TPG

Volume 44, Number 2 THE PROFESSIONAL GEOLOGIST MAR/APR 2007

A Publication of the American Institute of Professional Geologists — Professionalism Is Our Purpose www.aipg.org

Welcome to the 44th Annual Meeting of AIPG!

Hosted by the Michigan Section
Traverse City, Michigan
October 7-11, 2007

On behalf of the Michigan Section of AIPG and the 2007 Annual Meeting Planning Committee, I invite you to join us at one of Michigan's top travel destinations for this year's Annual Meeting. Traverse City offers many opportunities for fun and relaxation in addition to business. The newly renovated Park Place Hotel in Traverse City will provide a venue for a meeting that we hope will be long remembered. The Park Place Hotel has free, high-speed wireless internet available.

Yes,

Traverse City is Michigan's cherry capital, and has something for everyone. The downtown area contains numerous specialty shops and restaurants within walking distance of the Park Place Hotel. The Dennos Museum, which will be the location of one of the evening events, houses one of the largest and most historically complete collections of Inuit art of the Canadian Arctic in the United States. Numerous casinos and wineries are within a short drive of Traverse City. Interlochen Center for the Arts and Sleeping Bear Dunes National Lakeshore are also nearby. Miles of hiking and biking trails and three trout streams are also in the area. Golf Digest rated Traverse City as #12 in its list of the world's top 50 golf destinations!

Michigan!

The theme for this year's meeting, Geology: The Foundation for the Environment and Resources, will underscore the role of geology in our everyday lives. The program includes field trips to Northern Michigan's Marquette Iron District, Mackinac Island, Sleeping Bear Sand Dunes, and local quarries. Several short courses will be offered, including the Geology of Michigan, Low-Flow Groundwater Sampling Techniques, Mining Issues in Northern Michigan, and Ethics in Geology. Social events include trips to several wineries near Traverse City, an evening at the Dennos Museum, the awards reception, and a golf outing.

The meeting will be held during the peak of the fall color season in Traverse City, and the field trips and social events will provide plenty of opportunity to see the incredible color of northern Lower Michigan. I hope that you plan to join us in Traverse City in October for a great meeting.

Adam Heft, CPG-10265
Chair, AIPG 44th Annual Meeting

TPG

Volume 44, Number 2 THE PROFESSIONAL GEOLOGIST MAR/APR 2007

AIPG 2007 Annual Meeting Information

Welcome Letter	IFC
Travel and Hotel Information	2
Program	3
Field Trips	3-5
Technical Program	5
Social Events	5-7
Short Courses	7-8
Registration Form	9-10

FEATURES

Spring Flow Restoration	43
Aggregate Resources, Development and Extraction in the United Kingdom	49
Using Vapor Barriers to Prevent Vapor Intrusion	55
Inside the World's Largest Hand Dug Well: Ground Water, Up Close and Personal	59
BOOK REVIEW	22
CALL FOR PAPERS	20
WHERE IN MICHIGAN? CONTEST	58
AIPG STORE ITEMS	61

DEPARTMENTS

EDITOR'S CORNER	11
SECTION NEWS	12
LETTERS TO THE EDITOR	17
MEMBERS IN THE NEWS	18
IN MEMORY	19
TEST YOUR KNOWLEDGE	21
AIPG STUDENT CHAPTERS	21
PRESIDENT'S MESSAGE	24
EXECUTIVE DIRECTOR'S COLUMN	25
PROFESSIONAL ETHICS AND PRACTICES	26
PROFESSIONAL LIABILITY AND RISK MGMT.	30
MARKETING	32
STUDENT'S VOICE	34
NEW APPLICATIONS AND MEMBERS	36
PROFESSIONAL SERVICES DIRECTORY	40

The Professional Geologist (USPS 590-810 and ISSN 0279-0521) is published bi-monthly by the American Institute of Professional Geologists, 1400 W. 122nd Ave., Suite 250, Westminster, CO 80234-3499. Periodicals Postage Paid at Denver, Colorado and additional mailing offices.

POSTMASTER: *The Professional Geologist,* AIPG, 1400 W. 122nd Ave., Suite 250, Westminster, CO 80234.

Subscriptions for all Members and Adjuncts in good standing are included in annual membership dues. Subscription prices are $35.00 a year for Members' additional subscriptions and $45.00 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 nonreceipt or for damaged copies are honored for three months.

Printed in U.S.A. by The Ovid Bell Press, Inc. in Fulton, Missouri.

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

ON THE COVER - Various trip locations for the AIPG 2007 Annual Meeting in Traverse City, Michigan.

Traverse City Information

Weather in Traverse City

Daily Average Temperature: 49°F, with a low of 40°F and a high of 58°F.

Generally, there are only five rainy days in October, so the weather should be good.

Note: For those attending the field trip to the Marquette Iron District, the temperature will be approximately 10°F colder than in Traverse City.

How to get to Traverse City

By Air: The Traverse City Cherry Capital Airport has direct flights to Detroit, Minneapolis, and Chicago. Information on the Cherry Capital Airport is available at: http://www.tvcairport.com. A free shuttle is available between the airport and the Park Place Hotel.

By Car: Traverse City is located at the junction of Michigan highways 37 and 72 at the south end of Grand Traverse Bay.

From the North: Come south from the Upper Peninsula via I-75. Continue south to Grayling and take M-72 west to Traverse City. Or for a more scenic drive, take US-31 from I-75 just south of the Mackinac Bridge, and follow it through Petoskey to Traverse City.

From Detroit: Take I-75 north to Grayling. Follow M-72 west to Traverse City.

From Chicago: Follow I-94 west into Michigan. Take US-31 north to Holland, then I-196 to Grand Rapids. US-131 goes north from Grand Rapids to Cadillac. Turn left onto Route 115, and follow it to M-37. Turn right (north) and head into Traverse City.

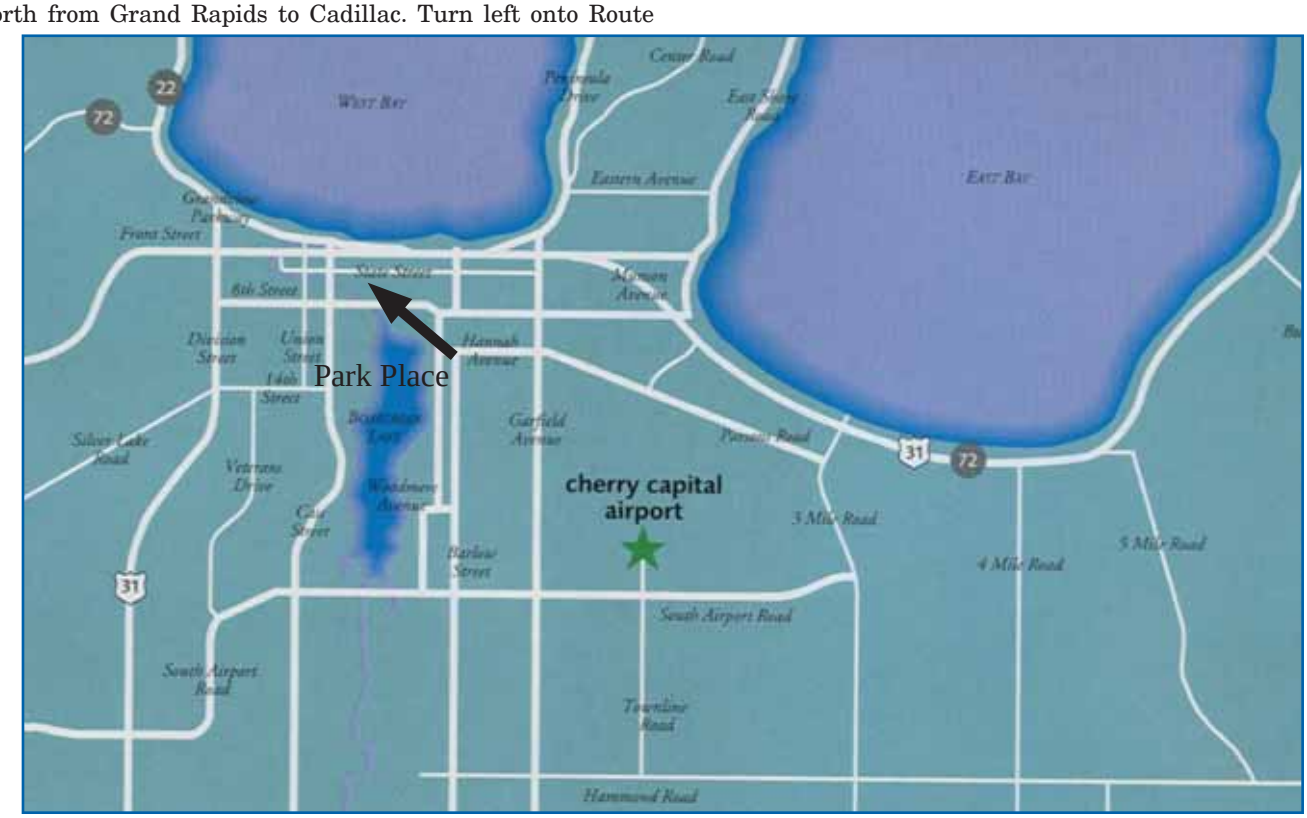
By Rail: Amtrak offers rail service to Grand Rapids, and Kalamazoo. From there, Amtrak offers bus service north to Traverse City. Arrangements can be made at: www.amtrak.com.

Hotel Information

The Park Place Hotel is the location of the 2007 Annual Meeting. A large block of rooms has been reserved for AIPG members at $119 per night, single or double occupancy. Make your reservations by calling (231) 946-5000 (other reservation numbers are for the hotel chain, and they do not have information on group rates). You must specify that you are attending the AIPG conference to get the discounted room rate. Additional information about the hotel can be found at www.park-place-hotel.com.

The Park Place Hotel is located in the heart of downtown Traverse City at 300 East State Street, and is only a short walk from some of Michigan's best specialty shops. Grand Traverse Bay, with its beaches and scenic views, is within two blocks of the hotel. Transportation to and from the Cherry Capital Airport to the Park Place Hotel is by complimentary shuttle. Call the Park Place Hotel upon arrival for shuttle pickup.

