacial geology of the Meadowlark Lake quadrangle, Bighorn Mountains, Wyoming*: M.S. Thesis, South Dakota School of Mines and Technology, 41 p.
- Howard, J.D., W. Kaufman, and O.H. Pilkey, 1985, *Strategy for beach preservation proposed*: *Geotimes*, vol. 30, no. 12, p. 15-19.
- Kolbert, E., 2005, *The climate of man – III: The New Yorker*, May 9, 2005, p. 52-63.
- Krabill, W., et al., 2004 *Greenland Ice Sheet: Increased coastal thinning*: *Geophysical Research Letters*, Vol. 31, L24402.
- Macdougall, D., 2004, *Frozen Earth*: University of California Press, Berkeley, 256 p.
- Sagan, C., O.B. Toon, and J.B. Pollack, 1980, *Human impact on climate*: *Science*, v. 206, p. 1323-1362.
- Sever, M., 2005, *Arctic climate change in photos*: *Geotimes*, v. 50, n. 4, 46-47.

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Reviewed by AIPG Associate Editors: Edward M. Baltzer, CPG-08861; Brett W. Coulter, CPG-10125; and Dale H. Rezabek, CPG-09285.

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SIR 2005-5236. Colorado. Proceedings of the U.S. Geological Survey Fifth Biennial Geographic Information Science Workshop: March 1–5, 2004, Denver, Colorado. By Stephen J. Char and Jennifer B. Sieverling, Editors. 41 pages. Available on-line.

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SIR 2005-5196. OHIO. Chemical and Biological Characterization of the Headwaters of the Rush Creek Watershed, Perry County, Ohio. By Robert A. Darner, John S. Tertuliani, and Ralph J. Haefner, 69 pages. Available from the U.S. Geological Survey Earth Science Information Center, Open-File Reports Section, Box 25286, MS 517, Denver Federal Center, Denver, CO 80225, USGS Scientific Investigations Report 2005-5196, 69 p., 11 figs. For more information about the USGS and its products: Telephone: 1-888-ASK-USGS World Wide Web: <http://www.usgs.gov/>. Available on line.

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Marine Geophysical and Remote Sensing Techniques for Submarine Utility Projects:

HUBLINE NATURAL GAS PIPELINE CROSSING OF MASSACHUSETTS BAY

Jeffrey D. Gardner, CPG-10145

Abstract

The application of geophysical and remote sensing techniques to submarine utility projects allows the mapping of expansive areas of the seafloor in a timely and cost effective manner, often resulting in significant design and construction cost savings. Surficial (side scan sonar) and subsurface (seismic reflection) exploration conducted for the HubLine project in Massachusetts Bay reduced the amount of unsuitable burial conditions along an original proposed pipeline route from over 30% to less than 5% along a revised alignment. ROV surveys allowed efficient mapping and inspection of bottom features in depths unfavorable and too costly for dive operations. An integrated marine survey program is capable of providing scientific data to support engineering and design as well as for the regulatory agencies for environmental management of natural resources.

Key Words: marine geophysics, remote sensing, stratigraphy, subsurface, natural gas pipeline, Massachusetts Bay, reflection, refraction, magnetometer, anomaly, low/high frequency, geotechnical, coastal, glacial till, archaeology, ROV, USBL

Introduction

In the offshore environment, the submerged and buried nature of the stratigraphy requires geophysical and remote sensing techniques supplemented with geotechnical information to map the seafloor and subsurface geology. In some cases, extrapolation offshore of geologic

units on land aids the interpretation of marine geology in the nearshore environment. However, while some of the more traveled waterways have been generally mapped in the past, many coastal areas of the world's oceans remain largely unexplored.

By far the most cost effective method for obtaining geologic data over large areas of the marine environment is through use of geophysical and remote sensing survey techniques, including single and multibeam depth sounding, side scan sonar, single and multi-channel seismic reflection, seismic refraction, and magnetometry as well as less common methods such as gravity and self-potential (natural electric potential). The difficulty in conducting borings and bottom sampling on the water can make the geotechnical methods cost prohibitive, but not unnecessary.

