Not Just Software... RockWare. For Over 28 Years.

RockWorks®
Downhole Data Management, Analysis and Visualization
- Streamlined well manager includes:
  - Deviated survey data
  - Lithology
  - Stratigraphy
  - Permeability, porosity, etc.
  - Oriented fractures
  - and more
- Interactively pick formation tops from raster e-logs
- Generate well logs, cross-sections, fence diagrams and stratigraphy models
- 2D (e.g. structure, isopachs) and 3D (porosity/permeability) contouring and volumetrics
- Includes RockWorks Utilities

LogPlot®
Powerful, Flexible, Easy-to-Use Borehole Log Software
- Dozens of templates available or design your own in the drawing-style log designer window
- Tabbed data sheets
- Import/Export data from LAS, Excel, RockWorks
- Paginated and continuous logs at any vertical scale
- Export to a variety of formats
- Free viewer can be distributed to clients

RockWare GIS Link 2®
Connecting RockWorks15 and ArcMap
- Load RockWorks well locations as an ArcMap layer
- Pick profile, section, and fence diagram locations in ArcMap, generate the diagrams automatically in RockWorks
- Create contour maps of formation tops and isopachs, surface elevation
- Generate strip logs

Visual Modflow™
3D Groundwater Flow, Heat and Contaminant Transport Modeling
- Interfaces to MODFLOW (2000 and 2005), MODPATH, MT3D (MS and 99), RT3D, PHREEQ and SEAWAT
- Automatic calibration and sensitivity analysis using WinPEST
- Superior 3D graphics using the 3D-Explorer
- Zone Budget, Multi-Node Well, Stream Routing, LAK3 and ETSI Packages
- Pumping optimization using MGO

Standard, Pro and Premium versions available

$3,000
$699
$349

Call for pricing

Free trials for most of our products available at www.rockware.com

Follow us on:

303.278.3534 • 800.775.6745
RockWare.com
ON THE COVER - The beautiful lavender color of the pyrope garnet inclusion within this small gem quality octahedral diamond crystal is an exquisite example of the diagnostic G10 calcium depleted garnet/diamond paragenesis. Garnets belong to the isometric crystal system but in nature occur only as dodecahedral and trapezohedral crystals; in this example the host diamond has clearly imposed an octahedral structure on the included garnet. The octahedron is further modified by cubic faces developed on the octahedral apices. Stress fractures can be seen emanating from the garnet crystal into the host diamond. Also visible are two tiny colorless inclusions, probably olivine. Field of View is approximately 1.8 mm. Photo by Carl Brink, AS-0057.
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 an effective advocate for the profession of geology and to serve its members through activities and programs that support continuing professional development and promote high standards of ethical conduct.


POSTMASTER: Send address changes to The Professional Geologist, AIPG, 12000 N. Washington St., Suite 285, Thornton, Colorado 80241.

Subscriptions for all Members and Adjuncts in good standing are included in annual membershship dues. Subscription prices are $20.00 a year for Members’ additional subscriptions and $30.00 a year for non-members for 6 issues (for postage outside of the U.S. add $10.00). Single copy price is $4.00 for Members and $6.00 for non-members. Claims for non-receipt or for damaged copies are honored for three months.

Entire contents copyright 2011 by The Professional Geologist. Original material may be reprinted with permission. Deadline for articles and advertisements is six weeks preceding publication. Advertising rates available upon request. Opinions and views expressed by the authors are their own and do not necessarily reflect those of the American Institute of Professional Geologists, its staff, or its advertisers.

Printed in U.S.A. by Modern Litho-Print Company in Jefferson City, Missouri. For AIPG news and activities go to www.aipg.org.
Water itself is a marvelous compound. It can take several forms as a liquid, solid, or gas. It can be placid as to inspire a poet or artist – yet it can burn and explode, and it can be deadly. Its chemistry can tell its history, its age and where it has been. It can give life or take it. Without it, there is no way to have life on Earth as we know it.

Yet, increasingly, public and media attention has been directed to an emerging water crisis. Creative responses to ever-increasing pressures on water resources are urgently needed.

Discussions of water use, not unlike those of hydrocarbon use, have often taken the growing “need” as a given datum and then focused primarily, if not exclusively, on finding increasingly costly supplies to meet that given “need.” However, as nations are finally beginning to discover in the energy field, a barrel of petroleum saved is as good as, and perhaps much cheaper than, a barrel of oil extracted from the earth. The same is true of water, and hence effective water resource management should focus at least as much on the demand side as on the supply side. Agriculturalists have applied this principle for decades at the micro-level (e.g., drip irrigation), but such thinking is as yet less commonly or systematically applied at the country or ecosystem levels.

Water can be used in so many ways: to drink, to cool, to heat, to move a turbine, to swim, sail upon, and drown or pan for gold: water in itself is clear gold. To dissolve, to dilute, to freshen, to wash, to cook. To dispose and take away. In short, water can be both a consumer product and an input into most productive processes. But, its value is not the same in all uses. To take an intuitive example, arguably, water used to supply a hospital is being devoted to a higher value use than if it were washing a car or cleaning a driveway. But intuition need not be the guide. Water “productivity” in a given use can be estimated and varies widely from sector to sector and industry to industry. This is true for any scarce resource.

However, an effective economic system and good business practices tend to guide labor, land and capital into their most productive/valuable uses. For technical as well as political and social reasons, this has not necessarily been the case with water, which is not always viewed in the same way as those other scarce inputs. Effective water resource management therefore implies that all reasonable attempts should be made to ensure that each unit of water is put to its most valuable or productive use and that, as a minimum, it is not wasted by utilization in activities that generate little or no benefit. In many ways the consideration of water usage is similar to that of energy use: conservation, technological efficiency, distribution grids vs. local production, etc. Unlike energy, however, water resource management presents one big advantage; it can be reused. Unlike a liter of gasoline which is gone once it is burned, a liter of water (or at least part of it) can be recaptured and reused over and over again, producing value at each successive use, before the remainder is returned to the hydrologic cycle.

A hypothetical scenario illustrates the point. Assume the following ratios for the return of water to the hydrologic cycle after use by: agriculture (zero to 5 percent); industry (40 percent); and household use (ninety to one hundred percent). This implies that the sequence of access of these categories of users can have significant implications for the overall de facto access to water. For example, if a hypothetical community had 1 million cubic meters of water supply annually and the
first use was for agriculture, only five percent or so would be available for industrial and household use thereby causing the community to search for a larger supply. However, if it were possible to re-sequence the usage by giving households first access, perhaps 900 thousand cubic meters could be reused by industry, which in turn could return (say) 360 thousand to be used in agriculture. Such multiple re-use would in principle give the community a “virtual supply” of (1 million + 900 thousand + 360 thousand) = 2.26 million cubic meters of water access rather than one million. Of course, the issue is not simply one of arithmetic and the real world problem of allocation is a critical and contentious one that would have to be carefully worked out - - - a 64 percent reduction in water available for agriculture would probably not be palatable - - - but perhaps discussion of the allocation of a potentially larger virtual supply would be easier than the allocation of the smaller 1 million cubic meters. Alternatively, in an abbreviated scenario, the water could be reused only once, with households gaining first access to the 1 million and returning between 900 thousand and a million cubic meters for agricultural use, thereby lessening the adjustment burden on the latter sector. And, of course, any scenario raises technical feasibility issues and questions of the relative costs of sequencing and reuse compared to generating new supply. But, the point is that effective water management strategizing would benefit from such discussions and analyses of alternatives.

In the hierarchy of resource management, water can be productive for jobs and wealth production, and it can be readily sequenced from one use to another. It can be used, transformed, stored and recovered. It can be conserved, recharged, utilized, reduced, used and reused, and recycled for new uses. It can be converted to its component elements and dissolved constituents for new uses.

Reuse and recycling may also have political benefits by reducing the number of either/or choices in access to water by different users by more often presenting partially “both” (but in sequence) as an answer to the politically-charged question of who gets “the” water rights.

The table below illustrates how a given supply of water might be conserved, reused, and recycled to meet several of its major uses.

If you were thinking about developing and managing the water resources of a city, state, nation, or region several years ago, you probably would be thinking exclusively of its natural fresh water rivers, springs, and aquifers. You would likely not have thought about its wastewater, mineral springs, irrigation return flows, or seawater. Today, you would be remiss to ignore these often abundantly available and sustainable water resources, made usable if not potable by treatments now readily available. Here are some current examples:

- Palo Verde Nuclear Power Plant, Buckeye, Arizona – uses treated municipal wastewater from metropolitan Phoenix as its cooling water supply, which otherwise would not be available
- Jordanian potash mines, Dead Sea – uses treated municipal wastewater for the City of Aqaba for mining, replacing its earlier fresh-water demand
- Tucson Parks, including Reed Park and Zoo and its Golf Course, Arizona – uses treated municipal wastewater for landscaping, replacing its earlier fresh-water demand

<table>
<thead>
<tr>
<th>Water Status</th>
<th>Agricultural Use</th>
<th>Industrial Use</th>
<th>Municipal Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce demand</td>
<td>Select drought-tolerant crops</td>
<td>Efficient boilers</td>
<td>Slow the flow with flow restrictions; beat the peak by water-use scheduling</td>
</tr>
<tr>
<td></td>
<td>Efficient and water-wise irrigation on monitored demand (trickle or drip, subsurface)</td>
<td>Slow the flow with flow restrictions; beat the peak by water-use scheduling</td>
<td>Find and fix distribution leaks</td>
</tr>
<tr>
<td></td>
<td>Scientific farming</td>
<td>Find and fix distribution leaks</td>
<td>Control by permit</td>
</tr>
<tr>
<td></td>
<td>Greenhouse and plastic tube farming</td>
<td>Control by permit</td>
<td>Control by price</td>
</tr>
<tr>
<td></td>
<td>Control by permit</td>
<td>Control by penalty or fine</td>
<td>Control by penalty or fine</td>
</tr>
<tr>
<td></td>
<td>Control by price</td>
<td>Control by rationing</td>
<td>Control by rationing</td>
</tr>
<tr>
<td></td>
<td>Control by penalty or fine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reuse</td>
<td>Use irrigation return flows or tail waters, agricultural process wastewater and fish-farming wastewater for irrigation, food processing, fish farming, landscaping</td>
<td>Use cooling-tower blow-down water and industrial process wastewater for industrial cooling and processes</td>
<td>Capture and use rooftop, street runoff and grey water for flushing, landscaping, irrigation</td>
</tr>
<tr>
<td>Recycle</td>
<td>Use irrigation return flows or tail waters, agricultural process wastewater and fish farming wastewater for mining, industrial cooling and processes</td>
<td>Use cooling-tower blow-down water and treated industrial process wastewater for mining, irrigation, food processing, landscaping, construction, fish farming</td>
<td>Use treated wastewater for mining, industrial cooling and processes, irrigation, landscaping, construction, fish farming</td>
</tr>
</tbody>
</table>
• Riyadh, Saudi Arabia, and the United Arab Emirates – uses desalinated coastal seawater to meet its freshwater demand
• Jordan’s Wadi Ma’in, Zara and Mujib Water Treatment and Conveyance System desalts natural mineral springs and wadi water and delivers it to meet part of Amman’s fresh-water demand
• Irrigation return flows or tailwater recovery systems from wetland rice paddies are commonly used to supplement industrial and other water demands in Taiwan

Irrigation return flows are often used to supplement crop irrigation demands from California through the US mid-West, especially Nebraska.

Mr. Popkin is an international consultant with over 40 years of experience in the US and abroad in water, wastewater, solid and hazardous waste, and environmental management. He is a former USGS Hydrologist and USAID Foreign Service Officer specializing in environmental management in Asia and the Middle East. He recently conducted water sector assessments in Kosovo, Lebanon, and Jordan. This paper was prepared with the gracious assistance of Roy J. Grohs, an economic consultant and former USAID Foreign Service Officer.
Glaciotectonic and Associated Features in the Detroit, Michigan Metropolitan Area

Frederick Simms, CPG-10292

Abstract

In the Detroit Metro Area, a range of glaciotectonic and associated glacial geology features were observed in excavations. Near Franklin two thin clay-boulder diamictons are overlaid by laminated sands with a thin basal conglomerate. Deformed sand clasts occur in a complex layer between the moraines. In the lower fissile till, a sand filled wedge and gravel-filled crack occur. The features of this sequence suggest an upper plastic and lower brittle zone due to glacial deformation. The features are not strongly developed possibly related to their location near terminal moraines and a maximum advance of the ice sheet. At the Clarkston Post Office a gravelly soil horizon, water-laid gravels and sands overlie a clay-boulder diamicton. A glaciotectonic structure is 90 feet long, shows distinct compressive and extension zones and thrust surfaces that vary from horizontal to nearly 30 degrees from the horizontal. This feature is similar to others that have been described as due to ice push and associated hydrostatic pressure. Southwest of Mt. Clemens is a several hundred foot-long deformed section that consists of a succession that includes a clay-rich diamicton over lain by sands and an ice laid gravel layer with oriented striations which is succeeded by laminated sands. The orientation of the striations on the gravel parallel the length of the mapped moraine, and the associated erosion surface truncates the deformed section horizontally. The section is interpreted to represent an ice surge followed by stagnation. The features observed at these three sites appear to conform to the surrounding known glacial geology.

Key Words

Glaciotectonic, Diamicton, Clast, Wedge, Hydrostatic, Pore Pressure, Pavement, Striations, Truncated, Deformation, Antiforms, Surge, Stagnation

The author performed a field study of three excavations in the Detroit suburbs over a period of years. A variety of glaciotectonic structures and associated glacial features were observed. These exposures were generally short-lived and the extent of geologic study of the observed features was limited. This is a report of the features at the three sites with interpretations of the significance related to the conditions during the last glacial episodes in this part of the Great Lakes Region.

The features described here are not unexpected as they occur on the west side of Michigan and in surrounding northern states and Canada. Some of these are shown on the Glaciotectonic map of North America (Aber, et al., 1995). Certain types of features and characteristics are controversial i.e. strong pebble fabrics are not definitive of any single type of till deposition (Johnson and Hansel, 1999).

The three sites are shown on Figure 1 and are located as follows: near Franklin along Franklin Creek on the Fort Wayne-Defiance Moraine; at the Clarkston Post office in an area of outwash and moraine of the interlobate area in between the Saginaw, Lake Huron, and Lake Erie glacial moraine lobes; southwest of Mt. Clemens on the Mt. Clemens moraine. Also, a comparison of the features and significance of the Mt. Clemens exposure is made with similar features at Bradtville, Ontario.

The Franklin Site

The Franklin site is at the base of the gap created by Franklin Creek in the terminus of the Fort Wayne-Defiance Moraine. An east-west geological cross-section 20 feet below the surface overlooking the gap shows the observed features (Figure 2). Two thin boulder–clay diamictons occur separated by two sandy units. The lower diamicton is transected by two sand and gravel-filled fractures filled from above.

Although one of two of the filled fractures is wedge shaped it is probably not due to ice wedging. This is indicated by the following features (Figure 3): There are no laminations in the sand wedge from annual freeze, thaw and filling. Compressive features near the walls of the fractures due to ice development do not occur. The shape of the margin of the diamicton with the fracture has the appearance of being stretched in tension. It is not likely to be a sand wedge formed in dry glacial conditions as the nearby one is filled with gravel. Sand may have been washed into the cavity under or near the glacial front and the fracture was formed by loading and /or shear.
by glacial advance. Additionally, the other observed fracture which is mostly gravel-filled has parallel walls (Figure 4). Till wedges (some irregular in shape) have been identified in brittle zones associated with deformation tills in Ontario (Hicock and Dremanis, 1992) which support the interpretation that this feature is due to glacial and associated water pressure derived stresses.

Sand clasts and sand clast washouts occur in the intervening fine to medium sand unit. Similar features have been described in glacial deposits not too far to the east on the north shore of Lake Erie in Ontario (Hicock, 1992) which support the interpretation that this feature is due to glacial and associated water pressure derived stresses.

It is apparent (Figure 4) that the upper till thins and terminates to the east at least in part due to erosion where it is replaced upwards by a thin basal conglomerate and thin bedded sands.

In the eastern part of the exposure the lower diamicton has fissile upper part possibly due to shearing. There is no evidence for increased porosity in this zone that sometimes occur with deformable beds or deformation tills (Boulton 1979, Boulton and Hindmarsh, 1987). Another possibility is that it is a subglacial lodgement diamicton and it would be paired with the upper diamicton which may be superglacial diamicton. It would appear from this sequence that some lateral stress was allocated to the intervening, sandy glacial tectonite.

The features observed here are like those which have been used to assert two different views concerning the prevalence or non-occurrence of deformable beds. As pointed out by Johnson and Hansel (1999) the lack of, or weak deformation in subtilt sediments had been used as evidence for and against the deforming bed model.

Sand lenses associated with daimctons plus deformed and transported blocks of cohesionless sand have been seen elsewhere in the upper Midwest and suggested to Clayton, et al.,
(1989) that a pervasive deformed clay-rich bed did not occur beneath the rapidly moving southern Laurentide Ice Sheet at least in large areas west of the Great Lakes.

The fissile upper part of the lower diamiction probably represents some brittle shear. Perhaps the sand unit with sand clasts and the fissile upper part of the lower till, along with the undeformed sediment-filled fractures represent the ductile A layer and brittle B layer found by Boulton, and Hindmarsh, (1987), and others under some glaciers. Further, the amount of deformation has not been extensive enough to destroy the clasts as the location is near the terminus of the glacier that might have been thin and a deforming bed was not extensively developed.

The Clarkston, Michigan Site

At the Clarkston post office there was an excavation with a 150 foot east-west wall and a 30 foot north-south wall. From east to west a sequence of compressive to extensive features was exposed (Figure 6) that is described below. At the west end the excavation displays a gray diamicton at the base followed upward by horizontal sand and gravel zones. The upper organic gravel is difficult to interpret because some of it may be disturbed or removed.

To the east are thin-bedded folds, a few inches in amplitude, composed of sands and gravels evidently of similar competency, as indicated by the similar nature of the folds. These are abruptly succeeded to the east by several folds that are several feet in amplitude. This part of the structure shows some gravel alignment and shear fractures. It is very dense and without any roots suggesting that it has been stain hardened. Above is the sharp horizontal fault surface that is wavy where the tops of the underlying folds have been removed (Figure 7) At Myrdalsjokull, Iceland and elsewhere there are glacially deformed deposits that include variably horizontal thrust-planes that truncate the tops of folds (Kruger, 1994).

Above the fault the organic rich debris zone has gravel that is randomly oriented except possibly at the interface. Large cobbles and boulders occur in this zone.

![Figure 7. Truncated folds at the west end of the deformed structure at the Clarkston Post Office.](image)

![Legend](chart)

<table>
<thead>
<tr>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>translocated organic-rich debris (clay to Boulders) above thrust fault</td>
</tr>
<tr>
<td>gravel, (section east end - oxidized soil horizon that is offset by a normal fault)</td>
</tr>
<tr>
<td>thin, medium bedded sand (in the antiform some clay layers, deformed sand clasts)</td>
</tr>
<tr>
<td>folded, sheared, thin-bedded, silty sand with gravel, cobbles and boulders</td>
</tr>
<tr>
<td>sand, some gravel, cobbles, rare boulder</td>
</tr>
<tr>
<td>interbedded sand and gravel stretched partially to boulders</td>
</tr>
<tr>
<td>dense, clay-rich fill with cobbles, cobble rich in the antiform oxidized layer above</td>
</tr>
</tbody>
</table>

![Figure 6. East-West geological cross-section of the deformed glacial-related deposits at the Post Office in Clarkston, Michigan.](image)
Figure 8. North-South geological cross-section of the deformed glacial-related deposits southwest of Mt. Clemens, Michigan.
Further east a few feet is the start of the fault which dips at a 20 – 30 degree angle to the east. Cobbles occur that are oriented parallel to the fault plane. To the east the dislocated zone has several displacement surfaces. Other workers have been able to locate the displacement zone in sands and gravels at similar sites by locating repeated sections of similar lithology as indicated by grain size variations.

Further east at the section base the diamicton is exposed at base of the excavation as an antiform with a convolution in the thin bedded sands above and an associated oxidized horizon that emphasizes the structure. The convolution may be related to hydrostatic pressure. The asymmetry of the convolution may indicate a stress gradient from the east or the proximal end of the structure.

Further east toward the proximal end is an extensional zone with an upper gravel zone down-dropped along a nor-mal fault. The basal boulder diamicton is exposed at a higher elevation at the bottom of the excavation than further west. In this part of excavation small stretched boudins occur with small normal faults in sands that are typical of this part of such structures.

Other deformed structures like this that include distal folds out in front, low angle faults that become steeper toward the proximal end and a lower till that has been extruded into overlying layers have been described elsewhere such as at the margins of the Turtman glacier in Switzerland. Those structures have been attributed to glacier advance and associated hydrostatic pressure (Eybergen, 1986).

This glacioclinetic structure is on the shallow western slope of a north trending, crescent-shaped ridge. Martin, (1955), shows an elliptical moraine surrounded by outwash suggesting an ice advance in the area that may be the cause of the described structure. About a half of mile to the east, two gravel filled cracks occur in gravel that are similar to the ones that occur at the Franklin site.

This site is in a former glacial interlobe area where the ice advance moved in several directions. This might be an optimum situation for enhanced ice push and associated high pore water pressure to develop such a glacioclinetic structure. Similarly, the Waterloo Moraine in Ontario, Canada is a complex interlobe or kame moraine with deformation structures that are attributed to high pore water pressure (Arnaud, 2005).