There are also smaller blocks of rooms reserved for AIPG members at the Holiday Inn West Bay (for reservations call (800) 888-8020) and at the Great Wolf Lodge (for reservations call (866) 478-9653; you must state that you are booking a room with the AIPG, and the group number is 5A44WL).



Yes, M!ch!gan!

AIPG 2007 Annual Meeting October 7-11
Geology: The Foundation for the Environment and Resources

Program

Saturday, October 6, 2007	
7:00 am - 6:00 pm	Registration Booth Open
7:30 am - 5:30 pm	Mackinac Island Field Trip
3:00 pm - 6:00 pm	Hospitality Suite Open
Sunday, October 7, 2007	
7:00 am - 6:00 pm	Registration Booth Open
7:00 am - 6:00 pm	Hospitality Suite Open
9:00 am - 4:00 pm	AIPG Executive Committee Meeting
12:30 pm - 4:30 pm	GTR Spa Package
5:00 pm - 9:00 pm	Icebreaker - Exhibit Area Open
Monday, October 8, 2007	
7:00 am - 6:00 pm	Registration Booth Open
7:00 am - 6:00 pm	Hospitality Suite Open
7:00 am - 8:00 am	Speakers Breakfast
7:00 am - 8:00 am	Women in AIPG Breakfast
8:00 am - 9:30 am	Past Presidents Breakfast
8:00 am - 12:00 pm	Advisory Board Meeting
8:00 am - 5:00 pm	Exhibits Open
9:00 am - 4:00 pm	Geology and Geologic Resources of the Michigan Basin Short Course
10:00 am - 12:00 pm	Keynote Address and Morning Technical Sessions
10:00 am - 4:30 pm	Old Mission Lighthouse and Winery Tour
12:00 pm - 1:30 pm	Foundation Lunch
1:00 pm - 4:00 pm	Joint Executive Committee Meeting
1:00 pm - 4:00 pm	Monitoring Groundwater Quality Using Low-Flow Sampling Techniques Short Course
1:00 pm - 5:00 pm	Student Interviews
6:00 pm - 9:00 pm	Evening at the Dennos Museum

Tuesday, October 9, 2007	
7:00 am - 6:00 pm	Registration Booth Open
7:00 am - 6:00 pm	Hospitality Suite Open
7:00 am - 8:00 am	Speakers Breakfast
7:00 am - 8:30 am	Business Breakfast
7:30 am - 5:30 pm	Limestone Quarries and Fossil Collecting Field Trip
8:00 am - 12:00 pm	Exhibits Open
9:00 am - 12:00 pm	Morning Technical Sessions
9:00 am - 4:00 pm	Glacial Geology of Michigan Short Course
9:00 am - 4:00 pm	Leelanau Club Golf Scramble
10:00 am - 4:00 pm	Grass River Natural Area Tour
1:00 pm - 5:00 pm	Student Interviews
6:00 pm - 9:00 pm	Awards Reception and Banquet
Wednesday, October 10, 2007	
7:00 am - 6:00 pm	Registration Booth Open
7:00 am - 6:00 pm	Hospitality Suite Open
7:00 am - 8:00 am	Speakers Breakfast
7:30 am - 5:30 pm	Glacial Geology/Sleeping Bear Sand Dunes Field Trip
8:00 am - 5:00 pm	Practical Professional Ethics Short Course
8:00 am - 5:00 pm	Exploration for and Mining of Metals with Emphasis on Michigan's Upper Peninsula Short Course
9:00 am - 12:00 pm	Morning Technical Sessions
10:00 am - 5:30 pm	Leelanau Peninsula Winery Tour
Thursday, October 11, 2007	
7:00 am - 6:00 pm	Hospitality Suite Open
7:00 am Thursday - 5:30 pm Friday	Tilden/Empire Mine Two Day Field Trip

Field Trips

Geology and Glacial Lake Shoreline Features of Mackinac Island (Full Day)

Date: Saturday, October 6th (Pre Meeting)

Time: 7:30 am to 5:30 pm

Cost: $100/$110

Location: Bus pickup in front of the Park Place

Leader: Allan Blaske, CPG-10529

Mackinac Island represents one of the best exposures of late Silurian and early Devonian rocks in the Michigan Basin. The Island contains the best exposures of the Mackinac Breccia in the Straits of Mackinaw area. Dissolution and removal of salt (halite) from within the Silurian Pointe aux Chenes formation

allowed for collapse of overlying limestone, dolomite, and shale, forming columnar breccia pipes. Percolating groundwater gradually cemented the collapse breccias. Recent emergence (due to uplift, glaciation, and isostatic rebound) has brought the rocks to the surface, where differential erosion has sculpted the breccias into the forms observed on the island. The effects of coastline erosion are recorded in wave-cut cliffs and abandoned beaches. The Island offers an excellent opportunity to examine shoreline features related to the glacial Lakes Algonquin and Nipissing formed at the edge of the receding continental ice sheets of 10,000 to 12,000 years ago. This trip will visit all prominent rock exposures (including sea stacks, sea caves, sea cliffs, arches, and abandoned beaches), and will provide an opportunity to examine and discuss the method of formation of the Mackinac Breccia.

Access to the Island is by commercial ferry service. Since automobiles are not permitted on the Island, the trip will be via bicycles. The bicycle trip is anticipated to take approximately six hours, and will involve a ride of 12 to 16 miles with a total of 10 to 12 stops. This trip will leave from the Park Place Hotel in Traverse City at 7:30 am and return at 5:30 pm on Saturday, October 6. An optional upgrade from the single speed bike is possible at your own cost; the standard fee for the single speed bikes is included in the trip cost. A box lunch will be provided.

Limestone Quarries and Fossil Collecting, Charlevoix, Michigan (Full Day)

Date: Tuesday, October 9th

Time: 7:30 am to 5:30 pm

Cost: $60/$70

Location: Bus pickup in front of the Park Place

Leaders: Dr. William B. Harrison, III, Professor Emeritus Department of Geosciences and Director, Michigan Basin Core Research Laboratory, WMU, and St. Mary's Quarry staff

This trip will examine the rocks of the middle Devonian Traverse Group, composed of carbonate and shale sequences. This trip will visit the St. Mary's Cement quarry near Charlevoix, Michigan, as well as outcrops outside the quarry.

Field trip stops will examine several formations within the Traverse Group, and allow observation and collection of the abundant fossils within these rocks. The official stone of the State of Michigan is the "Petoskey Stone" (Hexagonaria percarinata), and this colonial coral is found in abundance in this region of the state. Other fossils, including trilobites, ostrocods, pelecpods, bryozoans, crinoids, brachiopods, and corals can be found in the Traverse Group rocks. This trip will leave Traverse City at 7:30 am and return at 5:30 pm on Tuesday, October 9. A box lunch will be provided.

Glacial Geology/Sleeping Bear Sand Dunes (Full Day)

Date: Wednesday, October 10th

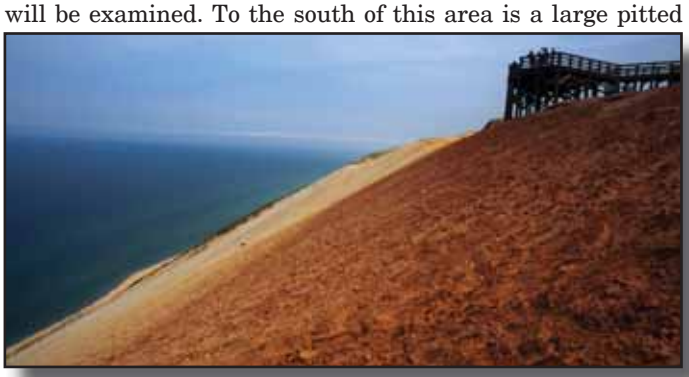
Time: 7:30 am to 5:30 pm

Cost: $60/$70

Location: Bus pickup in front of the Park Place

Leader: Kevin Kincare, USGS

This field trip will examine the late Wisconsin glacial deposits, as well as Holocene modifications to those deposits, of the northwestern lower peninsula of Michigan, including Sleeping Bear Dunes National Lakeshore. The dominant landforms in this area are from the glacial advance of the Greatlakean stadial (~11,800 radiocarbon years B.P.) and from reshaping the land by post-glacial processes, especially glacial Lake Algonquin 10,300 years B.P. and dune formation after 5,000 years B.P. Much of this area is a drumlinized upland covered by a reddish diamict. Structures within this unit and its relationship to the underlying sand and gravel deposit will be examined. To the south of this area is a large pitted



outwash plain with an impressive boulder-gravel component. The entire coastal area has been scribed by shoreline processes of proglacial Lake Algonquin. Wave-cut bluffs, beaches, and huge spits (up to 3 km long) overlie the glacial deposits. The spits contain untapped reserves of very well-sorted gravel. We will also visit one of three large dune complexes in this area. All three started developing via climatic cycles of activation and stabilization after the rise of post-glacial Lake Nipissing. Shoreline processes during the last 2,000 years have also closed off many embayments in a series of ridges and swales related to cyclical shifts in lake level. An overview stop will review the embayment process. This trip will leave Traverse City at 7:30 and return at 5:30 pm on Wednesday, October 10. A box lunch will be provided.

Yes, M!ch!gan!

AIPG 2007 Annual Meeting October 7-11
Geology: The Foundation for the Environment and Resources

Tilden/Empire Mine, Palmer, Michigan (Two Days)

Date: Thursday, October 11th and Friday, October 12th (Post Meeting)

Time: 7:00 am to 5:30 pm

Cost: $200/$225

Location: Bus pickup in front of the Park Place

Leader: Glenn Scott, Cleveland Cliffs

This two-day post-meeting field trip will visit the active iron mining region of Marquette County, Michigan. Two mines, the Tilden and the Empire, began production of pelletized iron concentrates in 1963 and 1974, respectively. Both mines are developed in the Early Proterozoic (+/- 2.0 billion years) Negaunee Iron Formation. The origin of the iron minerals in the Negaunee Iron Formation is a complex combination of primary sedimentary depositional, diagenetic, and metamorphic processes. The Tilden and Empire mines are located in close proximity to each other, and are both operated by Cleveland Cliffs, Inc. Together, the two mines are capable of producing 13.5 million tons of processed iron concentrate pellets annually. This trip will visit one or both operating open-pit mines to examine the structural and stratigraphic features of the iron ore bodies, and the implication of these geologic features in mine planning and ore control. Also included in the trip will be a tour of the iron ore pelletizing process, which entails milling the mined ore, separation of the iron, and production of high-quality iron ore pellets. Stops will also include examination of the disposal of mine tailings and waste rock. Time permitting; outcrops of the Marquette Range Supergroup (which includes the Negaunee IF) will be visited, as well as visit to the Michigan Iron Industry Museum.