Ideally, a strategic mix of geophysics (75-85%) and geotechnical sampling (15-25%) can provide adequate coverage of the seafloor and acquire the necessary information to support a project. Although seismic reflection profiling works well at numerous sites, in some places the presence of materials unfavorable for the propagation of acoustic signals limits the use of this technique. These materials include organic-rich, gaseous sediments and coarse glacial till deposits (gravel, cobbles, boulders) which may inhibit the penetration of seismic waveforms. At these locations, a geotechnical program of increased scope may be necessary.

Energy Sector

Some of the largest and most costly marine projects throughout the world include the installation of marine cables, pipelines, LNG terminals, oil platforms, and wind turbines associated with the energy industry. Due to the broad applications of the marine scientific data for these projects, which include site plans, routing, permitting, engineering design, construction, and inspection, a wide variety of marine survey tasks are required to meet the needs of all the companies and agencies involved in the entire process.

An overall increase in the natural gas industry over the past decade, including recent surges in liquefied natural gas (LNG) technology and proposed projects, has contributed a significant amount of work to the marine market. In the aftermath of September 11th, 2001, a number of offshore LNG mooring facilities have been proposed around the United States to avoid tankers having to enter major ports. In addition, the exploration for natural gas reservoirs, enhancement of existing pipeline systems, development of new pipeline routes, and large number of proposed LNG facilities around the world require detailed marine geophysical investigations. One such energy related project is the Duke Energy HubLine gas pipeline crossing of Massachusetts Bay.

The HubLine Project

Ocean Surveys started the Hubline Project for Duke Energy in Boston in December 1999, conducting remote sensing surveys to locate a suitable pipeline

route of 29-30 nautical miles connecting Salem to Weymouth, Massachusetts (Figure 1). The project was initiated to integrate existing Duke Energy pipelines south and west of New York with New England regional Algonquin Gas

pipeline systems. The route traverses generally east-southeast through Beverly Harbor and Salem Sound into Massachusetts Bay, then turns south around Marblehead and follows the coastline toward the southwest past

Nahant and the Boston Harbor approach channels. The route then passes through the Boston Harbor Islands State Park, follows a sinuous course through Nantasket Roads, and finally enters the Weymouth Fore River at its south end.