The Mt. Clemens Site

The third described disturbed glacial feature is located southwest of Mt. Clemens on the N33°E. trending Mt. Clemens Moraine that has been mapped as a water laid moraine in some areas along its length (Martin, 1955). A gap occurs in the Clinton River valley just to north that expresses the moraine though the topography is relatively level where the exposure lies.

The exposure was in a north trending drainage ditch that displayed a 400 foot lateral section of a contorted, boulder-clay diamicton that is overlain with bedded sands and gravels. These features die out to the north but the full extent to the south is unknown. Six large antiforms occur with thinly laminated gravelly sands containing angular and deformed diamicton blocks that have broken off from the lower deformed layer. A typical section (Figure 8) has truncated antiforms and at the horizon of truncation, striated boulders occur. The middle section displays the lower plastic clay-rich diamicton extruded into the sands above. In addition to the large antiforms, two other sizes of folds occur: small chevron folds that often are attributed to be common between lithologic units with significantly different physical properties such as the clays and sands that are involved here and asymmetrical folds that are one to three feet in amplitude. There is an oxidized surface layer that has been partially stripped off the upper surface of the diamicton. There is also some stretching suggested by small normal faults between antiforms.

The significant feature is the boulder pavement that truncates the large antiforms and occurs at the base of the upper gravelly-sand layer. A Phi Diagram shows the orientations of fold axes, beds, diamicton-sand contacts, and azimuths of striations on the upper surface of boulders and gravels of the pavement (Figure 9). The average striation orientation suggests that movement of the ice that truncated the diamicton moved in direction parallel to the long direction of the mapped Mt. Clemens Moraine.

A question arises why the last movement of the ice would occur parallel to the moraine rather than some large angle to the moraine length. Albino and Dremanis (1988) found a similar situation at Bradtville, Ontario on a moraine of approximately the same age (Figure 1) that indicated that there was change in stress gradient and ice flow from large angles to the ice margin to parallel to the margin. Hicock (1992) concluded that other features similar to those found in at the Mount Clemens represented fast ice flow. Deformed beds are often associated with surges as for example those associated the Taku Glacier in Alaska. In the summer of 2001 the Taku glacier started to readvance at a rate of 30 cm. per day and push moraines formed 1-10 meters high along a nine kilometer wide terminus (Motyka, 2003).

We can also speculate about the thinly-layered gravelly sand above the boulder pavement. This has been mapped as water-laid till over an extensive distance by Helen Martin. It could be a melt out till which are associated with stagnet ice flows. Glacial surges are often followed by stagnated ice in some glacial environment situations. Therefore, this may be an expected sequence - the striated pavement represents a surge that deformed the underlying diamicton and the upper gravelly sands representing stagnation of ice that usually follows. A similar sequence has been recognized on the Lake Michigan Lobe (Kelew, et al, 2003) and elsewhere.
Summary

These three excavations display an array of structural and associated features that appear to be related to the stresses that developed as glaciers covered this part of Michigan. The Franklin site is near the terminus of linear moraines where the weak development of any deformable bed could occur. The Clarkston site is in a glacial interlobate area where high hydrostatic pore pressure might develop and the resulting structure. The Mt. Clemens site is on a linear moraine that had been mapped as partially water-laid suggesting two styles of glacial action – the second in response to the first.

References


Arnaud, E.V., 2005 (October), Deformation in Quaternary Glacial Deposits of the Waterloo Region, Canada, Paper # 190-12, Geological Society of America Annual Meeting,


Hicok, S. R., 1992 (March), Lobed interactions and superposition in subglacial till near Bradtville, Ontario, Canada, Boreas Vol. 21, pp. 73-88.


Martin, H., 1955, Map of the surface formations of the Southern Peninsula of Michigan, Geological Survey Division, Michigan Department of Conservation, Manuscript maps and field notes.


Also see http://www.geospectra.net/glatec_biblio/index.htm for a data base on glaciotectonic structures in North America.

Reviewed by AIPG Associate Editors: Ed Baltzer, CPG-08861, Solomon Isiorho, CPG-07788, and U Kar Winn, CPG-11219.

Frederick E. (Gene) Simms, Ph.D., has considerable experience in assessing and using raw materials in products associated with the automotive and related industries and evaluating soil, ground water and associated real estate in Michigan. He is a certified underground storage tank professional and project manager with Service Environmental Engineering in Sterling Heights, Michigan and teaches Geology and Geography part-time at Wayne County Community College, Detroit, Michigan.

HAY YOU SIGNED UP A MEMBER LATELY?

REQUIREMENTS FOR PROFESSIONAL MEMBERSHIP

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

SIGN-UP FEE (prorated):
Dec-Mar = $100; Apr-Jun = $75
Jul-Sep = $50 Oct-Nov = $25

ANNUAL DUES: $100 plus Section dues

APPLICATION: Available on website www.aipg.org

*As defined by the American Geological Institute, a geological science is any of the subdisciplinary specialties that are part of the science of geology, e.g., geophysics, geochemistry, paleontology, petrology, etc.
The following members have received their 25 year pin and certificate. Your dedication to AIPG throughout the years is truly appreciated. It has ensured the growth and success of the Institute. Please join AIPG headquarters in thanking these members for their continuous support.

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
<th>State</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linda K. Aller CPG-06919</td>
<td>OH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David J. Allison CPG-06850</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harry S. Audell CPG-06771</td>
<td>CA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David M. Avant, Jr. CPG-06896</td>
<td>GA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John D. Beam, Jr. CPG-06920</td>
<td>KY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John W. Beck CPG-06897</td>
<td>MN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John C. Brower CPG-06853</td>
<td>MT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jonathan M. Brown CPG-06898</td>
<td>NV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robert B. Cheek CPG-06975</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael T. Christopher CPG-06806</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael G. Collentine CPG-06758</td>
<td>WI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rodney A. Combelleck CPG-06936</td>
<td>AK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radu R. Conelea CPG-06871</td>
<td>NV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael P. Convery CPG-06773</td>
<td>MN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael A. de Cillis CPG-06986</td>
<td>NY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwight E. Deal, PhD CPG-06828</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Julett R. P. Denton CPG-06774</td>
<td>VA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John F. Drake CPG-06808</td>
<td>OK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ivy B. Dupree CPG-06854</td>
<td>LA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steven S. Edgerton CPG-06921</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kathryn Epp CPG-06787</td>
<td>OH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ralph W. Ezelle, Jr. CPG-06812</td>
<td>LA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phillip L. Fitzwater CPG-06837</td>
<td>CA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>George C. Flowers CPG-06937</td>
<td>LA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas W. Fowler CPG-06827</td>
<td>NJ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curtis J. Freeman CPG-06901</td>
<td>AK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frank T. Gay CPG-06955</td>
<td>OH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roy E. Gephart CPG-06857</td>
<td>WA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drew A. Gould CPG-06985</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhea L. Graham CPG-06858</td>
<td>CA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael N. Greeley CPG-06922</td>
<td>VA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ralph D. Gruebel CPG-06841</td>
<td>TX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wayne A. Hamilton CPG-06833</td>
<td>TX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Howard M. Harlan CPG-06821</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frank C. Healy CPG-06842</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark A. Herndon CPG-06902</td>
<td>TN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Randall T. Hicks CPG-06777</td>
<td>NM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gary L. Hix CPG-06903</td>
<td>AZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ellen F. B. Hodos CPG-06966</td>
<td>NV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matthew R. Hoovler CPG-06876</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>William K. Johnson, Jr. CPG-06789</td>
<td>SC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donald E. Jones CPG-06782</td>
<td>MD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John G. Kuhn CPG-06908</td>
<td>AZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albert L. Lamarre CPG-06798</td>
<td>CA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paul W. Lambert CPG-06974</td>
<td>IN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>James W. Langman, Jr. CPG-06879</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David A. Lawler CPG-06880</td>
<td>CA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Randall L. Lentell CPG-06881</td>
<td>KS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dan O. Madison, Jr. CPG-06910</td>
<td>SC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scott B. McDaniel CPG-06783</td>
<td>KS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas R. Michael CPG-06817</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>James T. Mickam CPG-06824</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joachim Mohn CPG-06768</td>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syver W. More CPG-06981</td>
<td>AZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sean C. Muller CPG-06942</td>
<td>Greenwood Village</td>
<td>CO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James K. Munzter CPG-06911</td>
<td>CO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dennis B. Murphy, Sr. CPG-06912</td>
<td>FL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ronald M. Naman CPG-06882</td>
<td>NJ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edward A. Nemecek CPG-06980</td>
<td>AZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stephen D. Noel CPG-06883</td>
<td>AZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carl E. Norman CPG-06831</td>
<td>TX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lonnie D. Norman CPG-06799</td>
<td>TX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erik E. Olswong CPG-06822</td>
<td>PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christopher S. Peters CPG-06913</td>
<td>MI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Richard M. Powers CPG-06765</td>
<td>FL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>William F. Rapier CPG-06759</td>
<td>TX</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank You for 25 Years

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas C. Ratcliff</td>
<td>Austin</td>
<td>TX</td>
</tr>
<tr>
<td>Albert M. Richnafsky</td>
<td>Ripley</td>
<td>NY</td>
</tr>
<tr>
<td>James V. Roberts</td>
<td>Beckley</td>
<td>WV</td>
</tr>
<tr>
<td>William D. Robison</td>
<td>Fallon</td>
<td>NV</td>
</tr>
<tr>
<td>Robert A. Saar</td>
<td>Irvington</td>
<td>NY</td>
</tr>
<tr>
<td>Dennis R. Sasseville</td>
<td>Bedford</td>
<td>NH</td>
</tr>
<tr>
<td>Anthony S. Scales</td>
<td>Big Stone Gap</td>
<td>VA</td>
</tr>
<tr>
<td>Jeffrey T. Schick</td>
<td>Gahanna</td>
<td>OH</td>
</tr>
<tr>
<td>Paul V. Smith</td>
<td>Salem</td>
<td>NH</td>
</tr>
<tr>
<td>Philip G. Smith</td>
<td>San Anselmo</td>
<td>CA</td>
</tr>
<tr>
<td>Curtis C. Stanley</td>
<td>Spring</td>
<td>TX</td>
</tr>
<tr>
<td>Jackie E. Stephens</td>
<td>Mead</td>
<td>WA</td>
</tr>
<tr>
<td>Michael H. Stewart</td>
<td>Evergreen</td>
<td>CO</td>
</tr>
<tr>
<td>David W. Stoner</td>
<td>Syracuse</td>
<td>NY</td>
</tr>
<tr>
<td>Milton A. Surles</td>
<td>Houston</td>
<td>TX</td>
</tr>
<tr>
<td>Lewis W. Teal</td>
<td>Plant</td>
<td>FL</td>
</tr>
<tr>
<td>Charles M. Thomas</td>
<td>Snellville</td>
<td>GA</td>
</tr>
<tr>
<td>Thomas A. Trebonik</td>
<td>North Canton</td>
<td>OH</td>
</tr>
<tr>
<td>Harley A. Tucker</td>
<td>Canoga Park</td>
<td>CA</td>
</tr>
<tr>
<td>Tom A. Tveten</td>
<td>Naperville</td>
<td>IL</td>
</tr>
<tr>
<td>Thomas L. Uphoff</td>
<td>The Woodlands</td>
<td>TX</td>
</tr>
<tr>
<td>Joseph B. Vance</td>
<td>Mechanicsville</td>
<td>VA</td>
</tr>
<tr>
<td>Robert L. Vincent</td>
<td>Wichita</td>
<td>KS</td>
</tr>
<tr>
<td>Gregory L. Wallace</td>
<td>Scottsdale</td>
<td>AZ</td>
</tr>
<tr>
<td>Erick F. Weiland</td>
<td>Tucson</td>
<td>AZ</td>
</tr>
<tr>
<td>Walter D. Wells, Jr.</td>
<td>Houston</td>
<td>TX</td>
</tr>
<tr>
<td>Christopher M. White</td>
<td>Boston</td>
<td>MA</td>
</tr>
<tr>
<td>Jane M. Willard, PG</td>
<td>St Paul</td>
<td>MN</td>
</tr>
<tr>
<td>Milton A. Wiltse</td>
<td>Fairbanks</td>
<td>AK</td>
</tr>
<tr>
<td>Thomas R. Wood</td>
<td>Tallmadge</td>
<td>OH</td>
</tr>
</tbody>
</table>

Should I become a CPG?

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

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

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

www.aipg.org

Online Course: Geotechnical Properties and Engineering Problems of some of the North Central Texas Clay-Shales – Regional Geology Case History Series

- Cretaceous shales in the north-central Texas area give rise to engineering problems. This online short course covers:
  - Regional geologic setting, structure, and stratigraphy.
  - Specific material geotechnical properties including:
    - Clay mineralogy, values of Atterberg limits and indices, potential volume change, shear strength, etc.
  - Engineering problems and solutions concerning:
    - Accurate shear strength determination as dictated by field conditions, mass wasting, swell pressures and more.

Robert Font, PhD, CPG, PG, EurGeol – Author
Geoscience Data Management

AIPG Accredited! 0.5 CEU

www.geodm.com
www.aipg.org
AIPG White Paper: Importance and Future Roles of State Geological Surveys

By A Committee of Members of the American Institute of Professional Geologists

State geological surveys are vitally important to the economy of each state and to the nation. The information they collect and disseminate is used by other state agencies, by consultants, industry, developers, and the public as critical input in local and regional economic development plans, resulting in an economic advantage to the state. The information is essential for the responsible and sustainable development of a state’s mineral, energy, and water resources, safe development and modernization of infrastructure, protecting the public from losses due to geologic and natural hazards or anthropogenic hazards, and the wise use of the state’s natural resources for tourism and recreation. All of these are significant to the economy of the state and to the nation by providing jobs and various revenues, preventing or minimizing loss due to hazards and natural disasters, and by increasing our understanding of the earth’s resources and the need for sustainable use.

The American Institute of Professional Geologists (AIPG) formed a special committee to evaluate the importance of state geological surveys in today’s world and the future roles of the surveys. The committee included AIPG members who are familiar with and often work with the surveys. The committee members researched each geological survey, interviewed the State Geologists (the directors of the surveys), and reviewed guidance statements, organizational structure, programs, funding levels and staff roles of the surveys across the country. The committee concluded that state geological surveys provide critical functions in a cost effective manner that greatly enhances each state’s economy and environment. The surveys provide the public and private sectors considerable support on all types of important environmental and natural resource issues. Continued support of our state geological surveys is critical since the services they provide are invaluable.

The state geological surveys serve our country in a significant role by providing unbiased and sound scientific research, geologic data and maps, and reports to the public, industry, academia, government agencies as well as local, municipal, county, state, and federal legislators and regulators. The responsibilities of the surveys vary somewhat from state to state, depending upon the enabling legislation, the specific needs of each state and the traditions under which each survey evolved. A thorough understanding of the state’s geology is required to make informed decisions pertaining to the state and regional energy, water, mineral and land resources and to make this information available to the public. In many cases the longevity of a particular survey has allowed it to become the state’s most valuable source of information on natural resource issues. Some surveys were established well over 150 years ago and others are approaching 70 to 80 years of existence. State geological surveys continue to be a critical resource for the nation.

About one-third of the state geological surveys function under a state university system while the other two-thirds operate as part of state government, either as a stand alone agency or as part of a larger state governmental entity. Most state surveys are non-regulatory whereas some have enforcement duties. All provide data and information in support of other agencies that have regulatory responsibilities particularly with regard to public health and safety including mineral resource development, oil and gas exploration, dam safety, utilities siting and design, waste disposal facility siting and design, investigation and remediation of contaminated sites, and water well drilling. State surveys also serve as repositories for important geologic information and specimens such as geophysical data logs and rock core. These type of data repositories save the private sector millions of dollars in exploratory costs each year. Review of properly catalogued and archived rock core allows consultants, academia, and other public agency resource specialists and scientists to better understand the subsurface conditions at a site by using previously obtained resource information and reducing the need to obtain costly and perhaps redundant samples.

The surveys are managed and staffed by geologists, hydrogeologists, geophysicists, hydrologists, engineering geologists, GIS and spatial analysts, and other earth sciences professionals that have extensive knowledge of the earth’s natural resources in their states and surrounding region. These highly trained and qualified individuals play an important role in conducting geologic, hydrologic, and geologic hazards investigations and providing services that may be used to advise, inform, and educate stakeholders about the importance of earth sciences in public policy decisions. The surveys also provide outreach to the public, local government, state agencies, federal agencies, and industry; stimulate research, study, and activities in the earth sciences by supporting K-12 and university level education; and share expertise by participation in professional organizations and at conferences.
In the past, surveys conducted geologic mapping, often in support of mineral resource development. Today, in addition to traditional mapping and data collection, the surveys provide much broader services focusing on human health, the environment, natural geologic hazards and anthropogenic hazards, energy and mineral resources, water resources, land-use planning, agriculture, economic development, education, earth resources development, climate change, sustainability, public policy support, and tourism and recreation. A current trend is toward providing all data and reports in a digital format as well as accessing the archives of older reports and making them available in a digital format. This digital format has increased the value of the surveys by providing easier accessibility to geologic data and information to the public, state, and federal agencies.

The surveys develop and provide an array of publications for the general public as well as strong technical reports and data collections that are used by geologists and other earth science professionals in public agencies and private industry. Typical environmental and geological hazard reporting and mapping projects may include hazard zone maps for earthquakes, tsunamis, landslides, rock fall and other slope failure, sink holes, areas with accelerated soil erosion and other adverse soil conditions, land subsidence and earth fissures, volcanic activity, areas prone to flash flooding and debris flows, shoreline and stream erosion, geomagnetic storms, avalanche zones, radon, arsenic, and other local hazards. These reports and maps may be used to identify, inventory, assess, and mitigate geologic and subsurface environmental hazards to promote safe and responsible land use, and to facilitate emergency preparedness. Other important studies include identification of natural resources such as oil, natural gas, coal, geothermal energy, mineral resources, water resources (including conditions related to water quality and quantity), subsurface storage of CO2, hydraulic fracturing associated with shale gas extraction, and the need for alternative energy. It is critical to have a thorough understanding of these resources and their related geological settings for environmentally safe, economic, and sustainable development.

The surveys regularly provide staff and technical resource support to other state agencies. Cooperative programs with other state surveys and federal agencies add to the value of information from each survey. The surveys routinely assist the consulting community, industry, other local, state and federal agencies, to create the best solutions and at an economic benefit from shared professional knowledge and cooperative work. Most state geological surveys actively participate in federally-sponsored programs that lead to a better and more comprehensive understanding of the geology and subsurface resources of our nation.

The survey’s designated leaders are the State Geologists, who coordinate nationally through the Association of American State Geologists (AASG). This group shares ideas, issues and projects that enhance the group’s ability to better serve our nation. The state geologists often work closely with their state legislators as well as with members of the United States Congress to provide advice on how legislation may affect natural resources, the environment, and geologic hazards. As an example, AASG is taking the lead role in exploring America’s geothermal energy potential through an $18 million grant issued by the US Department of Energy (DOE) to develop a National Geothermal Data System (NGDS). Each state geological survey is involved in compiling, digitizing, and documenting their existing data for populating the NGDS in a coordinated effort that can be easily referenced to evaluate an area’s geothermal potential. Private industry is also involved in this project, which will lead to new software and database resources of great future value for many public and private sectors. Most state geological surveys participate in the US Geological Survey (USGS) Federal Cooperative Mapping Program, part of the National Geologic Mapping Act of 1992, which funds quadrangle mapping either through the STATEMAP or EDMAP programs. Each participating survey prepares geologic maps in an ongoing effort to map the entire United States on a statewide basis at a scale that is consistent and of the quality and detail to also be used to compile seamless digital maps for the entire country. State geological surveys also participate in the Geosciences Information Network (GIN) which links databases in the US state geological surveys (through AASG) and the USGS geology, geography, water, and biology databases. Cooperative programs such as these allow the state geological surveys to provide more useful maps, data sets, and reports and with a greater economic value.

The surveys contribute important data to the USGS and other federal agencies to compile assessments of minerals, energy, alternative energy, water, natural hazards, and other resources and information that are important to our nation. Mineral and water resource data submitted to USGS on a state basis are highly valuable to the USGS in evaluating known and potential resources and mining trends (quantity, quality, and projections).

The AIPG committee strongly supports the state geological surveys. The committee advises against neglect or termination of any of the primary state survey functions and highly recommends continued and even greater support for the long term and broad-reaching benefits afforded by the services of the surveys. It is vitally important that the surveys continue their efforts to conduct their work relevant to the issues of today and the future, to provide basic data and continue to map the geology and resources of each state, to continue the trend of providing information in a digital format, and to continue to work on cooperatively-funded projects, especially for those issues that are of value to each state and the entire nation. It is essential to maintain these valuable programs that are important to the public health and safety, to the environment and sustaining our resources, and the overall economy of each state and the nation.

Our nation’s state geological surveys serve a fundamental role in resolving many of the important issues facing our world today and in the future. Continued support of our state geological surveys is critical. Each state is fortunate to have a resource such as its state geological survey.