The trip will leave Traverse City at 7:00 am on Thursday, October 11, and travel to the Tilden/Empire mine near Ishpeming. Following the mine trip, the group will stay at a local motel, and possibly visit the Michigan Iron Industry Museum that evening. The following day we will return to the mine for a tour of the processing facility, followed by one or two local stops before heading back to Traverse City. Arrival time back in Traverse City is estimated to be 5:30 pm on Friday, October 12. Motel costs are included in the cost of the trip. Lunch is included, but dinner is on your own. Specific instructions and information regarding this trip will be provided to attendees about two weeks prior to the trip.

Technical Program

The technical program will occur on Monday, Tuesday, and Wednesday, October 8, 9, and 10. The technical program topics will include the following:

- Environmental and Engineering Geology
- Mineral and Energy Resources – aggregates, minerals, metals, petroleum, gas, geothermal etc.
- Stratigraphy, Sedimentology, and Paleontology
- Glacial Geology
- Hydrogeochemistry
- Karst and Groundwater Systems
- Geologic Mapping and Computer Applications, Including GIS
- Structural Geology, Basin Analysis, and Geophysics
- Ethics, Public Policy, and the Geologic Profession
- Geologic Outreach, Education, and Communication
- Licensure, Legislation, and Legal Issues, Including Water Law and Policy

The 2007 meeting not only incorporates our goal of highlighting the role of geology in defining, protecting, and sustaining our environment and its resources, but also offers a forum to provide opportunities for reporting on regional geologic studies pertaining to a variety of topics. Such topics include energy and mineral resources, stratigraphy, sedimentology, paleontology, structural geology, basin analysis, and geophysics in any of the diverse geologic regions of North America. The Michigan Basin is famous for the Great Lakes, a rich mining history, unique minerals, petroleum resources, Paleozoic fossils, Quaternary glacial deposits, sensitive dune and aquatic environments, and some of the oldest macroscopic fossils in the world. All of these areas provide many opportunities for thoroughly interesting study.

Social Events

Icebreaker (Evening)

Date: Sunday, October 7th

Time: 5:00 pm to 9:00 pm

Cost: Free with registration

Location: West Bay Ballroom Dome

Get to know your fellow annual meeting attendees at the Icebreaker event. This will be a perfect opportunity to renew acquaintances, meet new people, visit the meeting exhibitors, and view the student posters. The Icebreaker will feature a cash bar, hors d'oeuvres, and a chocolate fountain.

AIPG 2007 Annual Meeting October 8-11
Geology: The Foundation for the Environment and Resources

Yes, M!ch!gan!

Spa Package at Grand Traverse Resort (Half Day)

Date: Sunday, October 7th

Time: 12:30 pm to 4:30 pm

Cost: $225/$250

Location: Bus pickup in front of the Park Place

The spa package includes transportation from the Park Place Hotel to Grand Traverse Resort, where you will receive your choice of several services including facials, massage, pedicures, manicures, and others. Choose from one of the following: Spa Renewal Package, Eminence Package, Cherry Royal Treat Package, Men's Spa Package, or Serenity Package. For exact details on each package visit the following link:

http://www.grandtraverseresort.com/press_room/news_releases_content.cfm?PrimaryID=110.

Old Mission Lighthouse and Winery Tour (Full Day)

Date: Monday, October 8th

Time: 10:00 am to 4:30 pm

Cost: $50/$60

Location: Bus pickup in front of the Park Place

The Old Mission Peninsula is situated between the arms of Grand Traverse Bay on the 45th parallel. You will enjoy wine tasting at four of Traverse City's award winning wineries while taking in the breathtaking views of Grand Traverse Bay, as well as the surrounding orchards and vineyards of the Old Mission Peninsula. This tour will also make a stop at the Old Mission Lighthouse where you can stroll the beaches of Old Mission Point and enjoy lunch. A box lunch will be provided.

Social Banquet at the Dennos Museum (Evening)

Date: Monday, October 8th

Time: 6:00 pm to 9:00 pm

Cost: $65/$75

Location: Bus pickup in front of the Park Place

Enjoy dinner and a social gathering at the Dennos Museum in Traverse City. The entire museum will be open for exhibit viewing before and after dinner. The Dennos features a dynamic array of exhibitions and programs in the visual arts, sciences, and performing arts. The Museum's signature collection is Inuit art of the Canadian Arctic, one of the largest and most historically complete collections of these distinctive sculptures and prints in the United States. As an added attraction and focal point of the evening, the Dennos Museum has obtained an extensive mineral exhibit on loan from the Seaman Mineral Museum at Michigan Technological University in Houghton, Michigan.

Grass River Natural Area and Fall Color Viewing (Full Day)

Date: Tuesday, October 9th

Time: 10:00 am to 4:00 pm

Cost: $25/$35

Location: Bus pickup in front of the Park Place

The Grass River Natural Area is a 1,165 acre preserve comprised of wetlands and wildlife habitat. Miles of trails provide for enjoyable walking, bird watching, and wildflower identification. Enjoy an easy walk of approximately two hours on boardwalk or forest trails with a knowledgeable naturalist. Lunch will be provided at this location. Since the Grass River Natural Area is approximately 30 miles from Traverse City, there will be ample opportunity for viewing fall colors along the way.

Leelanau Club Golf Scramble (Full Day)

Date: Tuesday, October 9th

Time: 9:00 am to 4:00 pm

Cost: $45/$55

Location: Bus pickup in front of the Park Place

Enjoy an 18-hole golf scramble at the Leelanau Club. This course has spectacular views of Suttons Bay and West Grand Traverse Bay. Each player will receive a sleeve of golf balls and tees, range balls, and lunch. All skill levels are encouraged to participate in this fun event. This event is limited to 40 participants.

AIPG Awards Reception and Banquet (Evening)

Date: Tuesday, October 9th

Time: 6:00 pm to 9:00 pm

Cost: $60/$70

Location: West Bay Ballroom Dome

The Awards Reception and Banquet will be held on Tuesday, October 9th in the West Bay Ballroom Dome. This event has been streamlined in recent years, and the presentation of the awards will be made prior to dinner.

Leelanau Peninsula Winery Tour (Full Day)

Date: Wednesday, October 10th

Time: 10:00 am to 5:30 pm

Cost: $50/$60

Location: Bus pickup in front of the Park Place

This tour offers a beautiful drive through the stunning countryside of the Leelanau Peninsula. With fall colors at their peak, the scenery should be magnificent. Spend an unforgettable day visiting six of Leelanau County's most unique wineries while taking in the magnificent views. This is wine tasting at its finest. A box lunch will be provided.

Short Courses

Geology and Natural Resources of the Michigan Basin (Full Day)

Date: Monday, October 8th

Time: 9:00 am to 12:00 noon and 1:00 pm to 4:00 pm

Cost: $75/$95

Location: Courtyard I

Leaders: Dr. William B. Harrison, III, Professor Emeritus Department of Geosciences and Director, Michigan Basin Core Research Laboratory
Dr. G. Michael Grammer, Associate Professor of Geosciences and Director, Michigan Geological Repository for Research and Education, Western Michigan University, Kalamazoo, MI

This course will give an overview of the general geology of the Michigan Basin including structural, stratigraphic and lithologic characteristics of sedimentary strata comprising the basin. Some limited information about the crystalline basement underlying these sedimentary rocks will also be presented. Outcrop and subsurface data will be integrated to give a complete view of the basin. Core, sample and log data from the collections at the Michigan Basin Core Research Laboratory will be used to elucidate the subsurface portion of the basin. Distribution, abundance and geologic setting of hydrocarbon, mineral and water natural resources will be described using specific examples from public databases. Outcrop and core samples will be available for examination during the short course to illustrate key characteristics of selected important formations.

Monitoring Ground Water Quality Using Low-Flow Purging and Sampling Techniques (Half Day)

Date: Monday, October 8th

Time: 1:00 pm to 4:00 pm

Cost: $70/$85

Location: Torch

Leaders: Michael J. Barcelona, Western Michigan University, Department of Chemistry and James Boisineau, EnviroQuip Services

This course will cover the practice of monitoring well purging and sampling using low-flow (Minimal Drawdown) techniques. Starting with a thorough review of monitoring well design, construction, and development, the basis for the method will be presented. Distinct advantages of low-flow versus "conventional" techniques will be discussed in the context of specific contaminants which are prone to major bias (gross error). These include purging indicators parameters (electrical conductance, dissolved oxygen, and pH), redox indicators (dissolved oxygen, ferrous iron, sulfide, etc.) and volatile organic compounds (fuel constituents and chlorinated solvents). Case studies and research publications will be covered (copies will be provided as part of the course materials). Participants are urged to ask questions throughout the course period. In addition to the two-hour classroom session, the class will include a field portion (~1.5 hours) during which a low-flow sampling event will be conducted. Participants will be encouraged to actively join in the field proceedings.

Glacial Geology of Michigan: New Insights and Interpretations (Full Day)

Date: Tuesday, October 9th

Time: 9:00 am to 12:00 noon and 1:00 pm to 4:00 pm

Cost: $75/$95

Location: Leelanau

Leader: Dr. Alan Kehew, Professor of Geosciences, Western Michigan University, Kalamazoo, MI

Michigan was extensively glaciated during repeated Pleistocene fluctuations of the Laurentide Ice Sheet. The Lower Peninsula is covered by variable thicknesses of glacial drift (up to 1200 ft), with few exposures of bedrock. The Upper Peninsula was also completely covered by glaciers, but contains more extensive exposures of bedrock. Over the past decade, new mapping of the glacial drift has been completed as part of US Geological Survey STATEMAP and EDMAP programs. Prior to this new work, most interpretations of the glacial geology were based on mapping by Frank Leverett and others in the early 20th Century. Digital Elevation Models (DEMs) provide a new way to visualize and interpret glacial landscapes and are extensively used in current mapping projects. The wide availability of these databases has stimulated and facilitated glacial geologic research throughout glaciated terrains worldwide. DEMs will be used in the course to illustrate glacial landscapes.