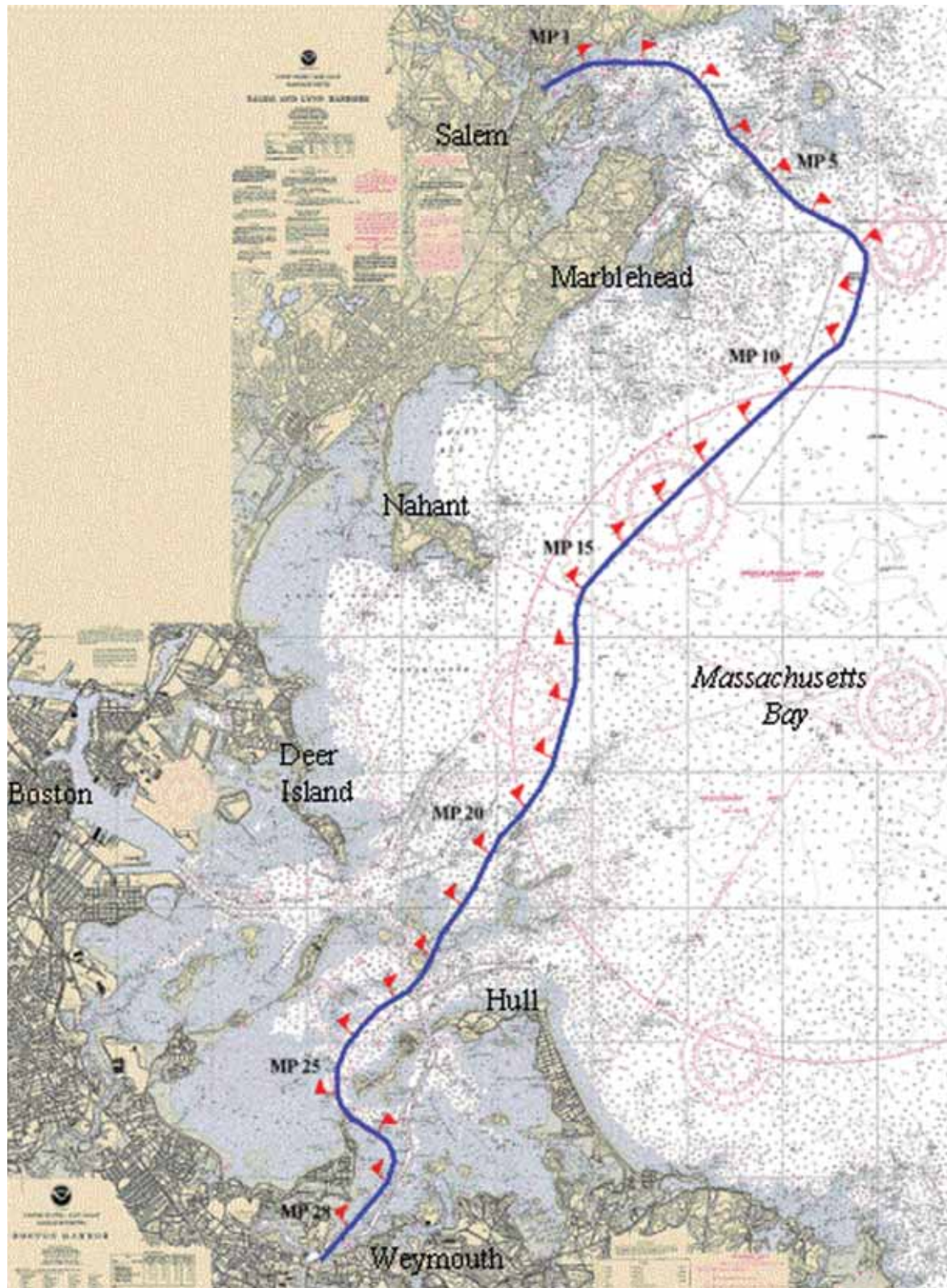


Figure 1. HubLine natural gas pipeline route (with mileposts) through Massachusetts Bay.

A combination of installation techniques were proposed in response to the variable geologic conditions and obstacles present along the route, which included water depths up to 140 feet. Typical of most submarine utility crossings, horizontal directional drilling (HDD) methods were used at both ends of the route to avoid impact to the shoreline area while a trench and cover method was employed offshore. Also, a unique 2,500 foot HDD crossing under Georges Island in Nantasket Roads (entry and exit underwater) added to the construction challenges of the project.

Initially, a Phase I reconnaissance mapping (400-600 foot line spacing) of the seabed was performed to identify bedrock and coarse glacial till to the initial design 7 foot burial depth for the proposed 30 inch diameter, concrete encased, steel pipeline. Rock outcrops and obstructions on the seafloor were identified using a 200 kHz frequency side scan sonar capable of a 100 meter sweep range (scans 330 feet out on each side of the towfish). Subsurface depth to rock was profiled using both “boomer” and “pinger” seismic reflection systems in an attempt to achieve both good penetration and resolution.

The low frequency (0.5-5 kilohertz) “boomer” system was necessary to penetrate coarse till which commonly overlies bedrock throughout much of the coastal region in New England (Figure 2). Typical nearsurface resolution of layer thickness observed with this system was 6-18 inches, depending on the strata and site conditions. A higher frequency (3-8 kilohertz) “pinger” system was used to gain increased resolution on the top of rock in areas where it persisted in the shallow subsurface. (This system is generally capable of resolving layer thickness’ in the range of 4-12 inches). The “pinger” system was also used to detect buried pipelines and cables. Under suitable site conditions, a linear object such as a cable or pipe generates a parabolic shaped reflection on the seismic record when passing generally perpendicular to