FREE RESUME POSTING
POST AND VIEW RESUMES FOR FREE ON THE AIPG NATIONAL WEBSITE VIEW JOB LISTINGS FOR FREE
www.aipg.org
Click on Jobs.
February 14, 2011

Mr. Bill Siok, Executive Director
AIPG National Headquarters
12000 N. Washington St., Suite 285
Thornton, CO 80241-3134

Dear Bill:

I want to personally thank you for the time and effort you put into the AIPG white paper, *Importance and Future Roles of State Geological Surveys*. This article is a great success and highly valued by the Association of American State Geologists (AASG). The article concludes that, "state geological surveys provide critical functions in a cost effective manner that greatly enhances each state's economy and environment. The surveys provide the public and private sectors considerable support on all types of important environmental and natural resources issues. Continued support of our state geological surveys is critical since the services they provide are invaluable." I know personally how in-depth the fact finding was for this white paper because I spent a considerable amount of time responding to questions for your committee about my survey's budget, mission, organization, and recent accomplishments. Speaking for AASG and the 2,500 geologists, engineers and support personnel of all 50 state geological surveys, I can say we are all pleased and honored to have such a great endorsement of our programs from the practicing professional geologists of America. Thank you!

AIPG's mission to advance the profession, certify geologists, promote high ethical standards, and advocate for geology is a terrific compliment to the missions of all state geological surveys. Your members are our friends, associates, colleagues, users, and providers of the vital geological information that is the stock-in-trade of both of our groups. I know from my close association with AIPG how vital and important your role in the promotion of our profession actually is.

At times like these when state and federal budgets are under attack and survey budgets are being cut, endorsements like this from AIPG can be and will be extremely important for defending our programs. I believe every state geological survey can include a copy of this white paper in their state legislature or university annual budget package. It has come at an extremely critical time in our nation's history because of the current serious fiscal outlook.

The Association of American State Geologists is certainly grateful for the excellent job you and the committee did on this white paper. This white paper will have a long lasting positive impact on all state geological surveys and we are very grateful for your effort.

Sincerely yours,

James C. Cobb, President
Association of American State Geologist
How We Speak

Robert A. Stewart, CPG-08332

As I was finishing my last column, How We Write, in the January/February 2011 TPG, and thinking ahead to this column, I recalled an article from the Wall Street Journal (WSJ) the topic of which seemed to make a good complement in terms of subject matter. The WSJ runs the occasional column “Managing Your Career,” and this particular item is entitled To Win Advancement, You Need to Clean Up Any Bad Speech Habits. The title says it all, and the author provides a variety of telling examples to make her point.

Teen Speak

Like, it is so cool to land a new job, and, like, I’m actually doing geology and gettin’ paid, dude! Well, yes, all of this may be true, but the impression was negative in terms of winning the respect of clients for one 23-year-old woman. The woman’s boss made her concerns clear, and asked her new hire to be mindful of creating a positive impression as an early-career professional and not an adolescent. The employee remarked “How you talk should not be how you’re judged, but of course it is.”

Poor Grammar

The president of a larger publishing company rejected sales and editorial candidates because they exhibited grammatically incorrect speech. “It’s as if they pulled out a baseball cap and put it on backward,” the publisher complained. “It simply reflects a low level of professionalism.” Poor grammar is considered unprofessional not just by employers, but also recruiters, whose fees depend on the success of the candidates they promote, and the recruiters want to make a good impression as well.

Heavy regional accents may also hinder employees if the audience views their speech as incomprehensible, and the speaker inarticulate and uneducated. Think My Cousin Vinny – the judge asks Vinny “What is a ‘yute’?” Vinny’s response “Oh, excuse me your honor, these youths...”

Foul Language

This should come as no surprise. A plant manager seeking a promotion to a corporate post was hindered by routine and frequent use of expletives. His employer hired an executive coach (a woman) to help him with the problem for eight weeks. The employee was able to change his habit, helped by the fact that he tended not to curse around females. The coach also taught the manager to avoid slang and use more formal language during meetings. The employee was promoted.

Tentative Speech

There are many tentative speech patterns that convey a sense of indecisiveness and lack of confidence. Beginning sentences with “I think...” or “Well...” do not establish the speaker as confident in presenting the subject matter that follows. Similarly, “uptalk” presents the same problem, in which declarative sentences end with a rising inflection. I often encounter this speaking style, and it leaves me wondering if the speaker is asking or telling. Lublin noted that a middle manager with this problem benefited from a speech coach, and the result was a more confident employee with greater respect from supervisors.

Speaking professionally is an asset that is widely recognized and discussed in print (WSJ and others) and electronic media such as careerbuilder.com and monster.com. Corrective action for poor speech comes in many forms. At the higher end are professional coaches and speech therapists hired by employers. Less expensive and more practical is asking a supervisor for an appraisal, self-rehearsal, and regular mentoring with a supervisor.

The WSJ article was published while my kids were, respectively, a freshman (my son) and junior (my daughter) in high school, and in fatherly fashion, I missed no opportunity to remind them of its central themes. For tentative speech – “Are you asking me or telling me?” Vulgarities? “I know what you hear at school – leave it there!” Teenspeak? “Like, do you want me to talk like this around your friends?”

My daughter has since graduated from university, and for three years was a paid tour guide for prospective students. In her senior year, during a tour a parent asked her what she had learned from the experience. She quipped that she could walk backwards around campus without tripping, didn’t use “like” in her conversation, and finished her declarative sentences without an upward inflection.

My son decided to join the U.S. Navy after high school, and after six months of pre-enlistment training, began his professional career as a new recruit in Great Lakes, Illinois. His first letter home was a two-page photocopy from the Navy that explained the program to the parents. Each recruit was required to fold the paper, put it in an envelope, and address the envelope for mailing. At the end of the photocopy was about half an inch for a personal note – “I have never heard more profanity...ever!”

As professional geoscientists, you may daily run up against jaw-dropping ignorance about our home, Planet Earth. Whether or not you go into your local school's classrooms to share a little about your profession with the students, you may be concerned about what if anything they are learning in school about the earth sciences. You share the concerns that drive geoscientists who support the National Association of Geoscience Teachers (NAGT). NAGT's mission is "to foster improvement in the teaching of the earth sciences at all levels of formal and informal instruction, to emphasize the cultural significance of the earth sciences and to disseminate knowledge in this field to the general public."

Our membership includes college and university faculty (~66%), K-12 teachers (~12%), educators working with the public, and geoscientists who are interested in education but may not be a formal educator. We are an eclectic group.

NAGT Organization

NAGT is run by an Executive Committee consisting of elected volunteers who typically serve for three to six years (http://nagt.org/nagt/organization/index.html). We employ a part-time Executive Director and support staff who keep the organization running smoothly. We also hire an editor for our Journal of Geoscience Education. NAGT is funded primarily by membership dues, as well as by donations and income from publications. NAGT has a number of geographic sections across the country, including parts of Canada. The smaller section structure allows members to focus their efforts more locally and thereby address the geology of their region and come together at less expense for meetings, field trips, and workshops. They can also more effectively collaborate with K-12 teachers in their region. We are currently considering modifying and extending our sections or groups to include international regions and specific interest groups like Two-Year College Faculty who desire a professional support group.

Publications

NAGT publishes in several different formats. We are introducing a new publication, In the Trenches, which will feature articles on teaching activities and tips for teachers, as well as book reviews and columns, such as “Ask Your Colleague.” This magazine is targeting teachers at all levels. It has a glossy, four-color, hard-copy format and each of its annual four issues focus on a theme. In this first year the themes are climate change, teaching in the field, service learning and learning in the local environment, and use of seismic data. Educators find that ideas and activities shared in our publications have immediate application to their work.

Our flagship publication is The Journal of Geoscience Education (JGE). The journal includes scholarly articles on geoscience education research and on curriculum and instruction, as well as commentary in the form of columns and editorials. It is now an online publication, with hard copy available at an extra fee. Content for its four annual issues will have open access after one year. This journal has evolved and continues to evolve since its first issue 60 years ago. The articles help the reader understand the learning process and how to effectively present information to students and the public.

We also publish, in collaboration with the American Geological Institute (AGI), 1) an environmental geology textbook, Living with Earth by Travis Hudson, that was recently published and 2) a Lab Manual in Physical Geology that is a popular choice for many geology departments.

Teaching Resources

Because geoscience educators need materials to teach concepts and skills in innovative ways, NAGT has been instrumental in fostering the development of a large number of teaching activities and related materials that are available online:

- http://nagt.org/nagt/teaching_resources/activities.html
- http://serc.carleton.edu/teachearth/search.html?q1=sercvocab__74%253A3
- http://serc.carleton.edu/NAGTWorkshops/search.html?q1=sercvocab__13%253A1
- NAGT has sponsored collections of some more specialized teaching materials focused on:
  - Teaching in the Field: http://nagt.org/nagt/field/index.html
  - Hazards: http://serc.carleton.edu/teachearth/site_guides/hazards.html
  - Teaching Introductory Geoscience Courses
  - Teaching Geoscience with Visualizations
  - Teaching Quantitative Skills, Thinking, and Reasoning
  - Teaching Geoscience Online
  - Energy and Climate Webinars and Book Club
  - Temporal Learning Journal Club
  - Teaching Mineralogy, Petrology, and Geochemistry in the 21st Century

Janis D. Treworgy, President of NAGT 2010-2011, Professor of Geology, Principia College, Elsah, IL
janis.treworgy@principia.edu

Janis D. Treworgy, President of NAGT 2010-2011, Professor of Geology, Principia College, Elsah, IL
janis.treworgy@principia.edu
Many others: [http://serc.carleton.edu/NAGTWorkshops/workshops.html]

As someone who came into teaching later in my career as a geologist, I have greatly benefited from some of these workshops as well as from the publications and online materials. They are a rich gold mine!

**Programs**

NAGT supports a variety of other activities as well, all with the goal of addressing the needs of innovative and effective geoscience education at all levels and venues.

**Student Support Programs.**

- NAGT offers partial scholarships for undergraduates to attend geology field camp ([http://nagt.org/nagt/programs/field_scholarships.html](http://nagt.org/nagt/programs/field_scholarships.html)).
- Since 1965, NAGT has collaborated with the USGS in support of their Summer Field Training Program, a student internship program that has placed many of the 1500 participants in full-time jobs at the USGS ([http://nagt.org/nagt/programs/usgs_field.html](http://nagt.org/nagt/programs/usgs_field.html)). They take only the best students from field camp programs, as recommended by their faculty. You might consider tapping this pool of students for employment opportunities.
- We also encourage excellence in teaching at an early stage in one's career through an Outstanding Teaching Assistant Award ([http://nagt.org/nagt/programs/ta.html](http://nagt.org/nagt/programs/ta.html)).

**Other Awards**

NAGT supports educators through a variety of awards. Some include monetary or membership benefits ([http://nagt.org/nagt/programs/awards.html](http://nagt.org/nagt/programs/awards.html)). If you know a precollege teacher in your area who has done an exceptional job in teaching and promoting interest in the geosciences, consider nominating her/him for the Outstanding Earth Science Teacher Award.

**Education and Public Policy**

NAGT has written position statements on specific issues related to geoscience education. We also manage a couple of email lists for discussion on public policy and science literacy. If you are interested in either of these topics, we invite you to go to our website and sign up ([http://nagt.org/nagt/policy/index.html](http://nagt.org/nagt/policy/index.html); you don’t have to be a NAGT member.

**Distinguished Speakers Series**

NAGT provides speakers on a variety of geoscience education topics ranging from alternative assessment to innovative strategies for teaching, to curricular reform and course design. If you are looking for a speaker for one of your luncheon meetings or seminars, consider an NAGT Distinguished Speaker ([http://nagt.org/nagt/programs/dsp.html](http://nagt.org/nagt/programs/dsp.html)). Speakers also will do workshops and in-person consultation with researchers and geoscience departments.

**Sponsored Sessions and Events**

As the geoscience profession has realized the need to strengthen and support geoscience education, NAGT’s mission, there has been an increasing number of sessions on some aspect of geoscience education at professional conferences for geoscientists as you may have noticed. This shift has required a greater recognition by all of us, from the practicing geoscientist in the field and their bosses to the K-12 teacher and faculty and administration of academic institutions, that effective geoscience education is the responsibility of all of us. For us to be able to maintain some balance in our lives, we should all get “credit” for our work in this line, rather than be penalized for it when it detracts from our other work or research. We have made progress. At the GSA in Denver in 2010, there were 22 topical sessions related to geoscience education, or 8% of the topical sessions; this is one of the three largest of 38 topical categories at the GSA conference. There are many education sessions at regional GSA meetings and at the American Geophysical Union meetings as well. These meetings also include an increasing number of workshops and field trips focusing on geoscience education ([http://nagt.org/nagt/programs/sessions.html](http://nagt.org/nagt/programs/sessions.html)).

**Geoscience Teachers-in-the-Parks**

You may have heard of the National Park Service’s Geoscientist-in-the-Parks program that grants interns an opportunity to collaborate with NPS staff on a variety of projects from building inventories, writing field guides, to giving interpretive talks for park visitors. Since 2006 NAGT has extended this program by funding a parallel opportunity for K-12 teachers and recent graduates in geoscience education programs who focus on developing materials for K-12 education while gaining experience in teaching in the field, lab, and classroom. Currently this program is functioning in Mammoth Cave National Park ([http://nagt.org/nagt/programs/GTIP.html](http://nagt.org/nagt/programs/GTIP.html)) and has been well received by teachers in the region who benefit from the program.

**NAGT-Sponsored Programs**

There are a number of projects that NAGT sponsors, or endorses, that align with our mission. Members may request access to NAGT resources. These projects are typically funded by NSF and currently include:

- **Building Strong Geoscience Departments**
- **Climate Literacy and Energy Awareness Network (CLEAN)**
- **DTEL: Digital Water Education Library**
- **EET: Earth Exploration Toolbox**
- **Geoscience in Two-Year Colleges**
- **The Math You Need, When You Need It**
- **MARGINS Data in the Classroom**
- **On the Cutting Edge: Professional Development for Geoscience Faculty**
- **Starting Point: Teaching Entry Level Geoscience**
- **Teach the Earth: A SERC Portal for Geoscience**
- **Web-based Interactive Landform Simulation (WILSIM)**
- **Workshop on Atmospheric Science and Climate Literacy**

**Conclusion**

Whether you are a formal geoscience educator or not and whether you are a member of NAGT or not, you can find support from NAGT for a wide range of activities that aim at improving the public’s understanding of our Planet Earth. You can find much information on our website: [http://nagt.org](http://nagt.org). We are partners with you in reducing the ignorance.
Dear Editor:

You will be pleased to know that we have compiled a complete list of outstanding earth science teachers receiving awards through the NAGT OEST program for 2010. A complete list of the OEST winners with addresses is included with this mailing for your convenience. On behalf of NAGT, I want to sincerely thank you and your organization for bringing additional visibility and stature to geoscience education through your support of NAGT's award program.

Dr. Gregory Wheeler
Chairman OEST Award Program,
Cathryn Manduca,
Executive Director NAGT

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

Eastern Section-Heather McArdle
Far Western Section-Nick Crooker
New England Section-Jennifer Judkins
Central Section-De Anna Tibben
Pacific Northwest Section-Chris Hedeen
Southeastern Section-Bryan Freeman
Southwestern Section-Laura Lukes

Dear Editor:

Is field camp still relevant? You bet it is! I would not hire a geologist who had not taken a field geology course. They say a picture is worth a thousand words. Well, an outcrop is worth a million or more! You can read all of the textbooks you want about a particular body of rocks, or articles about specific geologic problems. However, this does not translate into knowledge about every outcrop or geologic problem that you will encounter in your career. Geologic field study is not like building a bridge where the principles of construction are the same from bridge to bridge.

When you encounter a body of rock in the field or are given a field site to look over, the answers are not so obvious, even if the rocks look like something you have seen in a book or an article. Being exposed to rocks in the field forces one to attack the problem head on and to “rummage around” in one’s brain for answers. It’s scary, at first, and a little bit of a puzzle - to say the least. If you try to make your own personal discovery about the outcrop or site, then you are thinking - and this is what separates all geologists from other scientists and engineers. It’s your brain the employers want, not just your knowledge. It’s our ability to make sense out of what we see and encounter, even if we are given very little information in the beginning.

It does not matter what specialty in geology you undertake. Even if you spend most of your career sitting in front of a computer and writing algorithms for modeling, you still need to base your model on something that is in the real world. You have to know how accurate the model is and this can only be done by real world investigation and having the training to conduct your own investigations. Sure field camp is getting more expensive. This is a serious concern, but the burden of the expense of field camp should not be a reason for not taking the course, nor for geology departments to decide that the course can be eliminated.

Raphael Ketani, CPG-09003

MEMBERS IN THE NEWS

Lee Allison, MEM-0328, appointed to NSF AC-GEO-I’m honored to report that I’ve been appointed to a 3-year term on the Advisory Committee for the Geoscience Directorate of the National Science Foundation, beginning immediately.

The Geoscience Directorate (GEO) includes the Earth Science (EAR), Atmospheric and Geospace Sciences (AGS), and Ocean Sciences (OCE) divisions. The Fiscal Year 2011 budget request for GEO is $955 million.

As the principal source of federal funding for university-based fundamental research in the geosciences, the Directorate for Geosciences addresses the Nation’s need to understand, predict, and respond to environmental events and changes. GEO-supported research also advances our ability to predict natural phenomena of economic and human significance, such as climate changes, hurricanes, and earthquakes.

The charge of the NSF Advisory Committee on Geosciences is to
- Provide advice, recommendations and oversight concerning support for the NSF’s geosciences research and education portfolio.
- Be a base of contact with the scientific community to inform NSF of the impact of its research support and NSF-wide policies on the scientific community.
- Serve as a forum for consideration of geosciences initiatives and research thrusts.
- Provide broad input into long-range plans and partnership opportunities.
- Perform oversight of program management, overall program balance, and other aspects of program performance for geoscience activities.

Casey Joins Gannett Fleming (Houston, Texas)-Kimberly A. Casey, CPG-10221, P.G., has joined the Risk Assessment and Management Group (RAM Group) of Gannett Fleming, Inc. Gannett Fleming is an international planning, design, and construction management firm.

Casey is located in the firm’s Houston, Texas, office and serves as a principal hydrogeologist for the firm. Her responsibilities include business development, as well as conducting and supervising activities related to the cost-effective management of contaminated sites. These activities include risk-based site characterization, regulatory negotiations, risk assessment, and remedial activities.

With 20 years of environmental consulting experience managing public and private sector projects, Casey has significant experience with environmental regulatory programs at the local, state, and federal levels. She has managed projects for a variety of clients within a wide range of industries and has successfully managed diverse teams of professionals. Her scope of expertise
includes regulatory closures and strategy development; merger, acquisition, divestiture, and due-diligence assessments; groundwater management; spill response; and litigation support.

Casey holds a bachelor of science degree in geology from Sam Houston State University. A resident of Houston, Casey is a licensed Professional Geoscientist with the Texas Board of Professional Geoscientists and a Certified Professional Geologist with the American Institute of Professional Geologists.

**Brazie Named Transportation Group Manager of Gannett Fleming West, Inc.(Albuquerque, N.M.)-** Mike E. Brazie, CPG-05164, P.E., has been named transportation group manager of Gannett Fleming West, Inc., a New Mexico-based engineering corporation specializing in planning, design, and construction management. Brazie, a vice president and senior project manager, is based in the firm’s Albuquerque, N.M., office.

With this promotion, Brazie is responsible for business development, technical oversight, and overall management of staff working in the areas of road and bridge design, traffic analysis, drainage, geotechnical engineering, intelligent transportation systems, and related work. In addition to serving as principal for the firm’s transportation projects, he will continue to be responsible for project management. While primarily responsible for work within New Mexico, he and his staff provide support services in transportation analysis and design for other clients throughout the U.S.

Brazie holds a bachelor of science degree and a master of engineering degree in geological engineering from the Colorado School of Mines. He is a registered professional engineer in Arizona, Colorado, Kansas, New Mexico, Utah, Texas, and Wyoming. Brazie also is an active member of the American Association of Petroleum Geologists, the American Council of Engineering Companies of New Mexico, American Institute of Professional Geologists, American Society of Civil Engineers, Rocky Mountain Association of Geologists, and the Society of American Military Engineers.

**BCI CEO Rick Powers completes term as AGI President-** Richard M. Powers, CPG-06765, President and CEO of BCI Engineers & Scientists, Inc. recently completed his term as president of the American Geological Institute (AGI).

Power’s term ended on November 1, 2010, when he passed the gavel to incoming AGI President Skip Hobbs. He will continue to serve on the Institute’s Executive Committee until November 2011, which will complete six years of continuous service to AGI, a nonprofit federation of 49 associations that represent more than 120,000 geologists, geophysicists, and other earth sciences. During his tenure as president, Powers said AGI increased its membership, hosted a very successful geoscience education summit, increased communication with its member societies, and reviewed its current business model to assess its relevance for the future. In his new role as past president, Powers will continue his emphasis on increased communications and planning for the institute’s future.

In addition to his AGI service, Powers has held leadership roles in several other professional societies. He has served as national president of the National American Institute of Professional Geologists (AIPG) and Florida Section President for the Society for Mining, Metallurgy and Exploration and AIPG. In recognition of his professional accomplishments, Powers was awarded AIPG Florida Section Geologist of the Year in 1991 and the National AIPG Martin Van Couvering Memorial Award in 2006.
Organizing Underway for Arizona Science & Technology Festival

Planning is moving quickly for a 2012 Arizona Science and Technology Festival intended to rival the best such events in the nation. Jeremy Babendure, who was co-director of the hugely successful San Diego Science Festival, has moved to Arizona State University to set up a major event for Arizona. Jeremy told me that in just under two months they have met with over 50 organizations in industry, academia, the community and K12 and now have over 100 concepts in the works and likely 200 by the end of February. The first USA Science & Engineering Fair, held on the Capitol Mall in Washington, DC this past fall, was an incredible success drawing 500,000 visitors to over 1,500 free exhibits. The year 2012 is Arizona’s Centennial which should provide an incentive to make our event special.