This short course will review new interpretations and controversies involving the glacial geology of Michigan by giving examples of various types of landforms and landscapes and by summarizing the evidence and hypotheses for their formation. Major topics to be explored in the course include the record of the glacial lobes that covered Michigan including the Lake Michigan, Saginaw, and Huron-Erie Lobes, the processes and deposits occurring at interlobate boundaries, and the occurrence and origin of landforms such as moraines, drumlins, tunnel channels, eskers, and outwash fans. The characteristics and distribution of deposits such as diamicton (till), glaciofluvial sediment, and glaciolacustrine sediment will be covered and examined in terms of their environmental implications. Most examples will be chosen from mapped areas in southwestern Michigan.

Exploration for and Mining of Metals with Emphasis on Michigan's Upper Peninsula (Full Day)

Date: Wednesday, October 10th

Time: 8:00 am to 12:00 noon and 1:00 pm to 5:00 pm

Cost: $125/$140

Location: Top of Park

Leaders: Theodore J. Bornhorst, Ph.D., Michigan Technological University

This course will investigate several aspects of exploration for and mining of metallic minerals in Michigan within the framework of government regulations. The course will present an overview of the types and 3-D geometry of metallic mineral deposits with reference to Michigan's western Upper Peninsula. Techniques used for exploration for metallic deposits, mining methods, and engineering evaluation that is part of feasibility studies will be discussed. There will be consideration of the assessment of the environmental impact of mining, especially acid rock drainage (ARD) and the geochemical methods used to assess it. The course will include study and analysis of Michigan's metallic mining regulations using Kennecott's Eagle Mine in Michigan's Upper Peninsula as a case study.

Practical Professional Ethics (Full Day)

Date: Wednesday, October 10th

Time: 8:00 am to 12:00 noon and 1:00 pm to 5:00 pm

Cost: $150/$175

Location: Leelanau

Leaders: David M. Abbott, Jr., CPG-04570

"Ethics" is in the news. We're all in favor of ethical behavior; but what does this really entail, particularly in professional practice? Our childhood ethical training didn't cover common professional issues like conflicts of interest and employer/client confidentiality. What is the connection between common moral rules like "Do not kill," "Do not harm," and "Do not deceive" and the common headings found in professional ethics statements like "Protect the public health, safety, and welfare," "Relationships with employers or clients," and "Relationships with professional colleagues"? How does one determine whether an exception to a general moral or ethical rule is allowed? For example, is it ever acceptable to ignore data points in reaching scientifically valid conclusions?

This short course addresses these questions using actual professional practice examples. The course provides a review of fundamental moral principles, something missing from all too many ethical presentations, and demonstrates how these principles relate to common professional ethical statements along with guidelines on applying general statements to analyze particular case histories. Course participants are expected to contribute to discussions of case histories and are encouraged to contribute their own case histories for analysis.

2007 NATIONAL AIPG MEETING REGISTRATION FORM

NAME (Last) (First) (Middle Initial)	NAME FOR BADGE	Meeting Status	
		Speaker	
COMPANY/INSTITUTION	CPG or MEMBERSHIP NO.	Exhibitor	
		Session Chair	
ADDRESS		Exec. Comm.	
		Membership	
		CPG	
CITY, STATE, ZIP CODE	COUNTRY	Member	
		Student	
PHONE	E-MAIL ADDRESS	Past President	
***SPOUSE/GUEST NAME	NAME FOR BADGE		

Spouse/Guest Registration includes admission to Icebreaker and Exhibits

FEES AND PAYMENT INFORMATION

ANNUAL MEETING REGISTRATION	On or Before - 08/01/07	After 8/01/07	Amount
Full Registration (Member*)	$250.00	$300.00	
Full Registration (Non-Member)	$275.00	$325.00	
Daily Registration (Member*) ⊐Sat ⊐Sun ⊐Mon ⊐Tues ⊐Wed	$75.00	$100.00	
Daily Registration (Non-Member) ⊐Sat ⊐Sun ⊐Mon ⊐Tues ⊐Wed	$100.00	$125.00	
Spouse/Guest	$35.00	$35.00	
Student** (Full Registration)	$10.00	$20.00	
Daily Student Registration** Spec. Day(s)_____	$10.00	$20.00	

*AIPG Members Only **Student Confirmation Required ***Registration Required

FIELD TRIPS	Before 8-1/After	No. Attending	Amount
Mackinac Island (Saturday, October 6, 7:30 AM – 5:30 PM)	$100.00/$110.00		
Limestone/Fossil Quarries, Charlevoix (Tuesday, October 9, 7:30 AM-5:30 PM)	$60.00/$70.00		
Sleeping Bear Dunes (Wednesday, October, 10, 7:30 AM-5:30 PM)	$60.00/$70.00		
Tilden/Empire Mine, Palmer (Thurs. & Fri., October 11 and 12)	$200.00/$225.00		
SHORT COURSES	Before 8-1/After	No. Attending	Amount
Geology and Natural Resources in MI Basin (Monday, October 8, 9:00 AM to 4:00 PM)	$75.00/$95.00		
Low-Flow Purging and Sampling (Monday, October 8, 1:00 PM to 4:00 PM)	$70.00/$85.00		
Glacial Geology Michigan: New Insights and Interpretations (Tuesday, October 9, 9:00AM to 4:00 PM)	$75.00/$95.00		
Practical Professional Ethics (Wednesday, October 10, 8:00 AM to 5:00 PM)	$150.00/$175.00		
Exploring/mining metals in MI Upper Peninsula (Wednesday, October 10, 8:00 AM to 5:00 PM)	$125.00/$140.00		
SOCIAL EVENTS	Unit Cost	No. Attending	Amount
Spa Package at Grand Traverse (Sunday, October 7)	$225.00/$250.00		
Women in AIPG Breakfast (Monday, October 8)	$20.00/$25.00		
Old Mission Lighthouse and Winery Tour (Monday, October 8)	$50.00/$60.00		
Social Banquet at Dennos Museum (Monday, October 8)	$65.00/$75.00		

Leelanau Golf Scramble (Tuesday, October 9)	**$45.00/$55.00**		
Grass River Natural Area and Fall Color Viewing (Tues., Oct. 9)	**$25.00/$35.00**		
Awards Reception and Banquet (Tuesday, October 9)	**$60.00/$70.00**		
Leelanau Peninsula Winery Tour (Wednesday, October 10)	**$50.00/$60.00**		
Take a Student to Dinner	**$60.00/$60.00**		
Ice Breaker (Sunday, October 7) **(Must Show Badge)**	**Complimentary**		
Speakers/Moderators Breakfast (Monday, Tuesday, or Wednesday, please specify)	**Complimentary**		
Business Breakfast (Tuesday, October 9)	**Complimentary**		
Foundation Trustees Lunch (Monday, October 8)	**Invitation Only**		
Past-Presidents Breakfast (Monday, October 8)	**Invitation Only**		
		TOTAL AMOUNT DUE	

National and Sectional Meetings	Attending
National Executive Committee Meeting (Sunday, Oct. 7)	yes / no
2007 Advisory Board Meeting (Monday, Oct. 8)	yes / no
2007/2008 Advisory Board Meeting (Monday, Oct. 8)	yes / no
2007-2008 Joint Executive Committee Meeting (Monday, Oct. 8)	yes / no

Notes

- The Field Trips and Short Courses are subject to cancellation due to lack of participation. Minimum numbers of participants must be reached by August 31, 2007.
- Registration fees for cancelled events will be refunded to registered attendees.
- Full Registration includes Ice Breaker, Technical Sessions, Exhibits, Business Breakfast Meeting, Student Posters, Coffee Breaks, and Registration Package.
- CEU Credits Available.
- Please indicate if you have any special dietary requirements.

SPECIAL NEEDS/REQUESTS:_____

METHOD OF PAYMENT

TOTAL AMOUNT DUE $_____

PLEASE CHECK METHOD OF PAYMENT

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

Card No._____ Expiration Date_____

Print name of cardholder:_____
REQUIRED: Credit Card Billing Address (street, city, state, and zip):

_____

_____

Authorized Signature_____

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

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

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

Gail G. Gibson, CPG-09993,
Florida Community College at Jacksonville
1154 Morgan Circle E.
Orange Park, FL 32073
ggibson@fccj.edu

Continuing Professional Development — Necessity or Nuisance?

I would wager that essentially every reader of these editorial comments can remember a university faculty whose sole contribution to class was to reiterate the material printed in the text. No sharing of personal professional experience. No discussion of opposing interpretations or variations in approach to the solution of problems. Do you feel that you received your money's worth from that class and instructor? Or, you probably have read project completion reports or proposals in which the geologic framework section that often forms the basis of the work completed or proposed has not been updated in several years, as noted by the lack of citations from current peer-reviewed literature.

In the academic world, such behavior often reflects the lack of continuing professional development, in both the discipline and instructional techniques. In many cases these individuals have isolated themselves intellectually and physically from their peers. Comments like, "I really can't attend that conference or symposium because I have classes to teach" is a common excuse. These individuals often search for the older editions of textbooks so as not to have to revise their lecture notes and exams.

In the world of the practicing geoscientist, maintaining currency in one's discipline is just as essential as for the excellent instructor. A poorly written proposal that uses outdated information may be supplanted by a competitor's proposal. Your company and you deserve to compete on equal footing with proposals from competitors. The "new hire" straight out of college may lack your experience, but he or she has often been exposed to and is practiced with technology and knowledge that was not available to you when you attended college. Many companies team the "new hire" and the "old hand". This is professional development of a sort in that they learn from each other and as a team, the pair is very productive. There are no CEUs involved, just the professional growth for both individuals.

Professional development is essential to the continued success of the practicing geologist, and is more than taking the occasional online course or webinar (web-based seminar). Professional development is examining and discussing geology with peers on the outcrop — sharing observations and interpretations. Professional development is presenting a paper on a case study or the results of research at a section or national meeting of AIPG. Professional development is writing technical articles for peer-reviewed journals, sharing your knowledge with readers you never meet. Professional development is sharing your knowledge, experience, and enthusiasm for learning with students in an elementary grades class.