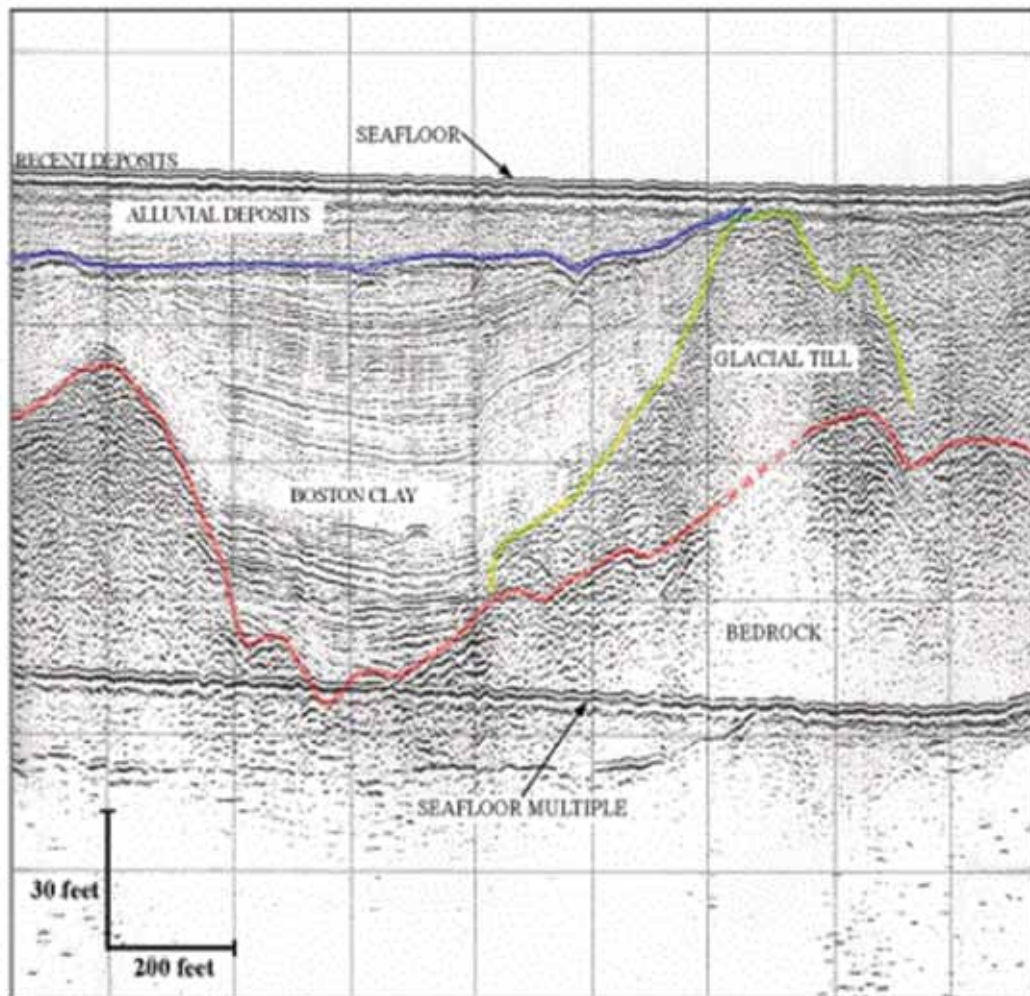


Figure 2. Seismic reflection “boomer” profile (800-3,500 hertz frequencies) collected off Nahant, Massachusetts along the HubLine route.

the feature indicating both its position and depth below the mudline.

Excellent quality data achieved in Massachusetts Bay allowed areas containing shallow subsurface or exposed rock to be identified and mapped in near real time. Using these data, the proposed pipeline route was realigned to avoid these potential impacts to construction early in the project, producing an efficient and cost effective field program. The new route was a dramatic improvement over the old one, as over 30% of the original proposed route had unsuitable burial materials compared to less than 5% along the realigned route. This translated to vast cost savings during construction. Some difficult burial conditions were unavoidable due to the geomorphology of the bedrock and glacial till units in the region and the limited bend radius of the pipeline. During the reconnaissance phase, numerous shipwrecks were also identified and avoided. All were modern vessels considered to

have little or no historic significance (Figure 3).

Phase II of the program consisted of detailed investigations along tracklines spaced 50-65 feet apart to acquire more detailed data within the pipeline construction corridor. This was necessary to satisfy archaeological requirements of the State of Massachusetts, provide closer data point spacing for accurate bedrock mapping, and obtain higher resolution on obstructions along the route. Surveys were performed within a 200 foot wide corridor centered on the proposed pipeline route and extended variable distances out to either side of the alignment to cover areas where construction activity might disturb the seafloor (ie. barge anchoring or spudding, HDD pull back areas, etc.). This phase included use of a 500 kHz side scan sonar for more detailed imagery, “chirp” and “boomer” seismic reflection profilers, marine magnetometer, and depth sounders. (The “chirp” subbottom