AZGS will be assisting Jeremy and his team with engaging the Tucson community in the Festival. He graciously agreed to let me share their list of tentative concepts from the early meetings. Remember, these are all subject to change. And if you want to become involved, contact Jeremy:

Jeremy Babendure, Ph.D., Director, Arizona Science and Technology Festival Office of Public Affairs, Arizona State University Email: jbabendure@asu.edu, Phone: 480-250-7764

Here’s the preliminary list of ideas: In the field science and collaborator events:

- Highways and Wildlife – Arizona Game and Fish
- Discovery Day - Southwest School of Naturopathic Medicine
- Walk For Brain Tumor Research - Students Supporting Brain Tumor Research
- Arizona Water Festivals - Project Wet
- A Day at Barrows Neurological Institute - Barrows Neurological Institute
- FutureScape City Nanotechnology Tour - ASU’s CSPO
- A Mathematical Walking Tour of the Botanical Gardens - Carole Greenes, ASU Prime
- Neighborhood Science Conversations-Experience science one’s own neighborhood with dozens of programs that highlight exciting careers in science, foster debate on pressing issues of the day, provide hands-on experiences for people of all ages.

Hubs
- Chandler – Innovations; Gangplank
- Glendale – Deer Valley Rock Art Center
- Mesa – Mesa Community College; Polytechnic Elementary
- Phoenix – University Public School; Benchmark Charter School
- Scottsdale – Skysong
- Tempe – ASU Museum of Anthropology, ASU Museum of Art, Barrett Honors College

Programs
- From Fish to Hook - Arizona Game and Fish
- Arizona Wildlife – Arizona Game and Fish
- Build Your Own Optical Illusion - Steve Macknik and Susan Martinez-Conde Lab
- Mind and Machine - Kinetic Muscles
- Toy Shop Engineering – EVIT
- Science of Collaboration - Gangplank Junior
- The art of science – Gangplank Junior
- Intro into Computer Programming Using Scratch – Gangplank Junior
- Intro into Electronics – Gangplank Junior
- Intro into Robotics – Gangplank Junior
- Intro into Green Science – Gangplank Junior
- Intro into Bioscience – Gangplank Junior
- Intro into Space Exploration – Gangplank Junior
- Intro into Geology – Gangplank Junior
- Biotech Teacher Workshop- Adrienne Scheck
- Science is Fun – ASU CEEE
- GPA: Is it a plague on education? - ASU School of Business
- Big Brother and Technology - ASU College of Law
- Intellectual Property and Entrepreneurship - ASU College of Law
- Health Care and Entrepreneurship - ASU College of Law
- Does My Dog Have Valley Fever? - ASU SOLS
- The Future of Health Monitoring – Biodesign
- Hohokam Canals and Long Term Water Use - ASU SHESC
- Soil Labs to determine prehistoric land use - ASU SHESC
- Uncovering Myths of 2012 - ASU SHESC

Lee Allison, MEM-0328
Arizona State Geologist
ORGANIZING UNDERWAY FOR ARIZONA SCIENCE & TECHNOLOGY FESTIVAL

- Forensic Anthropology - ASU SHESC
- Model of Complex Systems - ASU SHESC
- Travelogues about Ethiopia, Tanzania, and South Africa - ASU SHESC
- Pandemics in Arizona - ASU SHESC
- Alternative Imaginations: Rethinking Knowledge Systems – ASU CSPO
- Science Debates –ASU CSPO

Science Cafe’s
- Anne Stone, Neanderthals – ASU SHESC
- Brenda Baker, mummies – ASU SHESC
- CSPO will produce 3 science café’s, including one in Spanish

Signature Events
High energy, thought provoking events that draw crowds in the hundreds to thousands. Events already in development include:
- The Science of Magic – Steve Macknik and Susan Martinez-Conde
- Medical Careers of the Future – CHW
- Weird Science – Gangplank
- 2 Premiere Origins events - ASU Origins

World Premiere Conferences
Multiple world-class science conferences will be planned and draw visitors to Arizona during the Festival to experience the exciting events.
- International Conference of Sustainable Science, ASU GIOS
- Conference on Law and Sustainability, ASU College of Law

EXPO Booths and Performances
Highly visible exhibition providing engagement and exchange opportunities for children, teens, families, and local science professionals with dozens of hands-on activities, performances, interactive demos, science challenges, and family-oriented science entertainment.
- Prehistoric Kids Zone - Deer Valley Rock Art Center
- The Egg Drop Challenge - Coyote Middle School

Science, Innovation and Entrepreneurship - Miss Science and Biz in a Box
- Hands-on displays of fossils and bones and/or "digging for fossils" display - ASU SHESC
- Letters to Lucy" as an interactive booth; hosted by becoming human. org - ASU SHESC

Year Round Programs
- Junior Researcher Speaker Series – Barrows and ASU Undergraduate Researchers
- The Art of Water – ASU SHESC, SRP, Maricopa County Office of Education
- School Water Audit – Project Wet
- Pay it Forward Science – Benchmark Charter School at 6:45 PM

Remember, these are all subject to change. If you want to become involved, contact Jeremy:
Jeremy Babendure, Ph.D., Director, Arizona Science and Technology Festival Office of Public Affairs, Arizona State University Email: jbabendure@asu.edu, Phone: 480-250-7764

Zone 100 Presenters
Pairing 100 of Arizona’s most inspiring leaders in science & technology with local secondary schools
- Mark Jacobs – Dean, Barrett Honors College
- Chuck Kazilek - “Ask a Biologist’s Dr. Biology” ASU SOLS
- Lawrence Krauss –Director Origins Initiative; Co-Director Cosmology Initiative

GeoScience Data Management Proudly Presents
An Introduction to Landslides or Mass Wasting
An Online Course
AIPG Accredited (3.5 CEU’s)
- Landslides classification
- Soil mechanics principles
- Strength of earth materials
- Geologic influences
- Case histories
- Factors influencing mass wasting
- Control & prevention of mass wasting problems
- Slope stability analysis

For more information, contact
rgfont@geosciencedm.com, sbishop@geosciencedm.com, or visit our website at www.geodm.com or www.aipg.org
Robert Font, Ph.D., CPG, PG, EurGeol - Author
American Institute of Professional Geologists (AIPG)  
Georgia Section Presents:  
3rd Conference: Innovative Environmental Assessment  
and Remediation Technology

SCHEDULE:     Tuesday April 19, 2011 and Wednesday April 20, 2011

LOCATION:     Kennesaw State University  
Continuing Education Building  
3333 Busbee Drive  
Room 400  
Kennesaw, Georgia 30144

This conference will focus on all innovative technologies being used in the environmental field including but not limited to chemical oxidation and surfactants. Case studies will include petroleum hydrocarbons and chlorinated solvents sites. Presenters will include representatives from private consultants, regulatory personnel, industry, and legal backgrounds. Attendees will earn 14 personal development hours of continuing education.

If interested in presenting or exhibiting, please contact:

Ron Wallace at AIPG Georgia Section, 3650 Garrards Crossing, Roswell, GA 30075  
Office: 404-362-2589 or email: Ronald_wallace@dnr.state.ga.us

Register Online - www.aipg.org

2009 EXHIBITORS

[Images of various company logos]
1. This important marine invertebrate (well represented in the fossil record) has two valves (shells) protecting or covering the animal on its dorsal and ventral sides (upper and lower surfaces). Morphologically, there is inequality of the two valves in shape and size and equilateral symmetry of each valve. What is it?
   a) Pelecypod
   b) Bryozoan
   c) Brachiopod

2. In rock mechanics, which of these types of fractures would you expect to be essentially parallel to the direction of the major principal stress $\sigma_1$?
   a) Release fracture
   b) Shear fracture
   c) Extension fracture.

3. We are in need of a source of sodium. Which of the following minerals would provide us with such?
   a) Cryolite
   b) Cerargyrite
   c) Sylvite

4. What would you say is the probability of recurrence (e.g., the probability of occurrence in any given year) of a “50-year” flood?
   a) 2%
   b) 5%
   c) 50%

5. In the structural analysis of a tectonic structure, consider two positive force vectors of substantial magnitude, where vector “a” is the force vector in the “x” direction and vector “b” is the force vector in the “y” direction. We would expect their “scalar product” or “dot product” to be zero ($a \cdot b = 0$), but what would their “cross product” ($a \times b$) tell us?
   a) The “cross product” would give us a scalar quantity, equivalent to the “work” done by force vector “b” in moving an object along the path of force vector “a”.
   b) The “cross product” would give us the force vector in the “z” direction, perpendicular to both “a” and “b”.
   c) The “cross product” would give us the force vector which is the “resultant” of both vectors “a” and “b” in the plane that contains them.
   d) The “cross product” would lead to a natural disaster of catastrophic proportions!
Advocacy for the profession of geology is one of AIPG’s primary goals. I ordinarily would not consider this a subject for a President’s message, but I recently found an occasion to get fired up on the topic. My attention was drawn to advocacy during an American Geological Institute (AGI) member society meeting in early November 2010. AGI is a society whose members do not comprise individuals, but rather consist of entire societies such as AIPG, AAPG, GSA, AGU, and many others that collectively represent more than 120,000 geologists, geophysicists, and other earth scientists. AGI was founded in 1948 to “serve as a voice of shared interest in our profession” (i.e. advocacy for the profession). AIPG has a strong and constructive relationship with AGI that is based on consistent goals and an understanding of the significance of those goals. It would seem that we should have common interests amongst our other sister societies; however, that may not be the case, or at a minimum, we lack a common understanding of what constitutes advocacy.

The advocacy issue arose at the AGI meeting following an introductory statement that our Executive Director, Bill Siok, was asked to give. Bill briefly explained AIPG’s mission, which, among other things, included advocacy, and he then described recent educational seminars that AIPG sponsored on the Marcellus Shale in Pennsylvania and aquifer storage and recovery in Florida. Bill’s presentation was followed by an invited speaker from another sister society and several comments from the attendant societies. This following speaker and the subsequent commenters made it clear that their societies are not advocates and emphasized that they do not promote one side or another of an issue. They stressed that their membership focuses on science, the research into their particular specialties of interest, and outreach to students. They clearly do not understand how advocacy is applied by AIPG or by AGI.

AIPG was founded in 1963 to promote the profession of geology. In fact, our mission “is to be an effective advocate for the profession of geology and to serve its members through activities and programs that support continuing professional development and promote high standards of ethical conduct”. There is nothing in that statement that says that we will advocate (promote) a particular side of a hot button issue such as climate change or hydrofracturing for unconventional shale gas development. It is better to leave those promotional activities to politicians, environmental advocates or even lawyers. Lawyers, in fact, are ethically bound to advocate for their clients. This often places professional geologists in conflict with lawyers, but professional geologists will be well respected if they adhere to the proper application of the science and leave client advocacy to the lawyer.

My view of advocacy by AIPG is to promote the science of geology and the ability of professional geologists to apply the science to address related issues. We must keep in mind that our membership consists of a wide range of applied specialties and employment. It is expected that our membership should have a range of viewpoints that extends to all sides of the major societal issues that involve the science of geology. The AIPG goal is to raise our individual and collective level of knowledge and to increase public awareness and respect for the opinions of professional geologists. The seminars that Bill Siok offered as recent examples of AIPG activity exemplify how AIPG has brought experts together to present state-of-the-art concepts in hydrofracturing and aquifer storage and recovery. These seminars were offered to scientists, policy makers, regulators and the general public. This format demonstrates that professional geologists and other related scientists have expertise to offer to the public when pertinent issues arise. This is what AIPG intends as advocacy.
PRESIDENT’S MESSAGE

PROFESSIONAL MEMBER APPLICATION

American Institute of Professional Geologists
Professional Member Application
Sign up Online – www.aipg.org
12000 N. Washington Street, Suite 285, Thornton, CO 80241 – (303) 412-6205 - aipg@aipg.org

Professional Member Dues (Membership is activated upon receipt of dues.)
If you apply: Dec – Mar = $100; Apr – Jun = $75; Jul – Sep = $50; Oct – Nov = $25
Payment: □ Enclosed
□ Bill Me

Last Name: First Name: MI: Suffix:

Employer Name: □Mr. □Ms. □Mrs. □Dr.

Preferred Mailing Address: □ Home □ Business  □ Male □ Female  □ Year of Birth:

Street:
City: State: Zip: Country:

Work Ph: Home Ph: Cell:

Email: Yr Highest Degree Awarded:

Geological Degree: □BA □BS □MA □MS □PhD University:

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

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

Applicant Signature: Date:

HEADQUARTERS USE ONLY  Amt: Date Rcvd: Mbr #:

AIPG
Student Chapters

Bowling Green University
Founded in 2004
Chapter Sponsor: Robert K. Vincent, MEM-0216

Central Michigan University
Founded in 2003
Chapter Sponsor: Eric Wallis, CPG-09518

Colorado School of Mines
Founded in 1999
Chapter Sponsor: Graham Closs, CPG-07288

Eastern Michigan University
Founded in 2006
Chapter Sponsor: Walter J. Bolt, CPG-10289

Georgia State University
Founded in 2005
Chapter Sponsor: Ronald Wallace, CPG-08153

James Madison University
Founded in 1998
Chapter Sponsor: Cullen Sherwood, CPG-02811

University of California-Davis
Founded in 2010
Chapter Sponsor: James Jacobs, CPG-07760

University of Nevada-Reno
Founded in 2008
Chapter Sponsor: Jonathan G. Price, CPG-07814

Ohio State University
Founded in 2004
Chapter Sponsor: Thomas Berg, CPG-08208

Temple University
Founded in 2006
Chapter Sponsor: Dennis Pennington, CPG-04401

University of West Georgia
Founded in 2010
Chapter Sponsor: Eric Lowe, MEM-0385

Wright State University
Founded in 1996
Chapter Sponsor: Thomas Berg, CPG-08208
Answers:
1. The answer is choice “c” or “brachiopod”. Brachiopods constitute a phylum and belong to the class “Brachiopoda”. “Pelecypods” are mollusks belonging to the class “Pelecypoda”. They are characterized by bilaterally-symmetrical bivalved shells enclosing the right and left sides of the organism, by a hatchet foot, the lack of a distinct head and sheet-like gills.

Bryozoans constitute a phylum of colonial organisms with calcareous skeletons and U-shaped alimentary canal.

2. The answer is choice “c” or “extension fracture”.

“Shear fractures” typically make an angle of about 30 degrees (less than 45 degrees) with the major principal stress direction ($\sigma_1$). They may occur alone or as part of conjugate sets. Their plane is parallel to the intermediate principal stress direction.

“Release fractures” would be expected at right angles to the $\sigma_1$ direction. They generate as a result of a decrease in the maximum principal stress.

Failure through fracturing is characteristic of brittle behavior of rock units. Some rock types, such as shale and limestone, may deform in brittle manner at relatively low confining pressures and temperatures, but in ductile mode as these environmental factors increase. Other rocks, such as certain dolomites and quartz-rich lithologies, may fail in brittle fashion without passing through a ductile or plastic stage.

3. The answer is choice “a” or “cryolite”. “Cryolite” is a sodium and aluminum fluoride ($Na_3AlF_6$).

“Cerargyrite” is a silver ore, or silver chloride ($AgCl$).

“Sylvite” is potassium chloride ($KCl$) and a chief source of potassium.

4. The answer is choice “a” or 2%.

The “probability of recurrence” ($P$) and “recurrence interval” (RI) are given by:

$$P = 100 \left[ \frac{m}{n+1} \right]$$

$$RI = \frac{n+1}{m}$$

In the above equations, “m” is the relative magnitude of the flood and “n” is the number of years over which records are kept. In a 50-year flood, $RI = 50$. Thus,

$$P = 100 \left( \frac{1}{50} \right) = 2\%.$$  

5. The answer is choice “b” or “the ‘cross product would give us the force vector in the “z” direction, perpendicular to both “a” and “b”.

The “vector product” or “cross product” of two vectors “a” and “b” is:

$$|a \times b| = |a| \cdot |b| \cdot \sin \gamma$$

The “cross product” yields a vector “c” whose direction is perpendicular to the plane that contains both “a” and “b” and whose magnitude is given by the absolute magnitude of “a” times the absolute magnitude of “b” times “sin $\gamma$” (where $\gamma$ is the small angle between “a” and “b”). Note that $a \times b = 0$ if “a” and “b” are parallel, since $\gamma$ would be equal to 0 or $\pi$ and, consequently, $\sin \gamma = 0$.

In our problem, “a” and “b” are defined as force vectors in the “x” and “y” directions and are therefore orthogonal. The “cross product” ($a \times b$) describes a third vector “c” perpendicular to the other two, or the force vector in the “z” direction which establishes the third dimension. Choice “a” is not correct, as it defines the results of the “dot product”, not the “cross product”.

Choice “c” is also incorrect, as we would be adding vectors a and b rather than obtaining their vector or cross product ($a \times b$).
The AIPG Executive Committee at its February meeting effected some changes to AIPG Bylaws. These changes have positive implications for AIPG membership, particularly for students and postgraduate geoscience practitioners.

One modification which was made is designed to clarify the distinction between two AIPG membership categories: Certified Professional Geologist (CPG) and Member. The latter category, Member, has been reclassified as Professional Member. This change was made for two reasons.

Anyone who belongs to AIPG is a member of AIPG, irrespective of the category of membership. When AIPG refers to members it refers to all categories of membership. Henceforth, AIPG will no longer identify any specific membership category as ‘Member’.

In addition, the Executive Committee wished to extend proper recognition to its professional members who have elected not to seek the CPG. Professional Members are encouraged to seek certification as CPGs, and are the fastest growing membership category.

Another significant membership change is directed at students. AIPG, like its sister societies, strives to recruit students into AIPG departmental level chapters. AIPG is moderately successful at bringing students into the organization, but is challenged to retain most of them after graduation.

The Executive Committee approved a new article to the AIPG bylaws recognizing a new membership category, Young Professional Member. Young Professional Member is intended to include the transition period between graduation with baccalaureate and three years following.

The new article to the AIPG bylaws approved by the Executive Committee:

2.3.2.1 Requirements to be a Young Professional Member.

The requirements to be a Young Professional Member shall include

1. A baccalaureate or higher degree in a geological science; with

2. a minimum of thirty semester hours or forty-five quarter hours, or the academic equivalent thereof, in one or more of the geological sciences, and, at the discretion of the Executive Committee, acceptable continuing education to demonstrate a currency with technical, regulatory, and economic factors affecting the profession. In lieu of 1 and 2 above, evidence satisfactory to the Executive Committee of the applicant’s sound knowledge and proficiency in a field of geological science may be substituted.

3. Applicability during the first three (3) years upon earning a baccalaureate. Thereafter the Young Professional Member will automatically be upgraded to Professional Member.

Membership dues for the Young Professional Member will be at one-half (1/2) the Professional Member rate.

It is anticipated that an increased percentage of students, with encouragement from other AIPG members, will elect to retain membership after graduation.

Accordingly, Student Members will no longer be assessed any dues while enrolled in an undergraduate program leading to a baccalaureate degree. They will continue to enjoy an electronic subscription to TPG, as well as the prerogatives outlined in the bylaws.

Every society uses the tired old cliché, which does not diminish its truth that the students are the future of our respective societies. Please mentor and encourage them to engage in society activities, including governance.
Receipt of an Unexpected Bonus after Work is Completed (column 131)

Christopher Dail, CPG 10596, wrote, “In column 131, Jan/Feb ’11) Matt Shumaker, (CPG-07319) submitted a hypothetical situation involving an unexpected and unsolicited bonus paid to a consultant upon completion of a fixed price or hourly contract. The ensuing discussion focused on a number of points involving ethics and professional issues related to conflicts of interest and the perception of the possibility of conflicts of interest relating to the bonus as it might appear to third parties. In this case without knowing the specifics, payment of a bonus should not necessarily be considered unethical. If there is no obvious or potential problem from a public health and safety standpoint, possibility of public perception of impropriety, or potential conflicts of interest from the consultant’s work results regardless of the outcome of his or her work then the bonus could be accepted.

“However, there are many obvious situations where the bonus should not be accepted. For example, the consultant’s work involved an environmental project where the client has asked for a report documenting the presence or absence of a potential environmental problem. Clearly a bonus paid for a specific outcome in this situation would be unethical and even probably illegal if the consultant or the client were to use the report in a public filing or property transaction where the presence or absence of a potential environmental liability has financial or legal ramifications for any parties. But also, the obvious possibility of the perception of impropriety would preclude acceptance of the bonus as was pointed out by several respondents. Cases like this would appear to be relatively cut and dry.

“If the case involved an evaluation like the one described above, and the consultant completed the job well ahead of time and the estimated budget provided to the client (assuming there was a time and materials cost structure to the contract with a cost estimate as part of the contract versus a fixed price contract as Matt described). Could the consultant accept the bonus? Probably not since the possible perception of impropriety or bias probably would preclude it as well. However, take a contract situation where the results don’t have the burdens of an environmental or financial consideration/liability (e.g., a simple data compilation contract) then, in my view, a surprise bonus for getting the job done cheaper and faster than planned and originally bid could indeed be accepted by the consultant.