All of which reminds me, have you recorded your continuing professional development activities on the AIPG website this year? Just thought I would share this reminder I recently received.

Alaska Section

We were pleased to host a fascinating presenter for our January Section meeting. Mr. Mark Rebagliati of Northern Dynasty Resources, Ltd. transformed our meeting into a field adventure spanning several years of mining exploration to investigate the Pebble Copper-Gold-Molybdenum Porphyry in Southcentral Alaska. He shared fascinating insights into the already discovered ore bodies and the potential for continued success for future ore body delineation to the east, in the new Pebble East. Mark's skilled visual tour of the surface extent and subsurface cross-sections of known deposits presented the three dimensional representation of the current exploration efforts. Mark encourages us to stay tuned as more drilling, assay testing and potential mining plans unfold. He reminds us that planning and permitting for a mine is a multi-year effort, and that we should remain open minded and patient as more information becomes available. We hope to continue to get updates from as interesting and knowledgeable sources as Mark Rebagliati. He is welcome to come back again soon!

Nino Muniz, Alaska Section President.

Alaska Section Winter Meeting.

Susan G. Browne, CPG-08886

Arizona Section

AIPG Executive Director Bill Siok chaired the Steering Committee meeting at Clear Creek Associates' office in Scottsdale to discuss plans for the 2008 Annual AIPG meeting in Flagstaff. The meeting, in conjunction with the Third International Professional Geology Conference, will be held September 20-25. Bill explained the general structure of the meeting and asked for suggestions and comments. In addition to Bill Siok, Lee Allison, David Best, Larry Fellows, Barbara Murphy, Dale Nations, and David Palmer attended.

The Arizona Business Meeting was hosted by Lee Allison, State Geologist, at the AZ Geological Survey on Saturday, Feb. 10. The agenda included a summary of activities of geologic agencies and societies. David Kirchner, our President for 2007, presided. Bill Siok, Executive Director of the AIPG summarized what's happening with AIPG at the national level and introduced the officers and Executive Committee members. Discussions included plans for the Third International Professional Geology Conference to be held in Flagstaff in September 2008.

Larry D. Fellows, CPG-04447

California Section

California Section Vice President James Jacobs announced that the 2010 AIPG National Meeting will be held in California. It has been over a decade since the last time an AIPG meeting was held in California (Long Beach). Jim indicated that this will be a great chance to showcase our State to AIPG members from all over the country and will reinvigorate the California Section.

Richard R. Gundry, CPG-08518

Carolinas Section

Macklin M. Armstrong, CPG-07485, will present a half-day ethics course at the Clemson University Hydrogeology Symposium in Clemson, South Carolina on April 17, 2007. He has previously presented the AIPG Carolinas Section sponsored course titled Rules of Professional Conduct – Case Study Approach for geologists, engineers, land surveyors, and landscape architects in Raleigh, North Carolina. Mr. Armstrong serves on Ethics Committees for the AIPG and the National Association of State Boards of Geology.

Macklin Armstrong, CPG-07485

Colorado Section

Douglas C. Peters, CPG-08274, was the winner of the Colorado Section-AIPG Distinguished Service Award for 2006.

Doug has been very active in the Colorado Section, and National AIPG to a lesser degree, activities and offices, both in the past and at present. Doug is a two-time Past-President of the section. He has been most recognizable to the majority of CO-AIPG members (other than the ones he regularly "interacts" with in the Denver Metro area) via his activities as original developer and manager (and sender) of the numerous section e-mail announcements on geoscience and engineering events in the Front Range and Colorado in general.

Tricia Beaver and Anne Weber received Service To Geology Awards for their dedication and efforts serving the Colorado Section-AIPG. Tricia is a past Section President and both Tricia and Anne have served in various positions on the Executive Committee over the years. They organized the Legislative Reception for two consecutive years, one of the more time-intensive Section activities.

We congratulate Doug, Tricia and Anne on receipts of their awards and thank them for their dedication to our Institute and Section.

Some of the items David R. Rhode, incoming 2007 Colorado AIPG President would like to work on accomplishing this year are: 1) Energizing the monthly luncheons for greater attendance; 2) Encouraging greater participation from our section membership in the affairs of the section and national organization; 3) Recruiting more CPG candidates; 4) Establishing student chapters at the University of Colorado, Colorado State University, and the University of Northern Colorado (there is an existing chapter at the Colorado School of Mines); 5) Award the first scholarship from the Rex Monahan Scholarship Fund; 6) Investigate ways to make a greater impact on legislative issues, and finally 7) Develop networking activities among our membership.

David R. Rhode, CPG-08558

Georgia Section

The Georgia section will have a booth at the 56th Annual Meeting of the Southeastern Section, GSA in Savannah from March 28-30, 2007. We are also hosting a theme session Friday

on "Geology Careers for New Geology Graduates." We have twelve speakers for our session. We have talks on different areas of consulting, petroleum, federal, and state employment opportunities.

We are also the sponsor of the poster session on Friday titled "Geologic Maps, Digital Geologic Maps, and Derivatives from Geologic Maps." Michael Higgins and Ralph Crawford co-chair this session. Mapping is so important to geologists so this should be a great session.

We had a great turn out of students, members, and guests at our December 8, 2006, visit to Vulcan Materials Company Kennesaw quarry. We saw a video on blasting in the quarry and then drove our cars to the bottom of the quarry. It was very cold but everyone seemed to enjoy the trip.

Vulcan Materials Kennesaw Quarry.

Georgia State Geology Students.

Ron J. Wallace, CPG-08153

Hawaii Section

The Hawaii section held a meeting at the University of Hawaii - Manoa Campus on January 9, 2007. The guest speaker was John Sankey, P.Eng., True Blue Technologies Inc. He presented "Optimized In-situ Bioremediation - Ground Water Characterization and Anaerobic Bioremediation Using Emulsified Edible Oil".

Illinois-Indiana Section

You are invited to attend the Illinois-Indiana section annual meeting on April 25, 2007 from 5:00 pm to 9:30 pm at The Morton Arboretum, 4100 IL. Rt. 53, Lisle, Illinois.

The guest speakers will be John C. Steinmetz, Ph.D., Director and State Geologist, Indiana Geological Survey and Gregory W. Dunn, LPG, Program Manager, Voluntary Site Remediation Unit, Illinois Environmental Protection Agency.

Meeting contacts are David G. Pyles, DavidP@KPRGInc.Com and Ramona Cornea, r.cornea@insightbb.com

Kentucky Section

The Kentucky section held their Fall Field Trip, 'Geomorphology and Quaternary Geology of the Lower Ohio River Valley: Mapping and Applications' on October 5-7, 2006 along with the Kentucky Society of Professional Geologists.

Unconsolidated sediments in Kentucky have long been considered "dirt" compared to the spectacular preservation of depositional features within the Paleozoic sedimentary rocks that are usually studied by geologists in Kentucky. This field trip definitely changed the attitude of the participants that "It's not just Qal anymore" or "A silly little thing called loess" and that it can take its place of prominence in Owensboro.

Western Kentucky's proximity to the Wabash Valley and New Madrid Seismic Zones and the significant thickness of glacial outwash sediment raise concerns about ground-motion amplification of seismic waves and potential liquefaction. Recent mapping of the Quaternary unconsolidated deposits as engineering soils gives a better understanding of the architecture of the valley-fill sediments; coupled with data on the geotechnical characteristics of the various types of sediments, the mapping can be used to better predict the local behavior during a major seismic event.

The field trip was coordinated by William M. Andrews Jr., Steven L. Martin, Ronald C. Counts, E. Glynn Beck, Carrie Pulliam, and Brandon C. Nuttall of the Kentucky Geological Survey, University of Kentucky; James M. Durbin and Scott E. Waninger of the Geology and Physics Department, University of Southern Indiana; John D. Lutz of the Department of Earth and Environmental Sciences, University of Kentucky; and Kenneth E. Henn of the Louisville District, U.S. Army Corps of Engineers.

On Thursday, October 5, a pre-trip soil characterization workshop was hosted by Ron Counts, Dave Williams, Carrie Pulliam, Scott Waninger, and Steve Blanford of the Lexington, Kentucky, office of the U.S. Department of Agriculture. The workshop was held at the KGS Henderson field office. The day was spent studying soil samples and learning about the USDA and Natural Resources Conservation Service's soil classification process.

A demonstration was given in a field behind the KGS office of the Giddings soil probe equipment borrowed from the Illinois State Geological Survey. That evening the ice breaker and registration were held at the Henderson Ramada Inn.

Pre-trip soils workshop.

On Friday, October 6, the bus picked up the field-trip attendees at the Ramada Inn for several stops along the lower Ohio River Valley floodplain. Daviess and Henderson Counties are just south of the Pleistocene glacial limit, characterized by low-relief bedrock uplands separated by broad alluvial valleys. Current mapping has identified a series

Giddings soil probe, Ron Counts and Mike Murphy.

Steve Blanford (bottom left), USDA, with fresh soil samples.

of Pleistocene high terraces, several intermediate terraces, and a Holocene floodplain.

Stop 1, showed how the terraces and other landforms of the Ohio River Valley have been identified. Also discussed was land use with respect to flooding, demonstrated by the location of the line of barns. A number of borrow pits used to construct the new stretch of U.S. 231 were left to fill with water and become constructed wetlands for migratory birds. A number of seismic refraction surveys were conducted to reveal the different shear-wave velocities in the Ohio River Valley sediments, which provided a general understanding of the subsurface architecture of the Ohio River Valley fill sediments and allowed ground-motion amplification during a seismic event to be predicted.

Stop 2, provided an opportunity to

Drew Andrews, Steve Martin, and Mike Murphy in front of a borrow pit demonstrating how barns line up on the upper terrace.

visit the Daviess County Sand and Gravel Company's operation. Besides learning of the daily dredging and separation operation from owner Roy Adams, the field-trip attendees had an opportunity to rummage through the waste piles of near and far-traveled cobbles of limestone, sandstone, siltstone, coal, chert, quartz, quartzite, granite, and various other igneous, sedimentary, and metamorphic rocks.

Stop 3, the Bon Harbor Hills in Daviess County contains representative loess and associated paleosols for the Ohio River Valley, along with a late Pleistocene fluvial deposit and bedrock.

Daviess County Sand and Gravel Company waste pile of unwanted glacial outwash.