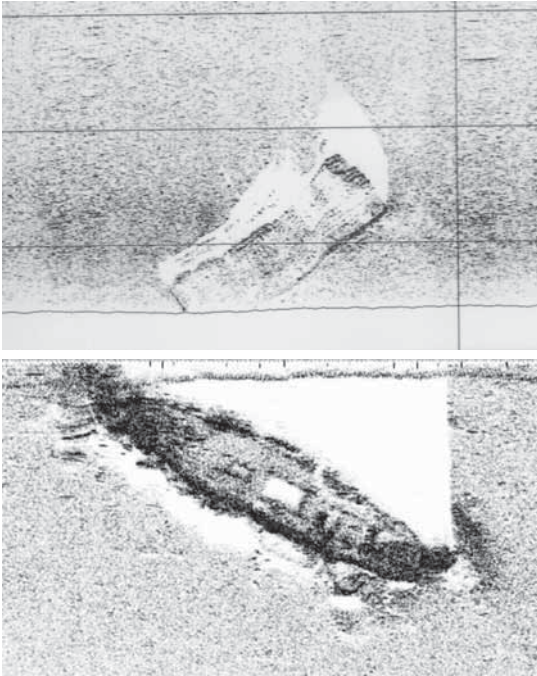


Figure 3. Side scan sonar images of modern, steel hulled vessels discovered in the vicinity of the HubLine route; a 20 x 90 foot barge near the Brewster Islands (top) and 30 x 150 foot commercial fishing boat off Marblehead (bottom).

profiler is a higher resolution system (2-16 kHz frequency) capable of detecting layers 2.5-6 inches thick under suitable conditions.)

Magnetic intensity measurements were collected along each line to detect the presence of ferrous objects along the route. A ferrous object creates an induced magnetic field which is detected as an anomaly in the total earth's field. This system, along with the side scan sonar, are the two primary tools of the marine archaeologist and are standard systems used for locating objects on the seafloor. The magnetometer was used in conjunction with the subbottom profiler to identify existing pipelines and cables buried in the seabed. Multiple anomalies along adjacent survey tracks mark the linear path of a ferrous object. This was particularly useful in areas where organic-rich, gaseous sediments prevent the acquisition of seismic reflection data. Geotechnical sampling (vibratory cores, grab samples) was also conducted along the entire length of the route, particularly in areas of suspected shallow coarse till or bedrock, to provide ground truthing of the seismic data and allow evaluation of sediments along the route.

Phase III of the field program included inspection of targets identified during Phase II, as prioritized by the marine archaeologist based on possible historic

significance (shape of acoustic target, association with magnetic anomalies, and relation to documented historic shipwreck locations). Inspection work consisted of dive operations and ROV (remotely operated vehicle) work. Targets located in deep water where diving was not operationally efficient were inspected using the ROV system. (The ROV is a sophisticated underwater video system with an array of cameras, lights, thrusters, compass, and other sensors which can be attached as needed for the specific requirements of each project.) We used an ultra short baseline (USBL) positioning system underwater to track the ROV as it navigated away from the survey vessel. Both the USBL positioning system and the vessel's GPS system interface to the navigation software which displays the survey vessel, ROV, and their coordinates in real time on the monitor. Images sent back to the

surface from the ROV were displayed and recorded with date and time, position, depth, view scale, and compass information, so that the precise location and viewing angle of the video was documented at all times.

The ROV system was also used during the construction phases of the project to inspect portions of the pipeline for proper burial and coverage of backfill material as well as pipeline integrity assessment. The underwater video was also used to verify seafloor restoration to its ambient condition prior to pipe installation, after natural gas began flowing from Salem to Weymouth in November of 2003.

Conclusion

Properly designed marine surveys, such as those performed for the HubLine project, integrate geophysical and remote sensing techniques with geotechnical data acquisition to gather the scientific information required to support a marine utility project in an efficient and cost effective manner. Survey techniques and strategies should be tailored to the marine geologic conditions expected in the area of investigation for optimum results. The techniques employed for this investigation are also applicable to a broad range of other marine projects including, but not limited to, foundation studies for coastal structures, dredging

and disposal, bridge design and inspection, wastewater treatment outfalls and intake pipes, marine archaeology, mapping navigable waterways, hazardous materials investigations, reservoir sediment accumulation, and benthic habitat mapping.