“Let’s examine this concept in regards to performance bonuses (not an unsolicited bonus as in Matt’s hypothetical case) which are very common in both the petroleum and metallic minerals exploration industries. Although as Matt and others pointed out, accepting a fee contingent upon a certain positive outcome could and likely should be considered a potential conflict of interest or ethics issue under most circumstances, a predetermined payment for a positive outcome for a project in itself should not necessarily be considered a ethics violation provided a number of considerations are examined, disclosed and made clear to all parties in advance and that documentation of these predetermined contractual relationships (and associated conflicts or potential conflicts of interest) are disclosed in full in any written, oral, or electronic documentation associated with the work performed. Acceptance of royalty interests, stock, or other ‘in kind’ payments in lieu of full fees are common in contractual arrangements in both industries and in themselves should not be assumed to be contrary to ethics rules. Without this mode of payment, many of us would not be able to make a living in the industries in which we work. Full disclosure of ownership interests, royalty interests, stock, or the possibility of obtaining them should be reported (Rule 3.1, 3.1.2 and others) in any documents, filings, or reports generated by the consultant in these circumstances, and indeed are required under most stock exchange reporting regulations. In many cases the existence of these rights or potential rights makes an individual an ‘insider’ and regulations dictate that the consultant and the client obtain independent third-party review of work performed under these circumstances as do AIPG ethics rules (Rule 3.3.3). The CIM1 and Canadian National Instrument 43-101 guidelines for Qualified Persons reporting on mineral resources or reserves spell this out clearly and are good examples of how

PROFESSIONAL ETHICS AND PRACTICES - Column 132

this can be addressed from an ethics disclosure standpoint. Most senior management and staff in the oil and gas and mining industry routinely are provided performance bonuses of this type based on company and or personal performance benchmarks they may include bonuses for discovery of significant petroleum accumulations or ore deposits. The key is to ensure that when these contractual relationships and conditions exist that: 1) they are disclosed to all parties to the contract, shareholders, investors, and potential stakeholders, including regulatory authorities with jurisdiction on reporting of exploration results; 2) that the arrangements do not violate laws, regulations, or guidelines; 3) that the arrangements do not preclude a fair and honest appraisal of the discovery; 4) that there is no obvious perception problem with the individuals work results; and most importantly, 5) that there is a predetermined and well-defined requirement for a truly independent qualified third party to validate and/or conduct an independent review of the data collection, procedures, etc. used in the definition of said discovery whether it be petroleum or minerals before it can be reported to any parties.”

Dail is correct in observing that there are a variety of situations in which bonuses are paid such as making a significant discovery or managing a project that comes within time and under budget. As Dail points out, having the possibility of the bonus and the circumstances for its award spelled out in advance, preferably in writing, and with disclosure to all interested parties avoids most of the ethical difficulties. There are government contracts with these types of provisions.

I will note an interesting wrinkle on such a bonus and insider trading. In the original insider trading case, SEC v. Texas Gulf Sulphur, which involved the discovery of the Kidd Creek base metal massive sulfide deposit in the early ‘60s, Texas Gulf’s exploration head was one of the few in the company who knew about the discovery when he was granted a bonus by the board of directors, which didn’t know. The court found that there was legitimate reason for not telling the board about the discovery at the time the bonus was granted and that the exploration head would have made people wonder had he not accepted the bonus. Exercising the granted options was another issue. When the Kidd Creek discovery was announced, the board reaffirmed the earlier bonus.

Here and There!

I hope everyone, although particularly students, read James Adu’s (Mem 1311) article “Here and There!” in the Jan/Feb ’11 TPG. Adu, who is Ghanaian and currently a graduate student at New Mexico Tech, recounts his experience of his first trip to the western US to attend the 2009 AIPG annual meeting in Grand Junction. A whole new world of geology and geologists opened up for him. But his most important observation was that the attendees were mostly older geologists rather than younger geologists such as Adu. This contrasted with Ghana where most geologists are younger. Adu comments on the need for younger geologists to learn from the experiences of their older colleagues, particularly about how geology is actually practiced outside academia. Older geologists are almost always willing to share with their younger colleagues, but you usually have to ask; you have to introduce yourself and start the conversation. Adu took the step of traveling from Ghana to Grand Junction to meet other geologists. As one of those who met him, I tried to give thoughtful answers to the questions he asked, including thoughts about graduate schools. One of my highlights at the 2010 GSA Annual Meeting was meeting Student’s Voice columnist Stephanie Jarvis, SA-1495, and discussing how we created our columns. We also talked about Jarvis’ plans for graduate school. Jarvis’ “Go for it!” column in the Jan/Feb ’11 TPG echoes Adu’s theme. Geologists of any age are fun to be around. Let’s mingle more.

Criminal Action Against John Paterson for Tampering with Assays

In column 123, Sep/Oct ‘09, I reported that the Australasian Institute of Mining and Metallurgy (AusIMM) had publicly banned John Gregory Paterson from AusIMM membership for life as a result of his tampering with reported assays from Southwestern Resources’ Boka gold property in southwestern China. On January 7, 2011, Paterson was arrested in Canada on criminal charges alleging that Paterson, the only person who received assay certificates from the analytical lab, simply “adjusted” the assay results with excessive grades and entered them into the company’s database. The fraud was discovered in June 2007. This case shows that while the professional society’s (AusIMM’s) action may have taken longer than some may have liked, they acted well before the criminal action was brought. The inquiry into such cases takes time regardless of whether the inquiry is being done by a volunteer professional society ethics committee or paid investigators for a law enforcement agency. Regardless of the time required, action is taken.

Pay Attention to Proper Punctuation and Format Style

The heading for a letter to the Editor of the Geological Society of London’s October 2010 issue of the Geoscientist caught my attention; it read, “Support Contaminated Land Specialists!” In what way are these land specialists contaminated? I believe the author intended to refer to a group known in the UK as contaminated-land specialists. (Just how this group differs from environmental geologists and geotechnical engineers is not made clear.) The point being that proper punctuation makes a big difference, as pointed out in Lynne Truss’ delightfully, if pointed, Eats, Shoots & Leaves: The Zero Tolerance Approach to Punctuation (2006, paperback). The Chicago Manual of Style2 notes that “A phrasal adjective (also called a compound modifier) is a phrase that functions as a unit to modify a noun. A phrasal adjective follows these basic rules: (1) Generally, if it is placed before a noun, you should hyphenate the phrase to avoid misdirecting the reader [dog-eat-dog competition]. There may be a considerable difference between the hyphenated and the unhyphenated forms. For example, compare small animal hospital with small-animal hospital” (entry 5.92). Hence my question about how the land specialists are contaminated.

Grammar and punctuation, subjects most of us were subjected to in junior

2. I use the CD version of the 15th edition, 2003, which is a lot easier to use than the printed book. A 16th edition was released in August 2010. An online subscription service apparently replaces the CD version and costs $35 for one year or $60 for two years for an individual. There are also group rates; go to www.chicagomanualofstyle.org.
high (now middle school) with less tedious revisits in high school and possibly later, are not most people’s favorite study. And without periodic refreshers and recourse to books on the subject, we forget things and do not learn about new conventions. An equally important subject not generally taught at all is style and formatting, which deal with things like the use of appropriate fonts, layouts, etc. Those old enough to have taken a typing class on a typewriter were given some elementary formatting rules, almost all of which are now wrong because word processing programs can display italics, font sizes and types are easily changed, and footnotes are easily inserted. *The Chicago Manual of Style* is an excellent reference a large number of grammatical and formatting issues. I wish more people would refer to it rather than going with some concept of “it looks right to me,” with frequently unfortunate results.

3. New conventions include items such as how to break long URL strings across lines. The 16th edition recommends that the line break precede the “/”. The old type writing convention of placing 2 spaces after sentences has never been correct when using proportionally spaced fonts, which typewriters did not have. Does anyone really yearn for the return of monospaced Courier or Elite fonts?

**PE&P Index**

With the publication of each *TPG* issue, I update the PE&P index that is posted on AIPG’s website at www.aipg.org/About/pepindex.xls. Unfortunately, I discovered in mid-November that I’d made a bad sort of the master file that didn’t include the (PE&P column) # column and so the index wouldn’t point you to the correct PE&P column number. This problem has now been fixed. If you use the index, please make sure to download the up-to-date and corrected version. If you should find other errors in the index, please let me know so that I can correct them. With 132 columns now in print, mistakes may be present as anyone who tries to maintain data files knows is a constant struggle.

**Invitation from AIPG to Submit Articles**

You are invited to submit an article, paper, or guest column based upon your geological experiences or activities to the American Institute of Professional Geologists to be included in “The Professional Geologist” (*TPG*) bi-monthly journal. The article can address a professional subject, be technical in nature, or comment on a state or national issue affecting the profession of geology.

Article submissions for *TPG* should be 800 to 3200 words in length (Word format). Photos, figures, tables, etc. are always welcome! Author instructions are available on the AIPG website at www.aipg.org.

Please contact AIPG headquarters if you have any questions. AIPG email is aipg@aipg.org or phone (303) 412-6205.

**Geologic Ethics & Professional Practices is now available on CD**

This CD is a collection of articles, columns, letters to the editor, and other material addressing professional ethics and general issues of professional geologic practice that were printed in *The Professional Geologist*. It includes an electronic version of the now out-of-print *Geologic Ethics and Professional Practices 1987-1997*, AIPG Reprint Series #1. The intent of this CD is collection of this material in a single place so that the issues and questions raised by the material may be more conveniently studied. The intended ‘students’ of this CD include everyone interested in the topic, from the new student of geology to professors emeritus, working geologists, retired geologists, and those interested in the geologic profession.

AIPG members will be able to update their copy of this CD by regularly downloading the pe&p index.xls file from the www.aipg.org under “Ethics” and by downloading the electronic version of *The Professional Geologist* from the members only area of the AIPG website. The cost of the CD is $25 for members, $35 for non-members, $15 for student members and $18 for non-member students, plus shipping and handling. To order go to www.aipg.org. Five dollars from every CD sold will be donated to the AIPG Foundation.
It has become obvious to me that my experiences as a young professional, in what seems the geologic past, has very little relevance to the young professionals of today. Each generation is a product of the environment in which they are raised. The value structure of today is more personal and family oriented than it was forty years ago. In the past, your life conformed to the requirements of the job; whereas, the job now conforms to the requirements of the family. The value system of today may be an improvement on the past, but it has changed the way companies relate to and retain their employees. In the same way it is changing the way professional organizations relate to and retain their members.

The attitude of today’s young professional toward membership in professional organizations has changed from what I experienced. Membership in a local and national professional society was an expected part of being a professional. It was the means by which we kept up with the latest ideas in the science of geology and it was the basis for our network within the profession. The internet has brought access to an incredible amount of data, and it has created a professional network that is as virtual as it is face to face. They have grown up with a technology that was in its infancy when most of us began our careers. It has created a generation that is more likely to communicate electronically than face to face. The young professionals place a high value on self fulfillment and have a sense that the sky is the limit, which some of us interpret as “what have you done for me lately?” A professional career is now part of a world view; it is not a world unto itself.

This generation is entering the industry during the “great crew change”, and that has given young professionals a leverage that most of us did not have early in our careers. They are highly mobile, have high expectations and they do not fear challenging the status quo. Fifty percent of the members of AAPG are over the age of fifty, and AIPG very probably has the same demographics. As this group moves into retirement in the near future, the young professionals of today will move into management positions.

Change is inevitable, but it can be managed. The key to managing change is to take a longer term view than we normally take as companies and professional associations. In my opinion, a five year outlook is too short. As leaders in professional associations, we need to try to envision what we will look like in twenty years. Our collective goal is long term survival. We need to evaluate our policies and procedures on an ongoing basis to identify possible road blocks that could impair reaching that goal.
Ground-water movement (both direction and rate) is a routine consideration in site characterization. The rate of movement (either as velocity or discharge) is of special interest. Flow velocity is critical for contaminant-transport modeling and well yield is important for water-supply projects.

Aquifer tests are the main source of data on rate of ground-water movement. Such tests, also called well tests or pumping tests, involve observing drawdown of water level in response to stress induced by pumping. (Calling them pump tests is misleading, unless, of course, only the pump was indeed tested.) More specifically, testing provides information on hydraulic parameters, such as transmissivity and storativity, averaged over a large area.

The quality of test results depends on the reliability of the field data collected and the validity of the method used to analyze the data. Well testing involves many considerations and whole books have been written on the subject. I focus here on just one test variable: pumping rate. An essential requirement of aquifer tests is that the pump discharge water at a constant rate. For a test to be valid, flow rate should not vary by more than 10% throughout the entire course of the test. This is assured by installation and regular monitoring of a flow meter on the discharge line.

Sometimes enthusiasm for collecting data overwhelms good judgement. When I called the site geologist on a shallow well we were installing to set a time for planning an aquifer test, he proudly announced that one had already been made. I had two reactions. First, I was both shocked and perturbed because, as project hydrologist, I was to design and carry out testing. But this was the first well to be tested, so the routine had not been firmly set. Also, I was skeptical that the testing was valid. Since I would conduct the tests, there was no reason to go over the correct procedure with him. Lacking that, I doubted that he had done it properly. This was confirmed when I saw the results: 1) discharge rate had been irregularly monitored, 2) there was no flow meter and the few measurements available had been only roughly made using a bucket and stopwatch, 3) discharge was nowhere near constant, and 4) most amazing of all, a small portable gasoline driven pump, as is used to drain a sump, had been employed for the test. Guess it was a pump test after all. The entire exercise had been a waste of rig time and staff effort. TIP: Don’t use the trash pump for your aquifer test.

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

AFLAC
Why Supplemental Insurance? Even the best health insurance plan can leave you vulnerable to:
- Unpaid medical bills... including deductibles, co-payments, and out-of-network charges.
- Loss of income... if a serious illness or accident seriously reduces the total earning power of the afflicted employee and/or spouse.
- Out-of-pocket expenses... such as the cost of travel, lodging, meals, child care, home care, and special equipment, as well as everyday living expenses like mortgage/rent, car, utilities, food, and credit card balances.

That’s why over 40 million people worldwide have turned to AFLAC. Our full range of guaranteed-renewable insurance policies includes:
- Accident/Disability
- Short-Term Disability, Cancer
- Hospital Confinement Indemnity, Hospital Intensive Care
- Specified Health Event, Life, Long-Term Care, Dental

Most important, all of our policies pay cash benefits directly to you even if you have other coverage. You decide where the money goes. It’s your choice!

AFLAC
http://www.aflac.com
Carol Streicher, AFLAC Sales Associate
Phone: (303) 674-1808
Please identify yourself as an AIPG Member to receive the AIPG Association discounted prices.
This summer I was visiting with some friends of mine, a couple that I had gotten to know over the past few years. She, a sweet woman with the most beautiful southern accent, worked as a secretary running the business that had employed me the summers before and after my first year of college. He, a man who had definitely had some rowdy younger days and possessed a sense of humor and storytelling that made you love him in the first conversation, brought his wife lunch everyday and always greeted me with a hug, kiss, and a “lookin’ good as ever!” That day, our conversation turned to streams, I think after I asked him the name of one my mom and I had passed on a bike ride. He started telling me where each stream in this county (Shelby) and the surrounding area flowed until every drop reached the Taylorsville Dam, the construction of which he then recounted. The way he talked reminded me of the storytelling of David Dick and the book he wrote with his wife, Lalie, called The Rivers of Kentucky. In it, they traveled to every river in the state (a “river” being defined as what the people who lived on it called it, having nothing to do with a quantity) and wrote about it in the context of its stories, told by the people they talked to and local history. It’s a great book (as are all of David Dick’s) that I recommend to anybody interested in water, and I suggested it to my friend. I lent him my copy, which he read while getting dialysis treatments and, according to his wife, talked about it the everyday person thinks about—the microbes swimming in it, its relationship to the groundwater, its sediment load, the seasonal cycles of the ecosystem it defines—that are extremely important to its functionality. But purely practical accounts of fluvial processes in a peer-reviewed journal cannot do a stream justice. It is the story of a stream that is interesting. Storytelling surrounds water. Biologists tell of the seasonal and yearly stories of the watershed’s ecosystem and geologists tell of the forming of the land and the flow of the water. However, these stories don’t tell all. As the Dicks state in their introduction when talking about the hydrologic cycle: “We believe the cycle would be unfinished and meaningless if there had not been people to supply the human texture.” The people of a river speak of it as a neighbor, not necessarily a force to be reckoned with (well, maybe) but one to know. It is this knowledge that captivates me.

When I walk in the woods behind my house and sit by the stream I think about the fact that its flow is faster and murdier today than it was yesterday, since the snow has melted. I think about all the brachiopods finding their way out of the eroding limestone and the animal tracks along the banks. I notice that there isn’t as much garlic mustard here as there was when I first entered the woods from the field that separates it from my house. But I also wonder who else has stood on that same bend, maybe cooling off after a long morning of tobacco harvesting in the hot sun so many years ago. I think about the thoughts of the hunter that sat in the stand that overlooks it, waiting quietly for a deer to come into range a few weeks or years or centuries ago. I wonder how it has changed since the Native Americans sat by it, if they did. I try to place its flow with that of other streams I know, the larger ones that swell with spring rains and occasionally block off roads, flooding fields planted with corn and soybeans in a sharp contrast to the dry stream beds of summer. Though this small stream, as far as I know unnamed, wouldn’t have made it into the Dicks’ book, its story is far more than downcutting through Ordovician Limestone and making a habitat for some leafcutters.

I was home for a random weekend in October when I got a shaky message on my cell phone. It was my friend, the woman of the couple, telling me that her husband had passed away a few days earlier and that she had my book if I wanted to stop by and pick it up. The flap of the sleeve marked his place in it, and she told me again how much he liked it. David Dick had passed away a bit before that after a long battle with cancer. I like to imagine they’ve gotten the chance to swap some good stories by now.

Storytelling

Stephanie Jarvis, SA-1495, sjarvis11@wooster.edu
American Institute of Professional Geologists (Kentucky Section) 

Presents a Professional Development Conference 

“An Overview of Contaminated Site Investigation and Remediation” 

SCHEDULE: Tuesday, April 19, 2011 7:45 AM – 5:00 PM 

LOCATION: Kentucky Geological Survey, Well Sample and Core Library 
2500 Research Park Drive 
Lexington, Kentucky 40511 

Detailed information on the conference can be found at http://ky.aipg.org/Announcements.htm 

DESCRIPTION: The conference will focus on innovative assessment and remediation technologies being used in the environmental field. Case studies include petroleum hydrocarbons and chlorinated solvents sites. Presenters include private consultants, regulatory personnel, and contractors. Attendees can earn eight personal development hours of continuing education. Documentation on attendance and conference content will be provided at the end of the conference, if desired. 

Name: ____________________________________________________________ 

Employer: ________________________________________________________ 

Address: _________________________________________________________ 

City/State/Zip: ___________________________________________________ 

Telephone: (___) _______ Fax Number (___) __________ E-Mail __________ 

REGISTRATION: STANDARD - $100 AIPG MEMBERS $75, STUDENTS $20, STUDENT AIPG MEMBERS FREE 

After April 1, 2011: Standard Registration fee $125; AIPG Members $100. 

SPONSORS: Fee of $150 entitles you to one free registration. Send an electronic copy of company logo and contact information will be placed in the attendees’ notebook. 

METHOD OF PAYMENT: 

Company Check #: _______________ Personal Check #: _______________ 

Make checks payable to AIPG Kentucky Section (all funds go to AIPG) 

MAIL TO: Kentucky Section - AIPG, P.O. Box 24690, Lexington, KY 40524 
Phone: 270.925.6636 E-Mail: jhoward89@hotmail.com 

REFUNDS AND CANCELLATIONS: All cancellations must be received in writing and sent to AIPG, Kentucky Section, by mail or e-mail. Phone cancellations are not accepted. All cancellations postmark-dated by April 1, 2011, will receive a REFUND minus a 25 percent administrative fee. After April 1, 2011, registrants are no longer eligible for refunds; however, substitutions are welcome. Call (270.925.6636 for substitutions. NO REFUND FOR REGISTRANTS WHO FAIL TO ATTEND. 

www.aipg.org
California Section-UCD Student Chapter News: The Geologic Poetry and Golden Voice of Stephen J. Baker

“Fundamental to our lives and environment,” is a phrase heard on over one hundred radio shorts that Stephen J. Baker of Living Water® Alliance uses on his radio programs in California that might be heard in several nearby states as well. The well-received radio programs are a geologic poetry of sorts, as the language is spoken clearly and the complex geologic concepts are explained in simple, every-day terms. The man with the golden voice was also the speaker and guest at the most recent California Section and University of California at Davis (UCD) AIPG Student Section meeting held on January 26, 2011 in Davis, California. The meeting included a pot luck dinner and then a rousing welcome for the guest speaker. Steve is a passionate speaker about water and people working together to solve real world problems, such as water shortages. Steve is a Co-Founder of Living Water Alliance and the developer of the Homestead and Neighborhood Alliance programs. He has owned and operated HydroSolutions of California, Inc. (an environmental consulting firm) for the last fifteen years. His work has included 30 years of assessment, monitoring and remediation of contaminated sediment and groundwater. He is a California Professional Geologist, California Certified Hydrogeologist and a California Environmental Assessor. But what sets Steve apart from most geologists is his love of communicating the importance of water to the public using radio shorts. As a public speaker, he is also in demand to participate in town hall meetings, presentation seminars, and internet, radio and television broadcast programs, all related to water.

Steve told me that his appearances on radio evolved from giving presentations at towns scattered throughout the Sierras. “People have a partial understanding of their water needs but aren’t motivated to do anything about managing it. Public perception has placed water availability and quality issues as a responsibility of somebody else.” For this reason, Steve decided to produce a radio program that would provide consistent attention in a soft fluffy way to listeners across the country. Living in Nevada City, California for many years, he has now become a local radio celebrity of sorts.