The lunch stop was at Little Hurricane boat ramp, where field-trip participants

Bon Harbor Hills loess.

had a scenic view of the Ohio River.

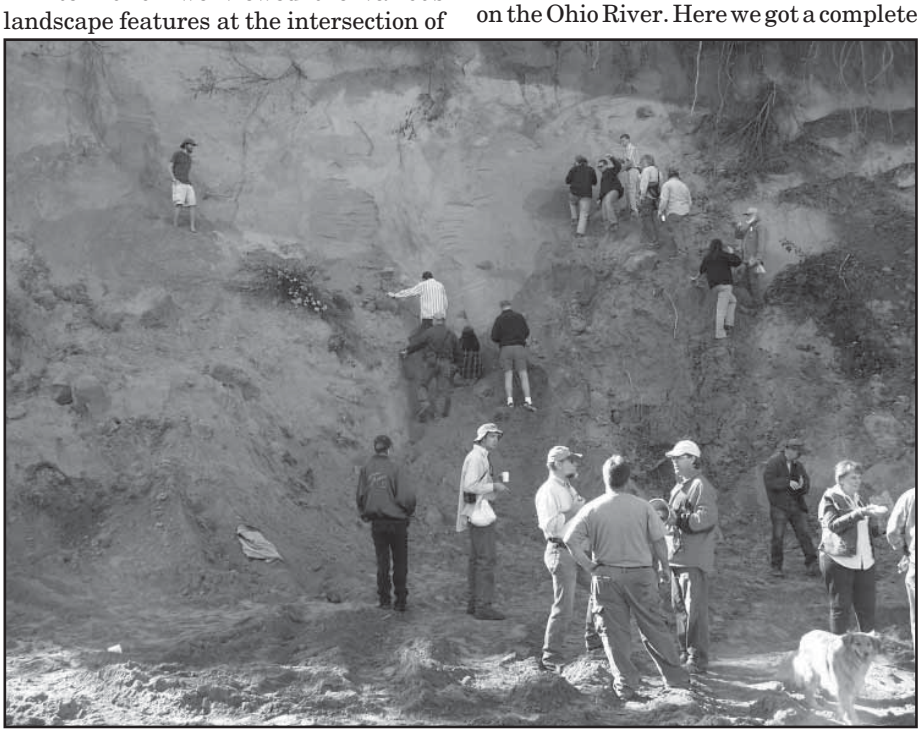
After lunch we viewed the various landscape features at the intersection of two of the oldest and highest paleochannels and associated landforms of lacustrine/slackwater terraces. Being in the Western Kentucky Coal Field, we also observed the stripping and reclamation conditions of an active surface-mining operation.

The day concluded across from the Keach Farm to view an upland area composed of 25 to 40 feet of loess overlying a relatively flat bedrock surface that forms the southern wall of the Ohio River Valley. Ongoing geotechnical work on this farm since 1996 has resulted in drillers' logs from groundwater monitoring wells, soil cores with detailed descriptions, electric-resistivity profiles, aquifer tests, a cone penetrometer sounding, gamma-ray logs, and seismic-refraction and -reflection profiles.

That evening we gathered in one of the meeting rooms of the Henderson Ramada Inn for dinner. Dr. Andrew Wulff, professor, Western Kentucky University and president-elect of KSPG, gave an after-dinner speech and introduced the guest speaker, Dr. James F. Howard, who gave a PowerPoint presentation on "Time: The Forgotten Element in Environmental Investigations and Remediations."

On Saturday the attendees loaded up in the bus and headed for Indiana to view a loess-capped paleosand dune in an active sand quarry.

Next we went to the U.S. Army Corps of Engineers Newburgh Lock and Dam on the Ohio River. Here we got a complete



Attendees and students climbing loess-capped sand dunes at Stop 8.

Dr. Andrew Wulff, professor, Western Kentucky University and president-elect (2006) of KSPG.

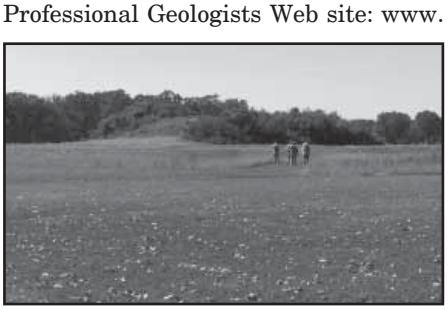
overview of the various geologic conditions that needed to be addressed during the construction of the project.

The field trip ended at the Angel Mounds State Historic Site in Evansville, Ind. The attendees watched a movie in

Kenneth E. Henn, U.S. Army Corps of Engineers discussing the Newburgh Lock and Dam on the Ohio River.

the visitors center and then strolled the grounds of the best-preserved prehistoric Native American site of the people of the Middle Mississippian culture.

The guidebook for this trip is posted as a pdf file on the Kentucky Society of Professional Geologists Web site: www.



Angel Mounds.

kspg.org/pages/fieldtrips.html.

Richard A. Smath, CPG-00240

Michigan Section

On December 14, 2006, the Michigan Section held its annual Awards Banquet at Tony M's in Lansing, Michigan. A total of 81 members and guests attended. Many members were recognized for longevity, significant contribution and the Outstanding Professional Geologist of 2006 was awarded. Following the awards Ms. Patty Brandt of the Michigan Department of Environmental Quality gave a presentation entitled "Application of Part 31 Water Resource Protection Rules to In Situ Injections".

The Michigan Section presented a $500 grant award to the Kenowa Hills Public School located in Walker, Michigan. The education grant was presented to Mr. Bill Pahl by Section President Kevin Lund and Section Secretary Sara Pearson. A second education grant was awarded to Forest Hills Public School located in Grand Rapids, Michigan. Forest Hills could not attend the awards banquet so the grant will be presented in January at the school.

Bill Pahl, Kevin Lund, Sara Pearson.

A total of 79 members received recognition for 40-years, 30-years, 25-years, 20-years, 15-years and 10-years as members of the Michigan Section. Plaques were awarded to the members with over 20-years and certificates presented to members with 15-years and 10-years. Gary Dannemiller was present to receive recognition for 25-years, and Tim Cullen received recognition for 20-years.

Gary Danemiller and Kevin Lund.

Tim Cullen and Kevin Lund.

Not present to receive their longevity recognition were Edith McKee 40-years, Charles Black 30-years, LeRoy Smith 30-years, Bruce Hulman 25-years, Chris Peters 20-years, Duane Jorgensen 20-years, Thrasos Eftaziadis 20-years, Ken Wiley 20-years and James Quince 20-years. The plaques and certificates for members that could not attend the awards banquet were mailed.

Walt Bolt, representing the section executive committee presented a plaque to Kevin Lund for Recognition of Significant Contribution. Kevin was the 2006 Section President, chaired the 2005 and 2006 golf fund raisers and is the Finance Chair of the 2007 National meeting to be held in Traverse City, Michigan.

Walt Bolt and Kevin Lund.

The Outstanding Professional Geologist of 2006 was awarded by Mark

Jim Brode, Jr. and Mark Sweatman.

Sweatman to Jim Brode Jr. Jim has over 22-years of experience. His last 10-years have been with FTC&H where he is an Associate. Jim received his degrees, BS/MS from Western Michigan University focusing on hydrogeology. Jim has been closely involved with AIPG, including section President, advisory board, section screening chair, and awards chair.

Minnesota Section

The Minnesota section held a meeting on January 9th, in which Charlie Tiller, CPG-10811, presented "Adventures in Yellowstone Geology: a coming-of-age tale".

Every geology major dreams of doing research in the most fascinating and beautiful places on Earth; Yellowstone is one such place. This presentation offered a brief background survey of Yellowstone geology, detailed research on surficial geology in the Yellowstone Lake basin, and teased out the complex interplay of factors influencing the sedimentary record there. Charlie illustrated some lessons learned from his experiences studying this special place and the other researchers he met along the journey. Those forces helped season him into the professional he is today.

Many members may know Charlie Tiller as the 2006 President of the AIPG Minnesota Section.

Tennessee Section

AIPG Tennessee Section 2006 year end review.

Among the successful activities last year, we completed a survey of Registered Professional Geologists in Tennessee regarding improvements needed in the TN PG registration law. The results of the survey showed strong support among TN geologists for upgrading the requirements for PG licensing including testing, continuing education and the institution of a review board or committee. A committee of 12 individuals consisting of AIPG and non-AIPG members has been assembled and is working toward a goal of getting a bill sponsored and introduced in the TN Legislature when it convenes in January 2007. We have been working from a 1999 draft legislation that came close, but was never introduced. The Committee will get together after the first of the year to iron out a few details and, hopefully, it'll be ready for potential sponsors to pick up for introduction.

It has been a pleasure serving as your president this year. I appreciate the efforts by those of you who have actively participated this year. We continue to need more folks to get involved. We have good core group of people that have been very active and helpful, but eventually people wear out and others are needed to step up. Please consider volunteering for an office or committee.

John W. Hofer, CPG-10341

Foundations Benefit From IRA Rollovers

Since last August, when Congress introduced tax-free IPA rollovers as part of the Pension Protection Act, educational institutions such as Harvard University and others have received more than $25 million. This provision, which is available to people over age 70 and older, has elicited a strong response from donors around the country according to the National Committee on Planned Giving. Donors can give as little as $100.00 or as much as $100,000.00. Harvard says it has received 11 gifts for the maximum amount.

Here's how it works. Once a person reaches 70 years, 6 months, that person can donate up to $100,000.00 tax-free and count that donation toward the required minimum distribution which IRA holders in that age group must take. The new rule, called "qualified charitable distributions" or QCDs, ends on December 31, 2007 unless Congress extends it.

There are two things to remember. Donors can't take a tax deduction. Donors must make their gift directly from the IRA to the charity. Donors to the AIPG Foundation do not have to worry about a third pitfall, because our Foundation is not a private foundation; private foundations are not eligible.

In order to effect the transfer of funds to the charity, you need to advise the holder of your IRA of your plans and ask them for the required paperwork. Once you have done that, you should advise the charity that they will be receiving this gift. You should ask the charity for a letter acknowledging the gift, the date of receipt, the amount, and language stating that it came from your IRA.