Even with the advances in digital signal processing and analysis software, marine geophysics will always be an interpretive science with each project's success dependent upon the knowledge and experience of the investigators performing the field studies and interpreting the seismic data. It is gratifying to see a project through from start to finish and know that your input was an integral part of the project's success, both for the utility company as well as the State and Federal agencies tasked with minimizing impact to the environment. The pressure placed on the coastal environment by man requires some ingenuity in the engineering and construction of structures that can withstand the forces of Mother Nature but not adversely impact her from their presence.

Mr. Gardner has extensive east coast, Great Lakes, and international marine geological and oceanographic experience. His education and experience provide him with a broad background knowledge of the marine environment with specific expertise in marine geophysics including seismic profiling and acoustical imaging. Any comments can be addressed to him at Ocean Surveys, Inc. by phone 860 388 4631 x115 or e-mail jdg@oceansurveys.com.

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Discovery of Three New Kuiper Belt Objects Announced

Natascha Wise

Things are starting to get a bit more crowded around here.

The announcements of the discovery of three large Kuiper Belt objects (KBO) have charged the astronomy world with excitement. Who can blame them? The sighting of what may come to be designated as the solar system's tenth planet is certainly cause to celebrate.

Announcements of three separate discoveries were made July 28 and 29, 2005. One discovery, designated 2003EL61, was credited to a team working at the Sierra Nevada Observatory in Spain. The second object, 2003UB313, was spotted in October 2003 and confirmed by data from the Samuel Oschin Telescope at Palomar Observatory in Mauna Kea, Hawaii. The third object, 2005FY9, was also discovered by the Palomar Observatory team. The exact size of UB313 is not yet known, but all calculations show that due to its brightness, it must be larger than Pluto. EL61 allowed for more accurate observation, as it has a moon orbiting it. By following the orbit of the moon for six months, scientists were

able to accurately calculate the mass of the object. EL61's mass is calculated at approximately 32% of Pluto's mass, and the estimated diameter is 70% of Pluto's, or roughly 1500 km. FY9 is estimated to be comparable in size to EL61.

The EL61 team consisted of F.J. Aceituno, P. Santos-Sanz and J.L. Ortiz, with assistance from J. Nomen and Observatori Astronòmic de Mallorca (OAM). They made their observations with what is known as a "quad-telescope", a telescope with four 0.36m individual telescopes arranged in pairs in two separate housings. Each telescope is then equipped with a 1024x1024 CCD camera.



Image of 2003EL61, taken at the Sierra Nevada Observatory is denoted by a circle.



EL61 was also being observed by the team at Palomar Observatory, and the photo below shows 3 images of EL61 and its satellite moon taken at 1 1/2 hour increments on May 6 2004. Photo courtesy of California Institute of Technology Website.

Discovery of 2003EL61 is credited to the Sierra Nevada team because they were the first to announce their findings. At the time of the announcement, the Palomar Observatory team was still waiting for the Spitzer Space Telescope observations to determine the actual size of the object, and the other team beat them to the announcement. Michael E. Brown, one of the members of the Palomar Observatory team, has this to say on the matter: "There is no question that the Spanish group is rightly credited with discovery. Even if they had found the object only this year and announced its existence they would still be considered the rightful

discoverers. The field of astronomy, like most fields of science, works by the system of priority where the first group to publish a result receives the discovery credit. We could have announced the object earlier, but we took a chance that no one else would find it while we were awaiting our observations from the Spitzer Space Telescope. We were wrong! And we congratulate our colleagues on a very nice discovery."

The Palomar Observatory team consisted of Michael E. Brown, Chad Trujillo, and David Rabinowitz. They gathered a majority of their data with the Spitzer Space Telescope, which is a 0.85m telescope that also is equipped to detect infrared radiation. This instrument was launched on a Delta Rocket from Cape Canaveral, Florida, on August 25, 2003. Its position in space allows observation unclouded by the Earth's atmosphere, including observation of cooler or dimmer objects not normally noticeable from Earth. In addition, the Spitzer Telescope allows accurate measurements of the amount of heat coming off of an object, and since the distance to the object is known, allows for the calculation of size.