The radio broadcast “Water is a Many Splendid Thing” is a series of short-segment radio broadcasts lasting from about 3 to 7 minutes long and are well received by the community. They have been run since 2007 and Steve has written, performed and produced over 140 segments. They have played on KNCO, KVMR, KFOK and occasionally on NPR. Interviews for the various segments have taken him across the country. Steve has ridden with the Pittsburgh River Patrol in Pennsylvania, visited with the Tlingit, Maidu and Washoe people of Alaska, California and Nevada learning about local customs toward water and resources. He interviewed the producer of “The Antarctic Challenge”, a Canadian documentary of climate impacts at the South Pole.

Sometimes Steve is surprised with what he learns. While interviewing the well-known and energetic past executive director of the National Ground Water Association, Jay Lehr, Steve learned that Jay is a diehard sky diver. At the end of the interview about Jay’s research into fluoride and water, Steve asked Jay, what it is like to jump through a cloud with ice crystals. Well, that turned into a very entertaining radio segment that Steve never expected when he started the interview. Listen for that interview on the radio. Steve responds to local fans, “it is truly amazing how much of our lives are all connected with water.”

Steve works hard researching the science topics and background history for the interviews. He writes questions and scripts that bring out our connections with water.

Examples of twelve of Steve’s radio shorts are posted on www.living-water-alliance.com As you listen to one of the shows, you may find yourself engulfed in the dialog or laughing out loud as you hear segments covering many topics related to water. You may hear water relationships about daily interactions, national, global, planetary and yes, universe water interactions. Each segment is written with the intent of discovering the value that water has in each of our lives. Interviews are with real people sharing a piece of their life experience about water.

The goal of Steve’s professional interest is to recognize and find solutions to water-related challenges. In his view, we can accomplish great things by working together as a unified community. Society has historically shown that water can bring the worst out of people and he sees, instead, a way to bring people together, even in controversy. Steve’s unique vision of uniting the public brings strong emphasis on people relationships in the midst of water relationships. Success occurs through our Living Water® Alliance social and multimedia platform which Steve spoke about during his UCD lecture. Part of the lesson Steve noted is that public awareness and outreach programs for water solutions can evolve.

For the California Section meeting, Steve described some of his career path and radio shows. As part of the give and take of the evening, Steve asked each student at UCD what their career plan was and their interest in geology. The California Section - UCD AIPG Student Section meeting was a great success and the students asked lots of questions of speaker. After the meeting, it was time to drive home on the freeway. I hoped to be able to turn on the radio and listen to the geologic poetry of a Stephen J. Baker radio short.

Jim Jacobs, CPG-07760, is the president of the California Section and UCD AIPG student section sponsor. He can be reached at jimjacobs@ebsinfo.com
This service is open to AIPG Members as well as non-members. The Professional Services Directory is a one year listing offering experience and expertise in all phases of geology. Prepayment required. Advertising rates are based on a 3 3/8” x 1 3/4” space

ONE YEAR LISTING FOR ONLY:

AIPG Member $300.00
Non-Member $400.00

Space can be increased vertically by doubling or tripling the size and also the rate.

---

BCI
Engineers & Scientists, Inc.
2000 E. Edgewood Dr., Ste. 215
Lakeland, FL 33813
863-667-2345/863-667-2662 Fax
www.bcieng.com

David M. Abbott, Jr.
Consulting Geologist LLC
AIPG CPG, FAusIMM, EurGeol, PG-TX, UT, WY
2266 Forest Street Tel: 303-394-0321
Denver, CO 80207-3831 Fax: 303-394-0543
dmageol@msn.com or dmageol@aol.com

MCD of Central Florida
Subsidence Investigation Specialists
Geologic Evaluations • Geophysical Surveys
Geotechnical Investigations
P.O. Box 747 Phone 863-676-2600
Lake Wales, FL 33859 Fax 863-676-2699
www.sinkhole-expert.com

HB Engineering Group
Risk Analysis, Corporate Restructuring
& Mine Appraisers

Gerald J. Daub, P.G., C.P.G.
President
2241 SOUTH BROADWAY
GRAND JUNCTION, CO 81507-4101
gidaub@daubandassociates.com www.daubandassociates.com

Draper Aden Associates
Engineering • Surveying • Environmental Services
Blacksburg, VA • Charlottesville, VA • Hampton Roads, VA • Richmond, VA
www.daas.com
ELLIS INTERNATIONAL SERVICES, INC.
Valuations • Geology • Economics
www.minevaluation.com

TREVOR R. ELLIS
Certified Minerals Appraiser-AIMA
Certified Professional Geologist-AIPG
Mineral Economist-MS

600 Gaylord Street
Denver, Colorado 80206-3717, USA
Phone: 303 399 4361
Fax: 303 399 3151
e-mail: ellis@minevaluation.com

Dr. Robert Font, CPG, PG, EurGeol  President
Geoscience Data Management, Inc.

Our geological scientists specialize in the research, analysis and
electronic data capture of geoscience data.
Examples include unconventional hydrocarbon resources and oil &
gas field studies.
972-509-1522 (office) www.geodm.com
P. O. Box 864424, Plano, TX 75086
AIPG Corporate Member

Want to purchase minerals and
other oil/gas interests.
Send details to:
P.O. Box 13557, Denver, CO 80201.

Lawrence C. Weber, P.G.  Vice President
TTL
geotechnical • analytical • materials • environmental
www.ttlusa.com

New Software
AIPG has new software for our
website. This change will make the
website easier for our members to
use the online directory, signup for
events, purchase products and pay
dues.

When you go to the website for
the first time to login, the system
finds you and confirms your identity.
Then you will be sent an email with
a link to set a password.

Please review and update your
information.
You may contact AIPG at aipg@
aipg.org if you have any questions.
The website is www.aipg.org.
# Student Application Form

**American Institute of Professional Geologists**

**Student Application – FREE Membership**

Sign up Online – www.aipg.org

12000 N. Washington Street, Suite 285, Thornton, CO 80241 – (303) 412-6205 - aipg@aipg.org

<table>
<thead>
<tr>
<th>Last Name:</th>
<th>First Name:</th>
<th>MI:</th>
<th>Suffix:</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Name:</td>
<td>Undergraduate ☐ Graduate ☐ Doctoral Candidate ☐</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preferred Mailing Address:</th>
<th>Home ☐ School ☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipated Graduation Date:</td>
<td>Male ☐ Female ☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Street:</th>
<th>State:</th>
<th>Zip:</th>
<th>Country:</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Ph:</td>
<td>Home Ph:</td>
<td>Cell:</td>
<td></td>
</tr>
</tbody>
</table>

Email:

**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.

<table>
<thead>
<tr>
<th>Applicant Signature:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEADQUARTERS USE ONLY</td>
<td>Rcvd:</td>
</tr>
</tbody>
</table>

Mbr #: |
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 as 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 applicant’s rejection may be called as a witness in any resulting appeal action.

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

**AIPG Membership Totals**

<table>
<thead>
<tr>
<th></th>
<th>As of 02/08/10</th>
<th>As of 02/22/11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPG / Active</strong></td>
<td>3,566</td>
<td>3,089</td>
</tr>
<tr>
<td><strong>CPG/Non-Practicing</strong></td>
<td>415</td>
<td>344</td>
</tr>
<tr>
<td><strong>Prof. Member</strong></td>
<td>1011</td>
<td>762</td>
</tr>
<tr>
<td><strong>Associate Mem.</strong></td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td><strong>Student Adjunct</strong></td>
<td>447</td>
<td>588</td>
</tr>
<tr>
<td><strong>Corporate Member</strong></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>5,245</td>
<td>4,800</td>
</tr>
</tbody>
</table>

**Applicants for Certified Professional Geologists**

<table>
<thead>
<tr>
<th>State</th>
<th>Name</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>David Goodman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AK</td>
<td>Kevin J. Krause</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AK</td>
<td>Peter Condon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>Stephen Shank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV</td>
<td>Peter Dilles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV</td>
<td>John Lukens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NY</td>
<td>Matthew Melny</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OH</td>
<td>Susan Yarger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RI</td>
<td>Brian Kortz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WA</td>
<td>David Smith</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>David Thornton</td>
<td>MEM-1956</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>Lawrence Turner</td>
<td>MEM-1952</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Lindsey Maness</td>
<td>MEM-1958</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Tammie Crossen</td>
<td>MEM-1975</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Alexander Garhart</td>
<td>MEM-1985</td>
<td></td>
</tr>
<tr>
<td>CT</td>
<td>Megan Desrosiers</td>
<td>MEM-1994</td>
<td></td>
</tr>
<tr>
<td>FL</td>
<td>Sandra Will</td>
<td>MEM-1974</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Daniel Anderson</td>
<td>MEM-1959</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>David D’Armond</td>
<td>MEM-1960</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Yukio Galiisano</td>
<td>MEM-1961</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Ronald Fitzanko</td>
<td>MEM-1962</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Richard Gnat</td>
<td>MEM-1963</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Scott Dawson</td>
<td>MEM-1964</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Thomas Enno</td>
<td>MEM-1970</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>Mir Karim</td>
<td>MEM-1995</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Claire Astore</td>
<td>MEM-1965</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Daniel Gold</td>
<td>MEM-1969</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Roy Hoin</td>
<td>MEM-1971</td>
<td></td>
</tr>
<tr>
<td>MN</td>
<td>Derek Schilling</td>
<td>MEM-1976</td>
<td></td>
</tr>
<tr>
<td>NV</td>
<td>Ronald Parratt</td>
<td>MEM-1955</td>
<td></td>
</tr>
<tr>
<td>NY</td>
<td>Todd Marsh</td>
<td>MEM-1967</td>
<td></td>
</tr>
<tr>
<td>OH</td>
<td>Timothy Brown</td>
<td>MEM-1957</td>
<td></td>
</tr>
<tr>
<td>OH</td>
<td>Barry Aird</td>
<td>MEM-1990</td>
<td></td>
</tr>
<tr>
<td>WI</td>
<td>Ryan Haney</td>
<td>MEM-1977</td>
<td></td>
</tr>
</tbody>
</table>

**New Certified Professional Geologists**

<table>
<thead>
<tr>
<th>State</th>
<th>Name</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>Leigh Rasher</td>
<td>SA-2054</td>
<td></td>
</tr>
<tr>
<td>GA</td>
<td>Lauren Bradley</td>
<td>SA-2056</td>
<td></td>
</tr>
<tr>
<td>GA</td>
<td>Russell Tyler</td>
<td>SA-2057</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>Jonathan Launspach</td>
<td>SA-1917</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>Matthew Even</td>
<td>SA-1920</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>Jennifer Shepeck</td>
<td>SA-1921</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>Christina Spirlbauer</td>
<td>SA-1922</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>Shawn Malone</td>
<td>SA-1958</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Elizabeth Benge</td>
<td>SA-1989</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Daniel Little</td>
<td>SA-1918</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>David Little</td>
<td>SA-1923</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Bryan Ware</td>
<td>SA-1934</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Melissa Hill</td>
<td>SA-1996</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Andrea Wofflitz</td>
<td>SA-1997</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Robert Mahon</td>
<td>SA-2035</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Megan Saunders</td>
<td>SA-1959</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Hunter Morton</td>
<td>SA-1961</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Justin Jurgerson</td>
<td>SA-1964</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>David Kolpacki</td>
<td>SA-1991</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>Eric Dieck</td>
<td>SA-2015</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>Chris Banser</td>
<td>SA-2014</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>Alissa Feilen</td>
<td>SA-2026</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>Codi Weiler</td>
<td>SA-2027</td>
<td></td>
</tr>
<tr>
<td>KS</td>
<td>Nathan Corbin</td>
<td>SA-1928</td>
<td></td>
</tr>
<tr>
<td>KS</td>
<td>Mathew Crawford</td>
<td>SA-2029</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>Stephanie Stratton</td>
<td>SA-1902</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>Nicholas Fedorhck</td>
<td>SA-1926</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>Keenan Brown</td>
<td>SA-1936</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>John Perry</td>
<td>SA-1937</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>Dalene Smith</td>
<td>SA-1967</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>Chasity Slinson</td>
<td>SA-2030</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>Nicholas Bull</td>
<td>SA-1912</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>Marylyne Crisp</td>
<td>SA-1913</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>Ellen Kristiansen</td>
<td>SA-2019</td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>Nathan Katsifias</td>
<td>SA-1919</td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>Chishala Kapupu</td>
<td>SA-2000</td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>Bryce Pludow</td>
<td>SA-2006</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Matt Mahony</td>
<td>SA-1947</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Elizabeth Koeman</td>
<td>SA-1973</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Stephen Shields</td>
<td>SA-1974</td>
<td></td>
</tr>
<tr>
<td>MN</td>
<td>Siiri Kokkinen</td>
<td>SA-1986</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Andrew Schiller</td>
<td>SA-1984</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Ashley Mayfield</td>
<td>SA-1985</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Sasha Butkovich</td>
<td>SA-1996</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Thomas Hafner</td>
<td>SA-1987</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Kenneth Wright</td>
<td>SA-1988</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Laura Thayer</td>
<td>SA-1900</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Shana Swirin</td>
<td>SA-1901</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Rebecca Stallings</td>
<td>SA-1903</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Susan Strele</td>
<td>SA-1904</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Trevor Penner</td>
<td>SA-1905</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Kevin Moon</td>
<td>SA-1906</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Alicia Metzger</td>
<td>SA-1907</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Elizabeth Johns</td>
<td>SA-1908</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Timothy Keenan</td>
<td>SA-1910</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Annelee Hoy</td>
<td>SA-1987</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Emily Eckert</td>
<td>SA-1988</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Alex Bieg</td>
<td>SA-1989</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>James Berglund</td>
<td>SA-1990</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>Lucy Luscri</td>
<td>SA-2013</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>Carla Roig-Silva</td>
<td>SA-1914</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>Jonathan Geroux</td>
<td>SA-1957</td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>Daniel Ross</td>
<td>SA-1993</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>Sonia Torres</td>
<td>SA-2007</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>James Crowell</td>
<td>SA-1970</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>Anna Crowell</td>
<td>SA-1975</td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>Jonathan Taylor</td>
<td>SA-2002</td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>Zachary Kita</td>
<td>SA-2032</td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>Drew Seymour</td>
<td>SA-2033</td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>Andrew Hutsky</td>
<td>SA-2034</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>Jessica Rosenberg</td>
<td>SA-1875</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>Jared Lopes</td>
<td>SA-1969</td>
<td></td>
</tr>
<tr>
<td>NJ</td>
<td>Tyler Hall</td>
<td>SA-1983</td>
<td></td>
</tr>
</tbody>
</table>

**Applicants Upgrading to CPG Geologists**

<table>
<thead>
<tr>
<th>State</th>
<th>Name</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>NV</td>
<td>Joseph Hebert</td>
<td>MEM-1973</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Lawrence Turner</td>
<td>MEM-1952</td>
<td></td>
</tr>
<tr>
<td>AK</td>
<td>Matthew Faust</td>
<td>MEM-0869</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Eric Kimber</td>
<td>MEM-1972</td>
<td></td>
</tr>
</tbody>
</table>
NEW APPLICANTS AND MEMBERS (12/02/10 - 1/31/11)

New Student Adjuncts Continued

<table>
<thead>
<tr>
<th>State</th>
<th>Name</th>
<th>Last Four Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM</td>
<td>Phil Ragonese</td>
<td>SA-1979</td>
</tr>
<tr>
<td>NV</td>
<td>Erica Romero</td>
<td>SA-1876</td>
</tr>
<tr>
<td>NV</td>
<td>Justine Overacker</td>
<td>SA-1877</td>
</tr>
<tr>
<td>NV</td>
<td>Murya Dube</td>
<td>SA-1878</td>
</tr>
<tr>
<td>NV</td>
<td>Ellen Hall-Patton</td>
<td>SA-1879</td>
</tr>
<tr>
<td>NV</td>
<td>Landon Barlow</td>
<td>SA-1880</td>
</tr>
<tr>
<td>NV</td>
<td>Luis Rodriguez</td>
<td>SA-1881</td>
</tr>
<tr>
<td>NV</td>
<td>Jessica Pence</td>
<td>SA-1882</td>
</tr>
<tr>
<td>NV</td>
<td>Michael Hartley</td>
<td>SA-1883</td>
</tr>
<tr>
<td>NV</td>
<td>Greg Saunders</td>
<td>SA-1884</td>
</tr>
<tr>
<td>NV</td>
<td>Hannah Gaither</td>
<td>SA-1885</td>
</tr>
<tr>
<td>NV</td>
<td>Jared McIneskey</td>
<td>SA-1886</td>
</tr>
<tr>
<td>NV</td>
<td>Craig Deebrow</td>
<td>SA-1887</td>
</tr>
<tr>
<td>NV</td>
<td>Colin Spence</td>
<td>SA-1888</td>
</tr>
<tr>
<td>NY</td>
<td>Christopher Keefe</td>
<td>SA-1941</td>
</tr>
<tr>
<td>NY</td>
<td>Kyle Greenberg</td>
<td>SA-1960</td>
</tr>
<tr>
<td>NY</td>
<td>Heath Collins</td>
<td>SA-1985</td>
</tr>
<tr>
<td>NY</td>
<td>Elyssa Tennant</td>
<td>SA-1994</td>
</tr>
<tr>
<td>NY</td>
<td>Sheila Niedziela</td>
<td>SA-1995</td>
</tr>
<tr>
<td>NY</td>
<td>Corey Goddard</td>
<td>SA-1998</td>
</tr>
<tr>
<td>NY</td>
<td>Sierra Derby</td>
<td>SA-2001</td>
</tr>
<tr>
<td>NY</td>
<td>Andrew Parisi</td>
<td>SA-2008</td>
</tr>
<tr>
<td>NY</td>
<td>Katrina Neiss</td>
<td>SA-2020</td>
</tr>
<tr>
<td>NY</td>
<td>Kathleen Robbins</td>
<td>SA-2028</td>
</tr>
<tr>
<td>OH</td>
<td>Tej Gautam</td>
<td>SA-1911</td>
</tr>
<tr>
<td>OH</td>
<td>April Menendez</td>
<td>SA-1916</td>
</tr>
<tr>
<td>OH</td>
<td>Travis Lovain</td>
<td>SA-1925</td>
</tr>
<tr>
<td>OH</td>
<td>Patrick Newman</td>
<td>SA-1939</td>
</tr>
<tr>
<td>OH</td>
<td>Will Emery</td>
<td>SA-1955</td>
</tr>
<tr>
<td>OH</td>
<td>Matthew McLain</td>
<td>SA-1976</td>
</tr>
<tr>
<td>OH</td>
<td>Megan Harris</td>
<td>SA-2011</td>
</tr>
<tr>
<td>OR</td>
<td>Daniel Curtis</td>
<td>SA-2044</td>
</tr>
<tr>
<td>OR</td>
<td>Samuel Castonguay</td>
<td>SA-2047</td>
</tr>
<tr>
<td>PA</td>
<td>Rebekah Morris</td>
<td>SA-1927</td>
</tr>
<tr>
<td>PA</td>
<td>Vincent Berestford</td>
<td>SA-1942</td>
</tr>
<tr>
<td>PA</td>
<td>Justin Paul</td>
<td>SA-1943</td>
</tr>
<tr>
<td>PA</td>
<td>Maxwell Hanusa</td>
<td>SA-1965</td>
</tr>
<tr>
<td>PA</td>
<td>Jennifer Anne</td>
<td>SA-2024</td>
</tr>
<tr>
<td>PA</td>
<td>Timothy Gould</td>
<td>SA-2055</td>
</tr>
<tr>
<td>TN</td>
<td>Christopher Howard</td>
<td>SA-1940</td>
</tr>
<tr>
<td>TN</td>
<td>Felicia Qualls</td>
<td>SA-1945</td>
</tr>
<tr>
<td>TN</td>
<td>Cara Thompson</td>
<td>SA-1946</td>
</tr>
<tr>
<td>TN</td>
<td>Bradley Craig</td>
<td>SA-1948</td>
</tr>
<tr>
<td>TN</td>
<td>Brittany Cavender</td>
<td>SA-1971</td>
</tr>
<tr>
<td>TN</td>
<td>John Corley</td>
<td>SA-2036</td>
</tr>
<tr>
<td>TN</td>
<td>Mark Van Aken</td>
<td>SA-2043</td>
</tr>
<tr>
<td>TX</td>
<td>Judah Epstein</td>
<td>SA-1924</td>
</tr>
<tr>
<td>TX</td>
<td>Abdusalam Agail</td>
<td>SA-1938</td>
</tr>
<tr>
<td>TX</td>
<td>Drew Chenoweth</td>
<td>SA-1977</td>
</tr>
<tr>
<td>TX</td>
<td>Ryan Dhillon</td>
<td>SA-1978</td>
</tr>
<tr>
<td>TX</td>
<td>David McCleery</td>
<td>SA-1980</td>
</tr>
<tr>
<td>TX</td>
<td>Jonathon Roberts</td>
<td>SA-1981</td>
</tr>
<tr>
<td>TX</td>
<td>Codie Kretzer</td>
<td>SA-1982</td>
</tr>
<tr>
<td>TX</td>
<td>Chloe Beddingfield</td>
<td>SA-1984</td>
</tr>
<tr>
<td>TX</td>
<td>Carolyn Sexton</td>
<td>SA-2016</td>
</tr>
<tr>
<td>UT</td>
<td>Nicholas Kerr</td>
<td>SA-1950</td>
</tr>
<tr>
<td>UT</td>
<td>Mariah Chambers</td>
<td>SA-2018</td>
</tr>
<tr>
<td>UT</td>
<td>Marie Green</td>
<td>SA-2025</td>
</tr>
<tr>
<td>UT</td>
<td>Ali Shearman</td>
<td>SA-2038</td>
</tr>
<tr>
<td>VA</td>
<td>Erin Hollenbeak</td>
<td>SA-1915</td>
</tr>
<tr>
<td>VA</td>
<td>Adeola Oyewumi</td>
<td>SA-2003</td>
</tr>
<tr>
<td>VA</td>
<td>Oluyinka Oyewumi</td>
<td>SA-2004</td>
</tr>
<tr>
<td>WI</td>
<td>Victoria Lubner</td>
<td>SA-1909</td>
</tr>
<tr>
<td>WI</td>
<td>Briana Berkowitz</td>
<td>SA-1953</td>
</tr>
<tr>
<td>WI</td>
<td>Elizabeth Ceperley</td>
<td>SA-1954</td>
</tr>
<tr>
<td>WI</td>
<td>Matthew Walker</td>
<td>SA-2040</td>
</tr>
<tr>
<td>WY</td>
<td>Virginia Marcon</td>
<td>SA-2005</td>
</tr>
<tr>
<td>India</td>
<td>Abhishek Saha</td>
<td>SA-2037</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Elizabeth Wuyep</td>
<td>SA-1952</td>
</tr>
<tr>
<td>Germany</td>
<td>Quentin Scouflaire</td>
<td>SA-2023</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Lawrence Och</td>
<td>SA-1929</td>
</tr>
<tr>
<td>Italy</td>
<td>Lorenzo Cremonese</td>
<td>SA-1930</td>
</tr>
</tbody>
</table>

Introduction to Well Logs and Log Analysis for New Hires

- A review of well logs in petroleum exploration and development.
- Prerequisites for finding commercial reserves.
- Exploration techniques.
- Integration of geophysical exploration records with log data.
- Calculating reserves and field size.
- Importance of economics and risk analysis.
- Drilling and logging.
- Lithologic and mud logs.
- Electric logs.
- Basic and specialized porosity logs.
- Other logs and log curves used in exploration and production work.
- Selecting log suite.
- Basic log analysis (recognizing pay zones).
- Identification and classification of logs and well log data management.