For IRA holders who must make a yearly required distribution but don't personally need the money, this new rule makes previously taxable gifts tax-free. For AIPG members, this new rule may make it easier for those who have wanted to make a gift to the Foundation. We hope you do.

Kelvin J. Buchanan,
CPG-06058
AIPG Foundation

Letters of appreciation from the 2006 American Geological Institute's Government Affairs Program Summer Interns

Dear Mr. Lehmann,

I am writing to thank you and the American Institute of Professional Geologists Foundation for your generous support of the American Geological Institute's Government Affairs Program Summer Internships. The summer of 2006 was a very active time for "geopolicy" because natural resources and natural hazards have become a much greater priority for policymakers. It was very helpful to have more staff in government affairs to cover the many hearings, policy statements and bills Congress considered.

Our three summer interns, Timothy Donahue, Jessica Rowland and Carrie Donnelly, were quick learners, good listeners, effective communicators, and great team players. I cannot overstate how valuable their help was and how nice it was to see them expand their horizons by learning more about the breadth of the geosciences and the role of geology in public policy development.

Attached to this letter are thank you letters from the interns, which provide a more personal perspective of the value of this program than my general letter can provide. I have also attached the draft version of their "The Professional Geologist" articles, which provides a bit more background on the intern in the introduction plus the articles. You can find the final version of the articles in the November/December 2006 TPG.

Thank you again for your generous support of the Government Affairs Summer Internships.

Sincerely,
Linda Rowan

Dear Mr. Lehmann,

As I approach the end of my summer internship with AGI and prepare to return home, I do so knowing that my understanding of the mechanisms of government, the intricacies of science policy and the options for young people in the geosciences has been infinitely enhanced. I hope that I can do justice to the opportunity that I have been given by building on what I have learned throughout my career and by communicating what I can of it to my colleagues and students. For all that I have gained this summer, I would like to thank you and the AIPG Foundation.

When I return to Seattle I will be working hard to complete my M.S. at the University of Washington before winter. I will also be teaching an undergraduate geology course, and hope to incorporate my new knowledge and AGI's resources into my lesson plans in order to expose my students to some of the things that geologists do when we're not looking at rocks. It is difficult to look much past the completion of my Masters, but I hope to remain active in policy as I proceed with my education and career.

My summer on the Hill has been well spent: I have attended several congressional hearings where I was exposed to the legislative process and learned about some very intriguing issues, such as the U.S. – India nuclear technology agreement. Perhaps more importantly, I have been introduced to some wonderful people at USGS, NSF, The Carnegie Institution of Washington, OSTP, AAPG and of course AGI. Everybody that I have talked to has been eager to share their experiences with me and has offered advice to help guide me as I choose my professional path. I could never have met or spoken with such a variety of professional scientists if not for this internship. Allow me to thank you again, and to express my hope that many more young geologists are able to enjoy the same opportunity that I have gained so much from.

Sincerely,
Carrie Donnelly

Dear Mr. Lehmann,

I would like to express my appreciation for the support AIPG has given to the AGI Government Affairs Internship program. This support was important because it allowed me to focus on my work and learning experiences at AGI and on Capitol Hill. With few student internships and opportunities offering stipends, I greatly appreciate and recognize how unique this support is. The personal and professional growth that I have experienced this summer is invaluable to me.

Because of the extra effort of Linda Rowan, we also had the opportunity to explore the various agencies and research institutions in Washington. We went to the U.S. Geological Survey, National Sciences Foundation, the Smithsonian's climate exhibit, the Office of Science and Technology Policy, the Carnegie Labs, and several others. Hearing from professionals in the geoscience field gave me important insight into the many opportunities available in the geoscience field of study. Additionally, it was interesting to witness the research labs in action. I was also able to meet my representatives in Congress.

This fall I will return for my last semester at Winona State University. I will graduate in December with majors in geology, political science, and public administration. With all of the opportunities available that I have seen this summer, I hope that I can find my place in the geology and policy community. I hope to attend law school in the future as my career develops.

Sincerely,
Timothy Donahue

Dear Mr. Lehmann,

I would like to thank the AIPG Foundation for supporting my internship with the Government Affairs Program at the American Geological Institute this summer. Not only was it very exciting to attend hearings, briefings and other events on Capitol Hill and in the D.C. area, but it was also extremely informative. I learned an incredible amount about Earth science policy, and am tremendously grateful to have had this unique opportunity.

This summer I primarily followed hearings and legislation on climate change and other environmental issues. I attended hearings ranging from air quality standards to abandoned hardrock mines, and from brownfields legislation to energy efficiency. The most exciting – and contentious – hearing that I attended were those on global warming and the "hockey stick" curve, which took place at the end of July in the House Committee on Energy and Commerce.

I just received my Master of Science degree in geochemistry from the University of Arizona at the beginning of August, and am now in the midst of deciding what the next step in my career will be. The summer internship at AGI was extremely beneficial in this respect, because it opened my eyes to the many career possibilities that geoscientists have outside of academia and industry – whether it is as a research scientist, an educator, or in an outreach position at a government agency or nonprofit organization. I am interested in pursuing science writing, and have had the opportunity to speak with editors and writers from both Science and Geotimes.

Their advice and encouragement has been very motivating.

I'd like to thank you again for making this internship possible. I hope that continued support for the program will allow many future Earth science students to have such a wonderful experience.

Sincerely,
Jessica C. Rowland

MEMBERS IN THE NEWS

AET Opens Second Office in Florida

Gerard Moulzolf, PG, CPG-10142, is manager of the new office of American Engineering Testing, Inc. (AET) in Bonita Springs, Florida. Strategically, the new office serves as a base of operations in southwestern Florida for forensic services, petrography, and testing of concrete and other cementitious construction systems.

For the last fifteen years, Gerard worked for AET's affiliate, American Petrographic Services (APS), in Saint Paul, Minnesota, becoming vice president in 1999. He specialized in the technical interpretation and forensic analysis of a wide variety of construction material.

Gerard has always been active in professional organizations and has spoken at conferences across the United States. He is a member of ACI and past president of the Iowa-Minnesota Chapter as well as the Minnesota Concrete Council. He is a member and a past director of the Minnesota Section of the American Institute of Professional Geologists.

BCI Engineers & Scientists, Acquires Insight Environmental Services, Inc.

Lakeland, FL – January 3, 2007 – BCI Engineers & Scientists, Inc. expanded its operations by acquiring Insight Environmental Services, Inc. of Howell, Michigan on January 1, 2007. This is the Lakeland-based engineering firm's first out-of-state acquisition. **Rick Powers**, CPG-06765, President and CEO of BCI, said that this acquisition was the "first step in a strategic growth plan designed to add technical service capabilities and expand BCI's geographic influence and client base." **Mark Sweatman**, CPG-08698, Insight's former President, is now Insight BCI's VP and Midwest Regional Manager. With this recent acquisition, BCI now has over 150 employees throughout 4 offices in Florida and 1 office in Michigan.

Insight was founded as a Michigan corporation in 1995 and provided its clients with practical and comprehensive solutions for a wide variety of environmental services including: Aquifer Evaluations, Facility Compliance Auditing, Industrial Mineral Appraisals, Real Estate Assessments, Remedial Studies, Solid and Hazardous Waste Compliance Monitoring, Water Supply Evaluations, Wellhead Protection Area Delineations, Wetland Delineations and Mitigation, and Wastewater Discharge Evaluations.

BCI Engineers & Scientists is a multidisciplinary engineering and environmental consulting firm. BCI's primary focus is to develop comprehensive solutions to complex engineering and environmental problems using state of the art professional engineering and scientific resources. Our professionals offer expertise in the following areas: Water Engineering, Ecological and Environmental Services, Mining and Land Reclamation, Geographic Information Systems, Geologic Hazards & Contamination Services, and Investigative Engineering. BCI also provides expert testimony services and operates a certified soil and materials testing laboratory. For more information, please visit www.bcieng.com.

LBG Names William Prehoda a Senior Associate

Leggette, Brashears & Graham, Inc. (LBG), a professional ground-water and environmental engineering services firm, has named **William Prehoda**, CPG-09289, a senior associate.

Mr. Prehoda is based in LBG's Ramsey, New Jersey office. He has close to 20 years of experience implementing and managing ground-water supply and contamination projects. His expertise includes undertaking hydrogeologic investigations of aquifer, well and well field yields for ground-water supply development, optimization and management, well rehabilitation and delineation and remediation of groundwater contamination.

A Certified Professional Geologist with the American Institute of Professional Geologists, a Registered Professional Geologist with the Commonwealth of Pennsylvania, a Registered Professional Geologist with the State of New Hampshire, Mr. Prehoda earned an M.A. in geological sciences from SUNY Binghamton. He is a member of the American Water Resources Association, New York State Section of the American Water Works Association, New York Rural Water Association, Association of Ground-Water Scientists and Engineers (National Ground Water Association) and the New York State Council of Professional Geologists.

LBG Names Jeffrey Trommer a Senior Associate

Leggette, Brashears & Graham, Inc. (LBG), a professional ground-water and environmental engineering services firm, has named **Jeffrey Trommer**, CPG-07531, a senior associate.

Mr. Trommer operates out of LBG's Tampa, Florida office. He has 20 years of experience in hydrogeologic investigations, specializing in water supply development, water use permitting, injection well permitting, ground-water modeling and regional ground-water resource evaluations and wastewater disposal evaluations. A Registered Professional Geologist in the State of Florida, Mr. Trommer holds an M.S. in geology from the University of South Florida and is a member of the Association of Ground Water Scientists and Engineers.

Charles L. Severy, CPG-00072, 87, died of cancer surrounded by family November 16, at his home in Denver.

Severy was born in Tulsa, Oklahoma and attended high school at the Texas Military Institute in San Antonio. He went on to receive a degree in Geology from Stanford University in 1941.

He then served as a communications officer in the U.S. Navy, stationed in the South Pacific during World War II.

Severy and his beloved wife, Gale, moved to Denver in January of 1949, where he was a practicing geologist involved in the development of the Rocky Mountain oil and gas industry. He was an active member of both the Rocky Mountain Association of Geologists and the American Petroleum Geology Society.

Severy was an avid outdoorsman who enjoyed skiing, golf, gardening and surfing. He loved to spend time with his family and close friends and will be remembered by all for his keen sense of humor. Charles and Gale spent much of their free time traveling the world and visited over 50 countries.