Since the exact composition of the surface of 2003UB313 is not known, the exact size cannot yet be determined. Observations are scheduled with the Spitzer Space Telescope for the end of August. Until then, based on the brightness of UB313 compared to that of Pluto, here are some possible size calculations, courtesy of Michael E. Brown and the California Institute of Technology website:

Type of surface	Amount of light reflected	inferred diameter of UB313	UB 313's fraction of Pluto's size
nothing known	100%	2210 km	97%
fresh snow on earth	90%	2330 km	102%
average Antarctica	80%	2475 km	108%
Pluto-like	60%	2860 km	125%
(based on the similarity to Pluto of the spectrum [see below] this is our best guess as to the size)			
Charon (Pluto's moon)	38%	3550 km	156%



Three images of UB313 taken 1 1/2 hours apart on October 21, 2003.
Photo courtesy of California Institute of Technology Website

UB313 orbits the sun in an even more eccentric path than that of Pluto, which is the current explanation for why no one has discovered it before now. UB313 moves from 38 to 97 times the sun-earth distance over its 560 year orbit, while Pluto only moves from 30 to 50 times the sun-earth distance over its

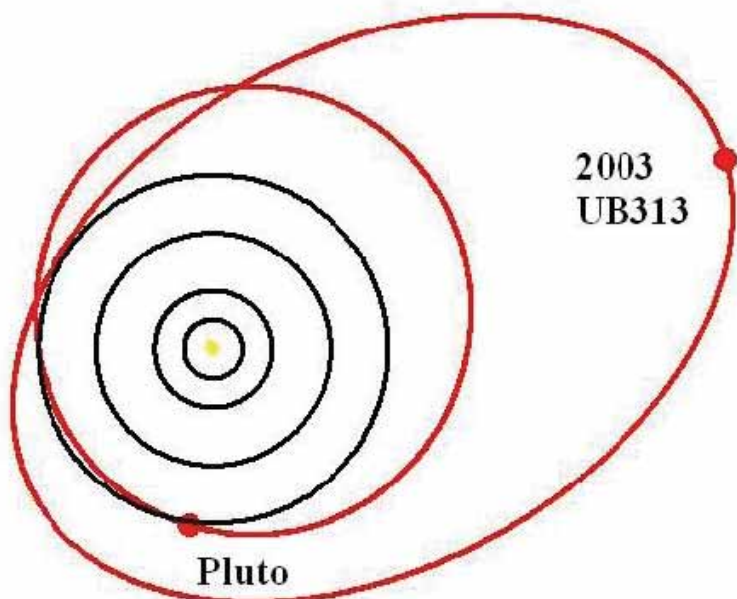
250 year orbit. No one has been looking for a planet to have such an odd orbital pattern.

Discussion is currently ongoing with the International Astronomical Union (IAU) to determine if UB313 is actually a planet or simply a large Kuiper Belt Object. The understanding of what a

planet actually is has changed since the initial designation of Pluto as a planet. Under the current standards, Pluto might not be considered to be a planet since it is so unlike the other planets in the solar system. In fact, there are now many other objects that have been discovered that would also qualify as planets if Pluto's designation is valid. It is unlikely that Pluto will lose its planet status, given how embedded it is within our culture, which would strengthen the argument that, since this object is significantly larger than Pluto, it also should be a planet.

On the same day as the UB313 discovery was announced the same team reported the existence of FY915. It is actually brighter than UB313 and EL61, though since it is approximately the same distance away as EL61, their sizes are thought to be similar. Table 1 shows a comparison of the three objects with Pluto.

As a word of warning to all scientists, the reason behind the swift announcement of the discovery of these objects was due to the sudden realization by Michael Brown that the data for his observations were readily available on the internet. Some of the telescopes used for these observations maintained open



Courtesy of California Institute of Technology's Website

Table 1

Kuiper Belt Objects	2003 UB313	2003 EL61	2005 FY9
discoverers	Brown, Trujillo, Rabinowitz	Aceituno et al.	Brown, Trujillo, Rabinowitz
size	Larger than Pluto	~3/4 Pluto	~3/4 Pluto
brightness	4th brightest Kuiper belt object (KBO)	3rd brightest KBO	2nd brightest KBO
(note that though we consider Pluto and 2003 UB313 planets, they are also clearly members of the Kuiper belt, with Pluto the brightest member)			
current distance	97 AU	52 AU	52 AU
(an AU is the distance from the earth to the sun)			
orbital period	560 years	285 years	307 years
closest approach to sun	38 AU	35 AU	39 AU
farthest from sun	97 AU	52 AU	52 AU
tilt of orbit compared to planets	44 degrees	28 degrees	29 degrees
satellite?	unknown	yes	no
surface composition	Pluto-like	water ice	Pluto-like
when visible	late summer, fall, early winter	later winter, spring, early summer	

logs of who was observing and where and what they had been observing. Professor Brown performed a Google search under the designations they had been using and found all the data were easily available to anyone. An e-mail to Brian Marsden at the International Astronomical Union’s Minor Planet Center (MPC) resulted in a hasty press conference, as he told Professor Brown that someone had already used a web

service of MPC to predict where the objects would be that night. From all indications, someone was about to take their years of work and claim the discovery for themselves, a sad reminder that there are those who are less than ethical in the world.