A product of Geoscience Data Management, Inc.
Author: Robert Font, PhD, CPG, PG
Power Point slides with review and self assessment questions.
AIPG accredited 1 CEU (with exam) or 0.5 CEU (without exam).
Reference CD available
To order the course or for more information go to www.aipg.org.

Practical Petroleum Geoscience
For Novice AND Experienced Oil-Finders!
by Robert Font, Ph.D., CPG, PG, EurGeol
Deepen your understanding of your industry
700+ Power Point Slides delivered to you Over the Net
AIPG Accredited (8 CEU’s)

GeoScience Data Mgmt.
www.geoedm.com or www.aipg.org
for more information, contact rgfont@geoscienceedm.com
sblishop@geoscienceedm.com
Abstract

Mineral inclusions in rough diamonds provide a window into the physical and chemical conditions of their formation in the upper mantle. The geochemistry of pyrope garnet inclusions may be utilized as a preliminary screening tool to differentiate potentially diamondiferous and non-diamondiferous kimberlite host rock. Diamond exploration programs utilizing stream sediment and glacial till sampling techniques in the Upper Peninsula of Michigan and Canada’s Northwest Territories illustrate the importance of the garnet discrimination tool to successful diamond exploration.

Key Words

Diamond, eclogite, geochemistry, harzburgite, inclusion, indicator, kimberlite, lherzolite, lithosphere, macrocryst, mantle, nodule, ultramafic

Introduction

“Better a diamond with a flaw than a pebble without” - Confucius (551-479 BC)

Mineral inclusions in rough diamonds reflect the paragenesis of the host diamond with the included mineral. As such the diamond inclusion minerals are extremely important to scientists by providing a window into the physical and chemical conditions influencing mineral formation in the upper mantle. Diamond crystals may contain a number of different mineral inclusions. The most common are olivine, garnet and clinopyroxene. Rarer inclusions such as chrome spinel, zircon, kyanite, iron, copper and nickel sulphides, and diamond itself have been identified. Analyses of inclusions revealed that the minerals could be separated into two suites: ultramafic and eclogitic. The suites were mineralogically and chemically distinct and reflected the minerals’ growth in different geochemical environments in the upper mantle. Purple-red pyrope garnet, bright emerald green chrome-rich diopside, colorless olivine and translucent black chrome-rich spinel comprise important members of the ultramafic suite of inclusions. Orange-red pyrope-almandine garnet, pale green omphacitic pyroxene, blue or colorless kyanite and yellow-brown rutile are well-known eclogitic minerals (Meyer, 1986).

Kimberlite Indicator Minerals

Early mining and processing of non-alluvial diamonds revealed their source was in volcanic rock chimneys or pipes named kimberlite after the town of Kimberley in South Africa where the kimberlite-diamond association was first recognized. It was observed that some minerals found in heavy mineral concentrates from mined and processed kimberlite ore were similar to minerals found as diamond inclusions. The kimberlite minerals occurred as discrete grains named macrocrysts dispersed in the kimberlite magma, and were also found in aggregates of mantle-derived rock. Due to their rounded and semi-rounded shapes the exotic upper mantle rock aggregates were aptly termed nodules. The disaggregation of the eponymous nodules, both in the mantle and in the kimberlite pipes themselves, was determined to be the source of the macrocrysts and diamonds dispersed throughout the kimberlite. Nodules and macrocrysts could be assigned an ultramafic or eclogitic paragenesis based on their geochemistry, and it was immediately recognized that these minerals were so distinctive that they could effectively be used as “pathfinder minerals” to locate new kimberlite pipes and thus, potential diamond deposits. The widespread use of the appropriately termed “kimberlite indicator minerals” (or KIMs) pyrope and eclogite garnet, magnesian ilmenite, chrome diopside and chrome spinel as pathfinders in exploration for diamondiferous kimberlite pipes resulted in considerable discovery successes over the past 100 years; however there remained a major drawback to KIM’s effectiveness as indicators of diamonds. Tracing KIMs recovered in field samples to their sources still did not in any way guarantee an economic, or even diamond-bearing, deposit would be the result. In many instances, large fields of kimberlites proved to have only one or two significantly diamondiferous pipes; most had none or just a few marginally diamondiferous pipes. To allow judicious application of exploration funds diamond explorers needed a tool to quickly and accurately discriminate between diamondiferous and non-diamondiferous sources early in an exploration program.

The Diamond-Garnet Relationship

Research proved that diamonds in kimberlite pipes were derived from disaggregation of the lithospheric upper mantle nodules such as lherzolite, harzburgite and eclogite. That knowledge thus allowed the simple conclusion that diamond quantity could possibly be qualitatively estimated from the amount of potentially diamondiferous mantle nodules and their disaggregated mineral product existing in any kimberlite pipe. In essence, the more plentiful the disaggregated mantle nodules or minerals, the more plentiful the potential diamond content (Fipke et al., 1995). Considering only the ultramafic paragenesis, the relative importance of the ultramafic suite of nodules in terms of their diamondiferous potential has been...
suggested as, in order of decreasing importance, garnet harzburgite, chromite harzburgite and garnet lherzolite (Gurney, 1984). Garnets from kimberlites and nodules had previously been classified into Groups 1 through 12 based on their chemical compositions; garnets that existed as inclusions in diamonds belonged to Group 10 (Dawson and Stephens, 1975). Further analyses and plotting of these diamond-inclusion chrome pyrope garnets revealed that eighty-five percent of the garnets fell into the calcium depleted compositional trend. These garnets popularly became known as G10s, and the garnets that plotted on the calcium rich side of the eighty-five percent separation were termed G9s. Most G10 garnets were known to be associated with harzburgite while lherzolite was the source of the G9 garnets. The line separating the two garnet populations became the famous “85%” line of J.J. Gurney (Gurney, 1984). Diamond explorers could think of the line as the “diamond in” and “diamond out” separator. Very simply, the more garnets plotting in the G10 field the better the chance for diamondiferous kimberlite being the source. Two factors were considered in interpreting such analyses: the abundance of garnets falling into the calcium depleted area of the plot; and the degree of calcium depletion. Greater abundance of calcium depleted garnets indicated greater probability for significantly diamondiferous source rocks. The G10 discriminator technology appeared to be the tool the diamond explorers had been looking for!

Relevance of G10 Technology in Diamond Exploration Applications

One of the most spectacular success stories using conventional KIM exploration techniques in concert with G10/G9 garnet discrimination was the discovery of the Ekati diamond province in the Northwest Territories of Canada in 1991. KIMs discovered in field samples near Blackwater Lake in western Canada, near the MacKenzie River, were traced over ten years to their extremely diamondiferous kimberlite pipe sources 500 kilometers further east. Financial backing to support such a long term and expensive venture was justified by the early geochemical analyses of field sample garnets that unequivocally indicated favorable derivation from significantly diamondiferous sources. A 1990 report from Dr. Gurney’s minerals laboratory assessing the diamond potential of the indicators stated in part, “the dataset represents the best for diamond potential we have seen anywhere in the world and we have no doubt that highly diamondiferous kimberlite is the source of the heavy minerals”. As we all now know, the Ekati claim block hosts kimberlite pipes with diamond grades as high as 3.3 carats per tonne (Fipke et al., 1995). It is important to remember that the correct assumption, based on indicator mineral geochemistry, that the anomalous minerals were derived from diamondiferous sources was made at least ten years before the sources were actually discovered!

Prospective G10 Garnet Selection

Selective sorting of all purple and purple-red garnets from heavy mineral concentrates greatly increases the odds of recovering prospective G10 garnets; however, submitting all purple-colored garnets from large sample concentrates for laboratory analysis may be quite cost prohibitive. G10 garnets have a diagnostic red-purple color with a blue tinge that has been described as claret, lavender, lilac or mauve. Identifying potential G10 garnets in a concentrate by their characteristic color may increase the odds of correctly selecting G10’s for geochemical analysis as well as reduce the quantity of prospective garnets suitable for analysis; however, many purple garnets display such subtle color variations that G10 selection by color discrimination may be quite difficult even for a trained eye. Repeated exposure to the beautiful lavender color of actual diamond inclusion garnets (much as a gemologist uses “master stones” when color-grading diamonds) may significantly aid the visual sorting of potential G10’s from heavy mineral concentrates.

Interpretation of Garnet Geochemistry and other Diamond Inclusion (DI) Minerals

Considerable progress in the interpretation of G10 garnet geochemistry by expansion of the dataset based on many additional analyses from multiple worldwide sources has resulted in improved forecasting of the potential for significantly diamondiferous or economic source rocks versus marginally or sub-economic sources. The preferred calcium depleted G10 garnet population could now be designated the G10D population to differentiate from the general G10 population (Grütter et al., 2004). Diamond explorers submitting garnets for possible diamond-inclusion analyses and potential diamond content estimates could expect greatly improved interpretation of sample results, allowing most efficient allocation of exploration funds to the most promising targets.

Although not addressed in this short article focused on the G10 or calcium depleted pyrope garnets, it should be noted that other diamond inclusion minerals are also used to reinforce the more commonly used G10 interpretation. Eclogitic garnets and high chrome spinel or chromites are often employed as indicators of diamondiferous provenance.

Garnet inclusions in eclogite diamonds are commonly orange or orangered in color, and sodium content greater than 0.7% is considered compatible with the presence of diamond (Gurney, 1984).

Diamond inclusion chromites with a chrome content of sixty percent or higher, sixteen percent magnesium and very low titanium (less than 0.3%) are also used as potential diamond indicators (Daniels, 1991; Fipke et al., 1995). Chromite analyses may be equivocal in exploration samples because chromites having compositions overlapping diamond-inclusion chromite compositions can be quite common in various geological terranes making accurate discrimination from DI-chromites difficult (Fipke et al., 1995; Mitchell, 1986). Diamond exploration companies attempt to most effectively employ all three of these potential DI-minerals in a cumulative and mutually-supportive approach to any successful diamond exploration strategy.

G10 Geochemistry Importance in Diamond Exploration in Michigan’s Upper Peninsula

The practice of diamond exploration using soil, stream, glacial till and esker samples combined with airborne and ground geophysics as well as satellite and aerial photography for target delineation have undergone continuous improvement and development and resulted in much exploration success over the previous one hundred years, and may be regarded as a mature technology. In addition to the notable
success mentioned previously in using G10 geochemistry to justify long-term financial support committed to diamond exploration projects in Canada, G10 technology has also been used to validate the existence of non-economic diamond deposits. Such an example can be described using the kimberlite exploration program in the Lake Superior area of the Upper Peninsula of Michigan by the Dow Chemical Company in the mid-1980s.

**Great Lakes Diamonds**

Finds of large gem quality diamonds in the glacial moraines and outwash sediments of the Great Lakes region had been documented since the 1800s. The source of the diamonds was postulated to be far to the north in the James Bay Lowlands of Canada, and the diamonds were presumed to have been transported to their final discovery sites by continental ice sheets (Hobbs, 1899).

In 1971 the accidental discovery of the Lake Ellen kimberlite in the Upper Peninsula (UP) of Michigan drove the realization that the still undiscovered source of the drift diamonds might in fact be in the USA and not in Canada (Cannon and Mudrey, 1981). Later, geochemical analyses of Lake Ellen garnets showed compositions approaching the G10 “diamond in” line and further supported the premise that diamondiferous kimberlite sources for the drift diamonds might be found locally in the Upper Peninsula (McGee, 1987; McGee and Hearn, 1983). By the mid-1980s there were a number of companies competing in diamond exploration in the UP and neighboring states.

One such company was the Dow Chemical Company of Midland, Michigan, which funded a diamond exploration project based out of Crystal Falls in the UP. Under the superb guidance of William Jarvis, an ex-De Beers geologist who had considerable diamond exploration experience in Africa, the project employed a program of stream sediment and glacial till sampling combined with ground geophysics.

It was acknowledged early in the program that the number of different glacial tills, extensive deposits of glacial outwash, eskers, and moraines in the area often carried not only abundant kimberlite indicator minerals but also kimberlite cobbles and boulders from various sources thoroughly intermingled laterally and vertically throughout the glacial deposits. Additionally, multiple ages of ice advance and retreat further complicated the exploration process (Carlson and Floodstrand, 1994). Unraveling possible KIM transport directions and attempting to trace the minerals to their source in such a mélange would be extremely time-consuming and difficult. The stream sediment program utilized the conventional and accepted practice of identifying heavy mineral trap sites in active drainages and collecting samples from as deep as possible at such sites. Considering that rivers and streams traversing glacial deposits may have sampled many different tills, eskers, or moraines dependent on the actual watercourse, stream samples provided a valuable and efficient tool for identifying prospective areas quickly. Once a promising area was located, follow-up till sampling and ground geophysics were used to zero in on potential kimberlite sources. Where lack of relief prohibited sampling, stream samples, a concept of basal till sampling was developed. Recognizing that the lowermost or basal tills represented material scraped from local bedrock sources and was the least traveled and pristine component of the glacial material, i.e. undiluted and uncontaminated with extraneous glacial debris, samples were preferentially collected from these coarse, unsorted and angular basal till components wherever possible. Concentration by gravity separation techniques using jigs and shaking tables provided KIM rich sample concentrates. Concentrates were further refined using rare earth permanent magnet separation prior to binocular microscope optical examination. Suspected kimberlitic garnets were selected from the concentrates and submitted for analysis. Criteria for selecting possible kimberlite-derived garnets included color, shape, and preserved textures such as “orange peel” surfaces and kelyphite rinds. Kelyphite is a reaction rind composed of serpentine and other minerals and formed between the garnet and the host kimberlite at the garnet’s expense, a chemical process termed resorption. Orange peel textures are often preserved under the kelyphite rind, and preservation of such rinds indicates close proximity to source because the rinds are quite delicate and easily destroyed (Mitchell, 1986).

Plots of garnets possessing possible G10 chemistry from UP stream and till field samples continued to suggest that diamondiferous kimberlites were sources of the garnets; however, the sought-after calcium depleted geochemistry was mostly absent. It should be remembered that G10 technology was in its infancy in the mid 1980’s and interpretation of the garnet geochemistry and correlation with diamond content were still evolving. It was becoming clear though, that the UP garnet geochemistries were clearly not encouraging in pointing to possible economic diamond deposits; however, the overall exploration program continued and was very successful in discovering a number of kimberlites, some buried under as much as thirty meters of glaciofluvial overburden!

Magnesian ilmenite and olivine were also successfully used as pathfinder minerals in the UP. The magnesium content of ilmenites may be used to estimate the degree of possible diamond preservation. Generally, higher magnesium oxide contents reflected higher diamond preservation potentials (Fipke et al., 1995). In the UP, however, ilmenites were not as effective as G10 geochemistry for providing possible diamond content interpretations. Olivine may be derived from a number of non-kimberlitic sources; however, kimberlite-derived olivine in the UP was readily identifiable by its characteristic rounded shape (from resorption) and pale olive green color. The common yellow-brown tint imparted to non-kimberlitic olivine due to iron content was absent in the magnesium-rich kimberlitic olivine.

**Verification of G10 Diamond Content Forecasts by Kimberlite Bulk Samples**

Despite the generally non-favorable G10 analyses, the Upper Peninsula diamond program was progressed to conduct processing of mini-bulk samples collected from drilling and trenching of discovered kimberlites in an attempt to directly determine diamond content. The bulk samples yielded fresh kimberlite for petrologic research, specimens of mantle nodules, and abundant indicator minerals. Garnets recovered directly from kimberlite bulk samples showed similar G10 analyses to the previous field sample garnets and again confirmed that calcium-depleted garnets were scarce (W. Jarvis, 1990, personal communication). Kimberlite processed at the Dow Chemical laboratories in Midland by hydrofluoric acid digestion yielded a few microdiamond specimens (less than 0.5 mm) from certain kimberlites. The lack of significantly calcium
depleted G10 garnet populations corroborated by extremely low or absent microdiamond contents in the UP kimberlites effectively united to ensure the end of further exploration in the area. Doubtless many more kimberlites exist in the Great Lakes region; however, it can be confidently agreed that they would be barren or very low in diamond content. The initial interpretation of the field sample G10 geochemistry in this case was thus completely vindicated once the source kimberlites were tested for actual diamond content, and resulted in an unqualified success in using the technology in an exploration program. Sadly, not all diamond exploration programs, no matter how successful at discovering kimberlites, have an Ekati-type discovery as the end result!

Conclusions

It is interesting to note that the initial observation made by W.H. Hobbs in 1899 that the possible sources of the Great Lakes drift diamond finds lay far to the north in the James Bay Lowlands, based on his interpretation of ice flow directions, proved to be almost prescient in its accuracy. In 2008 the newest De Beers diamond mine was officially opened in the exact area that Mr. Hobbs had predicted as a possible diamond source so long ago. The Victor mine is now in operation producing superb and extremely high value diamonds. G10 garnets, their geochemistry and interpretation surely played a major role in this world class discovery.

Two outstanding must-read books for additional information related to the practice and techniques of indicator mineral sampling and mineral geochemistry are, “Fire into Ice” by Vernon Frolick, and “Barren Lands” by Kevin Krajick. Both books relate the fascinating story of the search for diamonds in Canada and accurately capture the intense pressures endured by the geologists and diamond explorers during their passionate search for immense wealth and fame. I highly recommend these two books as “prescribed reading” for aspiring diamond explorers!

Acknowledgements

The rough diamond garnet inclusion specimen shown in Figure 1 was discovered in a parcel of melee provided for testing of diamond processing equipment courtesy of J.O. Huml, The Dow Chemical Company, Midland, Michigan.

References


Gurney, J.J., 1984, A correlation between garnets and diamonds in kimberlites in Kimberlite Occurrence and Origin: A basis for conceptual models in exploration, J.E. Glover and P.G. Harris (eds.), Geology Department and University Extension, University of Western Australia, Publication No. 8, p. 143-166.


Photo Captions

All photos Copyright © Carl F. Brink 2010

Carl F. Brink is a Graduate Gemologist of the Gemological Institute of America specializing in diamond exploration and ore processing, as well as rough diamond grading and evaluation. He has worked in Africa, South America, Canada and the USA for a number of companies including The De Beers Group, BHP-Billiton, Newmont Mining Company and DiamonEx USA. Carl is an avid rock and mineral photographer, and enjoys rock hounding and exploring the geological grandeur of the western United States.

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 AIGP 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.
THE IMPORTANCE OF GARNET GEOCHEMISTRY IN DIAMOND EXPLORATION

Figure 1. The classic “85% line” separating the G10 harzburgitic (diamond in) and G9 lherzolitic (diamond out) garnet geochemistry is shown in this figure reproduced from Fipke et al., 1995. The considerable quantity of garnets lying on the left of the 85% line, together with the substantial calcium depleted analyses, suggest the garnets were derived from significantly diamondiferous sources. The garnets plotted here were recovered by Dia Met Minerals during exploration of the Ekati claim block in Canada’s Northwest Territories.

Figure 2. A cobble of glacially transported kimberlite exposed in beach gravels near Michigamme Slough in the Upper Peninsula of Michigan. White Paleozoic limestone xenoliths and shiny black ilmenite macrocrysts are noticeable in the cobble.

Figure 3. Close up of a slab of glacially striated pavement composed of Lake Ellen kimberlite. Two directions of ice movement are conspicuously revealed on the Ordovician dolomite xenolith. The rounded black grains are serpentinized olivine macrocrysts. FOV is approximately 8 cm.

Figure 4. Pyrope garnets recovered from stream sediment samples in the UP. The rounded shape due to resorption and textbook “orange peel” surface texture preservation signify close proximity to source. The deep red color implies these garnets most likely belong to the G9 lherzolitic paragenesis. Garnets are approximately 1.5-2.0 mm in size.