1. F.J. Aceituno, P. Santos-Sanz and J.L. Ortiz, with assistance from J. Nomen and OAM, Bright Trans-Neptunian Object 2003EL61, <http://www.iaa.es/%7Eortiz/brightttno.html>, Consejo Superior de Investigaciones Cientificas (CSIC) Instituto de Astrofísica de Andalucía (IAA)
2. Michael E. Brown, 2003EL61, <http://www.gps.caltech.edu/~mbrown/2003EL61/>, California Institute of Technology Website

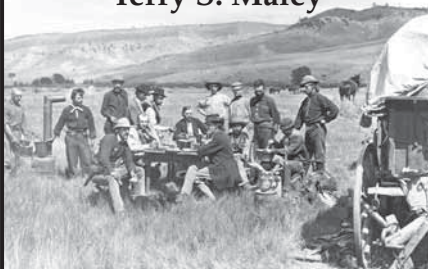
3. Michael E. Brown, Astronomers at Palomar Observatory Discover a 10th Planet Beyond Pluto, <http://www.gps.caltech.edu/~mbrown/planetlila/index.html>, California Institute of Technology Website
4. About Spitzer, <http://www.spitzer.caltech.edu/about/index.shtml>, maintained by California Institute of Technology

Natascha Wise has a BA in Environmental Studies with a focus on Ecology and Geology and a BA in English. AIPG requested Natascha to write an article on this subject.

Reviewed by AIPG Associate Editors: Edward M. Baltzer, CPG-08861; Dale H. Rezabek, CPG-09285; and Scott Tiller.

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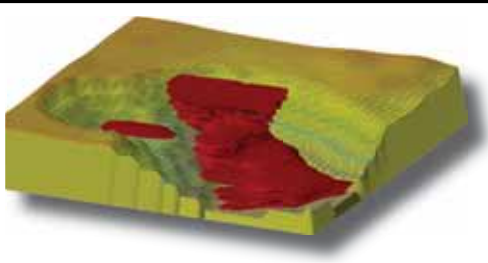
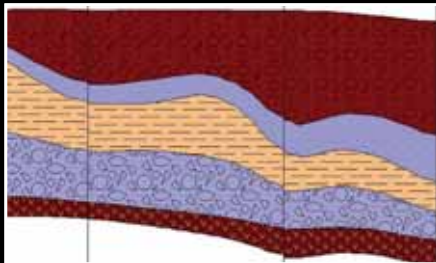


Name	Location	Interval	Grade	Grade
DM01	0.0	0.0	0.13	0.20
DM02	0.0	10.0	0.29	0.30
DM03	0.0	10.0	0.11	0.30
DM04	10.0	10.0	0.11	0.30
DM05	10.0	20.0	0.15	0.30
DM06	20.0	30.0	0.27	0.10
DM07	30.0	30.0	0.25	0.10
DM08	30.0	40.0	0.14	0.10
DM09	40.0	40.0	0.20	0.40
DM10	40.0	50.0	0.22	0.40
DM11	50.0	50.0	0.26	0.40
DM12	50.0	60.0	0.03	0.30
DM13	60.0	60.0	0.25	0.30
DM14	60.0	70.0	0.14	0.30
DM15	70.0	70.0	0.14	0.30
DM16	70.0	80.0	0.20	0.10
DM17	80.0	80.0	0.20	0.10
DM18	80.0	90.0	0.20	0.10
DM19	90.0	90.0	0.20	0.10

1 Enter / import your data into the relational database.

Volume	Weight
225,000 Cu.Ft.	135,000 Tons
450,000 Cu.Ft.	270,000 Tons

2 Compute reserves.



3 Visualize your data (logs, cross-sections, fence diagrams, ore models, pit models, etc.).

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