Figure 5. Magnesian olivines recovered from stream sediment samples in the UP. The pale olive green color, resorbed rounded shape, and pristine polished surfaces are, like the garnets in Figure 5, diagnostic of derivation from a kimberlitic source in close proximity. Olivines are approximately 1.5-2.0 mm in size.
Arizona Section

Arizona Section Fall Field Trip – Willcox Area - The AIPG Arizona Section fall geology field trip event began with a memorable dinner at the Coronado Vineyards restaurant near Willcox on Friday night. The field trip started early on Saturday morning, October 23rd. Larry Fellows, CPG-04447, (former AZ State geologist) as always, organized a wonderful trip. The itinerary included a tour of a zeolite mine (Dan Eyde, CPG-07647, assisted with the tour at the mine and provided a fascinating explanation of the mine and local geology) in the San Simon Valley near Ft. Bowie, a stop to buy wine and other local goodies in Ft. Bowie, a talk about the cultural history and geology at the Apache Pass fault zone, a short hike along the old Butterfield stage line, and then to the Chiricahua Mountains in southeast Arizona. We enjoyed a picnic lunch in the beautiful Chiricahua National Monument and went for a good hike along one of the main trails. Additional photos from the field trip will be posted on the Arizona Sections page of the AIPG web site for awhile. Thank you Larry for organizing such a wonderful field trip.

Arizona Section Spring Field Trip Jerome-Sedona Area - Our spring field trip was held on Saturday, May 22nd. It was a wonderful trip and we saw lots of very interesting geology. Paul Lindberg, CPG 6344, led one of his very popular trips through the Verde Valley, starting in Jerome, then overlooking the Verde Valley, and then to the Sedona area. This is certainly one of the most scenic areas of the state. We also enjoyed a picnic lunch at a fish hatchery near Page Springs. Paul discussed such interesting topics as the origin of very rich copper deposits in Jerome and currently developing sinkholes in the Sedona area, covering nearly a billion years of the planet’s history. On the field trip we traversed across the Verde Valley (a graben) from Mingus Mountain to Oak Creek Canyon, and saw rocks that range from the 1750 Ma Mesoproterozoic rocks at Jerome to Recent sinkholes in the Sedona area. Thank you Paul for another wonderful field trip. Pam Palmer took lots of great photographs on this field trip and those are posted on the Arizona Section page of the AIPG web site.

Barbara Murphy, AZ Section 2010 Secretary

California Section

Professional Geologists Needed For Answers - You just can’t read a national newspaper or magazine without seeing significant problems that relate either to infrastructure maintenance issues (seismic issues of bridges or California levee failure potential) or the need for more resources that are extracted with more environmental sensitivity. The underlying issue is the need for intelligent earth scientists and the place we start earth science education is in K-12. I have been to my kid’s science classes and bring in rocks and maps. I encourage you to go to a nearby school to offer your services for a 20 minute talk about the planet, the rocks, the resources or the environment. From there, I am trying to encourage college students. We will have a third meeting of the AIPG Student Section at the University of California at Davis. The meeting, which is open to AIPG members, will be on January 26, 2011 at 6-8 pm. It is a potluck meeting, so dinner is served! Just bring some cookies or a dish. The speaker is Stephen J. Baker, P.G., C.H.G., who is a consulting hydrogeologist who has made well over 100 three to seven minute radio “shorts” about living water and geology. He will talk about educating the public through radio and his most recent video projects.

We are also looking to find more college sponsors to set up more AIPG Student Chapters - please call Jim Jacobs (jimjacobs@ebsinfo.com) if you have some ideas of professors willing to work with us! It is worth commitment, because if we don’t do it, who will?

AIPG Meeting/CCGO Fundraiser: 3/9/11 - The California Section AIPG will meet with other members of the California Council of Geoscience Organizations (www.cngo.org) for a CCGO fundraiser and member meeting on March 9, 2011 at Spenger’s Fish Grotto in Berkeley, California. The speaker and guest of honor is Professor Doris Sloan, a well respected teacher at the University of California at Berkeley as well as author to the popular Geology of the San Francisco Bay Region book. The $50 dinner meeting will be 6 pm – 9 pm. Another announcement will go out for registration.

Jim Jacobs, Section President
Colorado Section

Section Luncheon-Below are photos from the November Section Luncheon with Dr. Thomas Moneck. Dr. Thomas spoke on seafloor massive sulfide deposits.

Jim Burnell, Editor and David Abbott

Georgia Section

Section Meeting-On October 9, 2010, the Georgia Section of AIPG and Atlanta Geological Society in conjunction with the Georgia Geological Society (GGS) co-sponsored a Field Day for over 125 students, professors, and geologic professionals.

The Field Day was designed to provide a real life, hands-on experience to educate all participants. A total of 16 exhibitors from private industry donated their time, personnel, experience and equipment for the Field Day. The participants were divided into eleven separate groups of 8-10 individuals and rotated through eleven stations. Stations include topics such as hollow-stem auger and direct push drilling rigs, portable vacuum remediation systems, in-situ-chemical oxidation and surfactant treatments, laboratory analytical studies, soil descriptions, sampling equipment selection, ground penetrating radar, slug testing and groundwater sampling.

Although safety concerns would not allow the general public to directly access the Field Day event, AIPG National Vice President Ron Wallace, Georgia Section President Eric Lowe, Georgia Section Treasurer Glen Faulkner, John Salvino, Jim Ashworth, and Tellus Science Museum volunteers were stationed along the perimeter of the Field Day event to interact with the general public. Environmental equipment, rock cores, soil cores and informative literature were available to encourage discussion and raise awareness of geology.

That evening our section bought pizza for everyone and gave us an opportunity to talk one on one with some of the students to discuss careers. Feedback from students and their professors indicated that the Field Day was helpful in applying some of their textbook concepts to real life situations. We received invitations from three departments to demonstrate direct push drilling on their campus next spring. We will discuss proper soil screening, sampling, and description along with groundwater sampling.

We would like to give a special thanks to the AIPG members that were exhibitors including: Tom Brown, David Goodrich, Sam Almaee, Ken Summerour, Dan Centofanti, Mark Mitchell, Henry Esterly, and Tim Beck. We also would like to acknowledge and thank Mr. Julian Gray, curator of Tellus Museum, for his support and coordination of the field day. Without their participation this would not have been possible.

Dr. Jim Henry Memorial Scholarship-Our scholarship to Georgia Southern University will be named in honor of Dr. Jim Henry. Early in my career I worked at Skidaway Institute of Oceanography and I worked for Jim. In March 2007 Eric and I attended GSA in Savannah where they had a special session dedicated to him. We have had discussions with Savannah Area Geological Society in going together with this scholarship. Georgia Section Scholarships Winners-Ashley White – University of West Georgia, Bryan Victor – Columbus State University, Joseph Dehnert – Georgia Southern University, Semir Sarajlic – Georgia State University

Ron Wallace, Section President

Kentucky Section

Professional Development Program-The Kentucky Section of the American Institute of Professional Geologists (KY-AIPG) is instituting a Professional Development Program designed to enhance the knowledge and skills of the practicing members of the geologic profession. The topics and the
character of presentation of the sessions are designed to be acceptable for Professional Development Credits for those who desire them.

The first offering of this program will be a one-day conference titled “An Overview of Contaminated Site Assessment and Remediation Technology”. This conference will be held on Tuesday, April 19 at the Kentucky Geological Survey, Well Sample and Core Library, 2500 Research Park Drive, Lexington, Kentucky 40511. Detailed information on the conference session topics, schedule, and registration form can be obtained at the KY-AIPG website, http://ky.aipg.org/Announcements.htm.

KY-AIPG requests your help or assistance in the development of this program. As additional workshop topics are added, we will need the unique knowledge and skills of our membership as well as outside volunteers to provide programs of benefit to professionals practicing in our area.

James Howard, Section Past President

Michigan Section

Annual Golf Outing-It is not too early to begin planning for our Seventh Annual AIPG Golf Outing. We hope to continue to add to our numbers of golfers and sponsors this year. To do this, we are asking for your help. Please make a point to do your best to spread the word and participate in this event which takes place on May 10, 2011 at the Arthur Hills designed Lyon Oaks Golf Course in Wixom, MI. Also, please pass this information along to your service providers, contractors, and suppliers. This event offers excellent exposure for companies that support and serve our profession.

This event has become a great opportunity to spend time with clients, network with colleagues, and celebrate the return of warm weather to Michigan. This event is open to everybody, so please come and take advantage of the opportunity.

The money raised is put toward the Michigan Section’s K-12 educational grant recipients. To insure continued success, please assist us by participating, sponsoring, soliciting sponsors, and/or donating prizes or items. Call Bob Reichenbach at 734-476-5933 or Kevin Lund at 888-417-4440 to register or to offer your time to assist with the event.

The registration and sponsorship form is included in the section newsletter and has been posted to the Michigan Section’s website http://mi.aipg.org/. Click on “Golf Outing”. Forms can be faxed to (888) 417-4440. We hope to see you May 10.

Bob Reichenbach, CPG and Kevin Lund, CPG Michigan Section Golf Outing Co Chairs

Photos from 2010 Annual Golf Outing.

December Section Meeting Summary-The Michigan Section AIPG’s annual meeting was held on December 2, 2010 at the Fetzer Center in Kalamazoo. Dr. William B. Harrison III was the featured speaker, and presented his talk on the New Shale Play (Collingwood).

The meeting was well attended, with about 50 members present, including five students who presented research posters. Following dinner and Dr. Harrison’s presentation, the judging of the poster contest was concluded. The winner of the student poster contest for 2010 was Shawn McCloskey of Western Michigan University with his poster titled “Sequence Stratigraphy and 3-D Reservoir Characterization of the South Buckeye Field, Dundee Formation (Devonian), Michigan Basin.” Shawn was awarded $500 to put toward completing his education.

Missouri Section

The last event for the section of 2010-Was a most important one for the Section. Its beginnings go back to the Branson GSA meeting and the Missouri Section AIPG booth. The booth-student success lead to the thoughts and possibilities of a panel seminar stressing student-panel interchange discussions and questions. This was also appealing to the Missouri State University geology department/program chair, Tom Plymate. To make that a success required money, hence the donation support planning at the “Informal Meeting” previously described.

Joe Gillman, State Geologist and director of the Division of Geology and Land Survey working with Tom Plymate put plans into action relative to time, place, banquet and other matters. A draft agenda had been prepared earlier and then finalized by Tom and Joe together with Bill Duley. With the theme of an active and energetic interchange discussion between students and panelists, it was relatively easy to find panelists who thought highly of such a concept. For others who may be planning or con-
considering this type of seminar, it is critically important to find panelists with a broad range of professional experiences and differing education backgrounds too actively and constructively participate in a useful an active interchange discussion seminar. This worked for us. Where many Friday afternoon seminars last one hour with a rush to the door, ours carried well into the next hour with many remaining for further personal meetings with the panelists.

We were fortunate to find four panelists that fit well into the concept of lively interchange discussions. Each represented a segment of geology. They are John Bognar, CPG-08341, Ann Hagni, Ana Londono and Joe Gillman, MEM-1326. John represented the private sector segment of engineering geology and hydrogeology. He currently is the director of the BCI St. Louis office that consults on a broad array of geology projects. John's credentials also include his past service as AIPG National President and his continuing contributions to AIPG. Ann Hagni, PhD, is a mining consultant whose work experience includes much of the U.S. and especially southwestern U.S., Mexico, Australia and other locations. She also has consulted and held management positions with various companies. Her masters degree is in engineering management. Ana Londono, PhD, is geology assistant professor at the St. Louis University, a private university. Ana began her professional career working as a field geologist for the Columbia, SA, Geological Survey. Ana's students receive a broad range of education in her classes that include engineering and geomorphology. Our fourth panelist, Joe Gillman, is the director of the Division of Geology and Land Survey and Missouri State Geologist. Joe also is a member of the Advisory Council that provides advice to Tom Plymate's department. His Survey’s responsibilities include economic geology and geologic mapping, together with public safety environmental geology projects, and the state's land survey program. Joe also is member of several state regulatory commissions including the Oil and Gas Council, Wellhead Protection, Mine Land Reclamation Commission and others. As State Geologist, Joe also has numerous national geology responsibilities.

Approximately 55 students from Tom Plymate’s Geography, Geology and Planning Department, including four from Ana Londono's Department of Earth and Atmospheric Sciences at St. Louis University, were treated to these distinguished panelists who explained the ins and outs of geology careers. The lively discussions that followed covered the broad spectrum of geology that has so many and varied opportunities. The importance of ethics in the profession came through loud and clear. Expanding career options through flexibility, hard work, and continuing education were emphasized. For some a stable career in one area and profession may be both the individual's choice and opportunity. For others numerous job changes, location moves and even discipline changes may be the best, and for some, the preferred options.

Many questions and comments were a part of this work option and needs discussions. Foreign geology work was extensively discussed. Ana Londono provided a personal example to illustrate what may confront a geologist working in a where the culture is much different and has the overarching control. Ann Hagni reemphasized the importance of ethics regardless of work location, national and internationally. John provided his example of an extreme change from an oil geologist to an engineering geologist doing environmental work which later expanded into a variety of consultant projects. Joe added to those and highlighted public responsibilities in all aspects of geology. The public has a right to know.

After the Panel discussion, the Section held a brief meeting in Temple Hall at MSU. Issues discussed included the proposed cutbacks to geology education by the Department of Higher Education and the Section’s response approach. No options other than what has been completed were seen as feasible. The outcome may not be known until the next few months. Uncertainty could continue for months. The Section meeting closed with the proposed slate of officers for 2011. A student adjunct Section officer was sought out by the selection committee chaired by Bill Duley, but no responses. It is hoped, with an increase in the Section’s numbers of adjunct AIPG students, perhaps a recommendation will come forth.

Following the meeting, a number of students and faculty joined together with AIPG Missouri Section members in a banquet at the Plaster Student Union. The same lively discussions between students, and experienced practitioners continued. Normally such banquets are more relaxed than presentation. This one was the exception, the easygoing but direct discussions continued unabated; networking at its best.

Mimi Garstang, CPG-10185, welcomed students, professors and AIPG members at the banquet. Her welcoming summarized the importance of students, the profession they are choosing, and a morale boosting encouragement in the continuance of their education goals. Kerry Nikolaisen, CPG-10454, initiated one of the best ways to get students signed on and ready to go. At the banquet start he briefly described in detail just what AIPG has to offer for the adjunct AIPG students and later as professionals. Then, with true vote-getting political skills, Kerry circulated the room handing out student adjunct cards. Some 22 students signed on, the seminar and banquet ended on a very positive note, not to mention the enjoyment of the banquet discussions.

MSU’s Dr. Kevin Evans led a joint field trip for students and AIPG members on the 13th with some excellent interaction and food for thought. Subject of the trip was “Stratigraphic and structural significance of Kinderhookian strata in southwest Missouri: Implications for Mississippian Tectonism.” Numerous rock exposures between Springfield and the Arkansas border were observed.

James H. Williams
Missouri Section 2010 President
Ohio Section

The Outstanding Achievement Award J. Matthew Justice, CPG-10485- President Frank Majchszak, CPG-10186, presented Past-President Matt Justice, CPG-10485, with the Ohio Section’s Outstanding Achievement Award. In presenting the award, Frank shared that deceased member Dr. William Kneller (CPG-06356) who established the award was his graduate advisor at the University of Toledo.

The Outstanding Achievement Award was established in 1992, in response to a monetary gift from now deceased member, Dr. William A. Kneller, CPG-06365. Dr. Kneller’s gift directed that medallions be cast for the award. Per his instruction, “the award is presented to any person who has made an outstanding, geologically related contribution to either science or the general public in the State of Ohio.” Past recipients of the award are as follows: Robert G. Van Horn (2001), Stanley E. Norris (2003), Lawrence Wickstrom (2004), Horace R. “Buzz” Collins (2006), Dale Gnidovec (2006), and William E. Shafer (2009).

Hocking Hills Fall Field Trip

On October 30, Ohio Section members along with family and friends enjoyed an autumn hiking tour through one of Ohio’s geologic wonders, Hocking Hills. This exceptionally scenic area is located in the Appalachian Plateau, about an hour’s drive south-southeast of Columbus along State Route 33. 2010 President Frank Majchszak planned and led the field trip. During his tenure with the Ohio Geological Survey, Frank conducted subsurface geologic mapping, and authored a publication on the subsurface extent and water quality of the “Big Injun” Sandstone (subsurface equivalent of the Black Hand) in counties to the northeast. The trek began under blue skies as hikers departed the Old Man’s Cave interpretive center at Hocking Hills State Park around 12:30 pm. While wandering the narrow gorge, hikers encountered numerous scenic geologic features including the Upper Falls, Devil’s Bathtub, the beautiful Lower Falls, and Old Man’s Cave. Named in honor of a reclusive civil war veteran who made the cave his home, Old Man’s Cave is one of the largest recessional caves in Ohio.

The Hocking gorge exposes more than 150 feet of the Mississippian-age Black Hand Sandstone member of the Cuyahoga Formation. As observed first hand, the Black Hand member comprises three distinct zones. The upper and lower zones are firmly cemented and very resistant to weathering, while the middle is loosely cemented and more easily weathered. The many rock shelters, caves, and recesses in this middle zone were sculpted by joint-controlled fluvial erosion.

The cool microclimate in the gorge provides an ideal home for quiet groves of Eastern Hemlock, more typically found in northern latitudes. After edifying and entertaining members with his classic wit, Frank treated members to a surprise Section-funded picnic featuring authentic Italian subs, and a variety of soft drinks, chips, and snacks. Everyone had their fill, including seconds on the subs. And don’t forget desert! Secretary Lynn Kantner offered everyone delicious homemade carrot cake muffins. Mark Rowland enjoyed seconds, and some say thirds.

After lunch, a handful of hearty souls embarked on a 6 mile round trip hike targeting the picturesque Cedar Falls. With the hiking completed and sunset approaching, the day was capped off with a brief visit to nearby Ash Cave, one of Ohio’s true natural wonders and the largest recessional cave in the state (yet wheelchair accessible from the nearby parking lot). The cave’s namesake is derived from a vast former ash deposit resulting from the countless camp fires of Paleolithic Indians. Gazing upward upon the cave ceiling, one is invited to follow the pronounced joint strike typical of those that control erosion patterns. Towering sandstone cliffs and the soft trickle of falling water made for peaceful and inspiring scene.
New Coffee Mugs


Roadster Mug - Get exclusive double-wall insulation that keeps the “hots” hot and the “colds” cold. Discover the comfortable handle with thumb grip and spill-resistant lid with thumb-slide opening. It even fits easily into automobile cup holders. Product Size: 16 oz. Price: $7.50


Outback Hat - The “down under” styling adds a sense of adventure to any outing. Heavyweight 100% cotton canvas; drawstring with cord locks and fashion brass eyelets. Two side snaps give the option of wearing the brim up or down. Available Colors: Canvas/Canvas, and Canvas/Navy. Price: $18.00

Sportsman Hat - 100% cotton, 3-panel construction, self-fabric sweatband and stitched eyelets. Lightly brushed to soften the fabric and color. Unique look achieved through a special pigment dye and garment wash process. Available Colors: Berry, Black, Navy, Faded Denim, Green, Khaki, Blue, and White. Price: $16.00


SALE SALE SALE
BOOK - Learn about the Geology of Northern Arizona with maps, photos and expert descriptions! This 6”x9” paperback has 321 pages that are packed with detailed information about Northern Arizona Geology. Price $10

SALE SALE SALE
BOOK - An excellent resource, the Second Edition of Roadside Geology of Colorado is a great book to add to your backseat. So pickup this book and hit the road. Price $10

SALE SALE SALE
BOOK - If you have wondered about the actual dangers of asbestos, radon, earthquakes, etc., that are not explained very well in the news, then this book is for you. Price $12
Not Just Software... RockWare. For Over 28 Years.

AquaChem™
The Most Complete System for Water Quality Data Analysis, Plotting, Reporting and Modeling

- Data Management – Customizable MS Access database
- Data Analysis – Numerous calculations, compare/mix samples, correlation matrix, data reliability check and more!
- Statistical Calculations – Trend analysis, outlier tests, test for normality
- Water Quality Modeling – PHREEQC
- Plotting, Mapping & Reporting – 23 industry-standard plots including: Piper, Schoeller, Scatter, Box & Whisker, time series, histogram, Stiff, Radial and Pie chart

$1,490

WellCAD™
Well Log Data Management

- PC-based composite log package, combining comprehensive graphic editing and data processing tools
- Formula parser for log analysis
- Fracture and breakout analysis
- Optional modules for core logging, image analysis, LID/DOV import, sonic processing, deviation calculations, ODBC connectivity, automation and cross-section generation
- Integrates all data acquired in a well into a single document
- Combines excellent display, editing and analysis capabilities for well data

$3,120

PetraSim™
A Preprocessor and Postprocessor for TOUGH2, T2VOC, TMMOC, TOUGHREACT and TOUGH-FX/HYDRATE

- Model multi-component fluid flow, heat transfer and reactive transport process
- Saturated and unsaturated conditions
- Fractured and porous media
- Mesh generation, parameter definition, and display of results
- Now supports TOUGH2-MP (parallel version of the TOUGH2 simulator)

Call for pricing

The Geochemist Workbench®

GWB is the premiere software solution for simulation of:

- Scaling
- Souring
- Flooding
- Formation damage
- Frac jobs
- Fluid compatibility

GWB Standard
Reaction Path Modeling
$3,499

GWB Professional
1D/2D Reactive Transport Modeling
$7,999

Free trials for most of our products available at www.rockware.com

Follow us on:

RockWare
Since 1983

303.278.3534 • 800.775.6745
RockWare.com