Severy is preceded in death by his son Chuck and grandson Christopher. He is survived by his devoted wife of 61 years Gale, daughter Margaret and son-in-law Dan, son Richard and daughter-in-law Betty, seven grandchildren and two great-grandchildren.

August Goldstein Jr., CPG-01418, beloved father and friend, died October 16, 2006.

Born December 3, 1920, in Shreveport, LA, to Melanie and August Goldstein.

Dr. Goldstein was a Petroleum Geologist. He had an MS from Louisiana State University and a Ph.D. from the University of Colorado. He began his career in Tulsa at Standard Oil-Amoco and subsequently became the Chief Research Geologist and Exploration Manager of Bell Oil and Gas Company, in Tulsa.

Dr. Goldstein was an active member of the Tulsa Geological Society, and at one time was the chairman of the investment committee of the American Association of Petroleum Geologists. During his tenure there, he worked with the trust department of Irving Trust Bank in New York City and his approach to investing won him their esteemed regard as an analyst.

Dr. Goldstein was a proud Veteran of the Army Air Corps in WWII, and retired as Lieutenant Colonel from the Air Force Reserves. He served on the foundation committee of the Jewish Federation of Tulsa and was on the board of the Jewish Retirement and Health Care Center.

Dr. Goldstein was an avid amateur historian with a near expert's knowledge of the military history of the American Civil war and WWII. He loved fishing the lakes of Arkansas and Canada; he loved dogs and his family, by whom he will be sorely missed.

IN MEMORY

Stanley D. Conrad
CPG-01190
Member Since 1966
November 4, 2006
Arvada, Colorado

Carl E. Carlson
CPG-03787
Member Since 1977
November, 2005
Chula Vista, California

August Goldstein, Jr.
CPG-01418
Member from 1966-2002
October, 2006
Tulsa, Oklahoma

William V. Harlow, Jr.
CPG-02661
Member Since 1974
April, 2006
Amarillo, Texas

Thomas E. Hodgin
MEM-0493
Member Since 2003
December, 2005
Laguna Niguel, California

Charles L. Severy
CPG-00072
Charter/Emeritus Member
Member Since 1964
November 16, 2006
Denver, Colorado

CALL FOR PAPERS

The American Institute of Professional Geologists
Michigan Section

AIPG 44th ANNUAL MEETING
TRAVERSE CITY, MICHIGAN

OCTOBER 7 - 11, 2007

You are cordially invited to attend the 44th Annual Meeting of the American Institute of Professional Geologists hosted by the Michigan Section of AIPG in Traverse City, Michigan, October 7 - 11, 2007. The theme of this year's meeting is "**Geology: The Foundation for the Environment and Resources**."

The 2007 meeting not only incorporates our goal of highlighting the role of geology in defining, protecting, and sustaining our environment and its resources, but also offers a forum to provide opportunities for reporting on regional geologic studies pertaining to a variety of topics. Such topics include energy and mineral resources, stratigraphy, sedimentology, paleontology, structural geology, basin analysis, and geophysics in any of the diverse geologic regions of North America. The Michigan Basin is famous for the Great Lakes, a rich mining history, unique minerals, petroleum resources, Paleozoic fossils, Quaternary glacial deposits, sensitive dune and aquatic environments, and some of the oldest macroscopic fossils in the world. All of these areas provide many opportunities for thoroughly interesting study.

In addition to technical presentations, there will be a forum for AIPG's core issues concerning ethics, public policy, licensure, and legislation. The Technical Program Committee encourages you to participate in this informative meeting by contributing a written abstract for an oral or poster presentation.

We will consider abstracts of up to 250 words for all papers related to the general meeting theme, to an area of geologic study, or to AIPG's core issues. The deadline for submitting an abstract is **July 30, 2007**.

To submit or discuss abstracts, contact:
Eric E. Wallis, CPG - Technical Program Chair
Ewallis@Comcast.net

TEST YOUR KNOWLEDGE

Robert G. Font, CPG-03953

Questions:

1. A volcanic eruption occurs in the ocean in proximity to the mid ocean ridge. Which of these minerals is less likely to form as the lava cools?
   a) $KAlSi_3O_8$
   b) $CaAl_2Si_2O_8$
   c) $(Mg,Fe)_2SiO_4$
2. These aquatic crustaceans are characterized by a bivalve and typically calcified carapace with a hinge along its dorsal margin. Most are microscopic and marine, but larger specimens as well as fresh water species can be found. They have also proven to be helpful in correlation.
   a) Radiolarians
   b) Ostracodes
   c) Foraminifers
3. Consider the equation "P = H (S-W) – hW" where P is the effective stress, H is the height/thickness of a water saturated sand, S is the unit weight of the water saturated sand, W is the unit weight of the water and h is the hydraulic head. What is the value of "h" that will give rise to the "quick condition?"
   a) h = (W/S) - S
   b) h = HS^2W
   c) h = H [(S-W)/W]
4. In this crystal system, axes a, b and c are of all of different lengths and at right angles to each other:
   a) Isometric
   b) Orthorhombic
   c) Tetragonal

Answers on Page 42

AIPG Student Chapters

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

Central Michigan University
Founded 2003
Chapter Sponsor:
David J. Matty

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

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

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

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

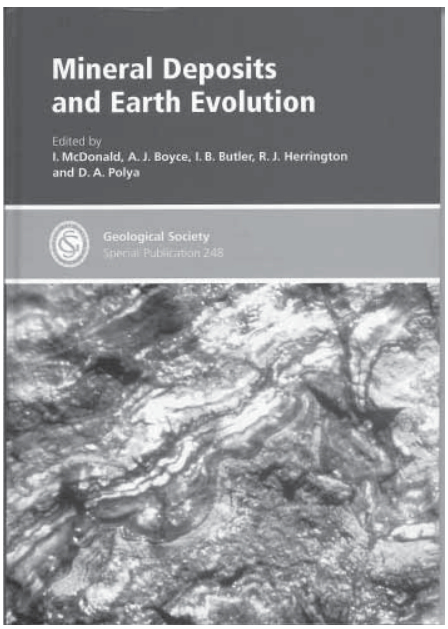
Ohio State University
Founded in 2004
Chapter Sponsor:
Thomas Berg, CPG-08208

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

Wright State University
Founded in 1996
Chapter Sponsor:
Thomas Berg, CPG-08208

A Review of *Mineral Deposits and Earth Evolution*

David M. Abbott, Jr., CPG-04570



The study of mineral deposits generally seems separated from the study of general geology. Perhaps because so many of the first exploited deposits, particularly in the 19th and the early 20th centuries in the U.S. were epigenetic base and precious metal deposits of the western states, or were the Precambrian iron and copper deposits of Michigan and Minnesota, the geology of these deposits was viewed separately from that of the host rocks. Structural preparation, proximity to intrusions, and the tendency of skarns and the like to be found in limestones were the main considerations of host rock geology. Lindgren's highly influential *Mineral Deposits* (first edition 1913, fourth edition, 1933) directed attention at the various types of hydrothermal systems believed to be the source of most deposits. R.L. Stanton's 1972 *Ore Petrology* was among the first texts to really focus on mineral deposits as part of the surrounding geologic environment, to consider that more thorough study of the host rocks was important.

The preceding observations can undoubtedly be criticized for oversimplification and for ignoring the work of various authors who viewed one or more types of mineral deposits more globally. Nevertheless, it was not until the revolution in geologic thinking that accompanied the development of plate tectonics in the late 1960s and 1970s that more global ore deposit model ideas became more widespread. With rare exceptions, like the restriction of banded iron formation ages to the late Archean and the implications these deposits had for atmospheric evolution, the study of ore deposit types and age distributions for providing important data and information on the geologic evolution of the Earth is relatively recent and is perhaps just emerging, if that, on the consciousness of those geoscientists whose specialty is not economic geology.

Mineral Deposits and Earth Evolution, 2005, edited by I. McDonald, A.J. Boyce, I.B. Butler, R.J. Herrington, and D.A. Polya: Geological Society of London Special Publication 248, 269 p. contains 13 papers dealing with various aspects of the title topic and which, with varying degrees of generality, provide the reader with current research on the contributions economic geology makes to the study of the Earth's evolution. The papers in the volume were presented at the 2003 Geological Society of London's Fermor Flagship Meeting, *World Class Mineral Deposits and Earth Evolution*, held Wales.

The book's first paper by R.A.F. Grieve addresses the surprising number and variety of economically important deposits associated with impact structures, many of which are oil and gas reservoirs along with iron, gold, uranium, platinum group metals (PGM), base metals, diamonds, zeolites, diatomites, and other types of deposits. I found this a very eye-opening paper. It is followed by Hayward et al.'s paper on the effect of the Vredefort impact event on the Witwatersrand gold deposits of South Africa, which apparently provides a solution to the long-running debates between the placer and hydrothermal origins of the world's largest concentration of gold deposits.

A paper by M. De Wit and C. Thart describes the differing metallogenic signatures of 11 Archean cratons in the southern hemisphere based on a database of over 6,000 deposits in the former Gondwana supercontinent. They conclude that mineral deposit density and diversity appears to have decreased over geologic time, although they acknowledge various constraints on their data.

Perhaps the paper that best summarizes the overall title of the volume is presented by Groves et al. In this paper, they point out that some deposit variation over time depends on the evolution of the atmosphere-hydrosphere-biosphere, like the unoxidized placer Late Archean-Early Proterozoic uranium deposits of Elliott Lake, Canada that contrasts with the Mesoproterozoic unconformity-related deposits of the Athabasca Basin in Saskatchewan, and finally with the redox cell, sandstone-hosted deposits of Wyoming and the Colorado Plateau. Tectonic setting and erosion rates apparently control the occurrence of other deposit types. For example, the porphyry copper and molybdenum deposits form at relatively high levels in accretionary terranes and are thus relatively quickly eroded away, which explains their late Mesozoic to Cenozoic ages. Conversely, the greater thicknesses of Archean cratons and the deep level of emplacement helps explain the preservation the PGM deposits of South Africa's Bushveld Complex and the Stillwater Complex in Montana. These are only a few of the various examples Groves et al. present. If you are only going to read one paper in this volume, this is the one to read.

A paper by Harcouet et al. describes the thermal evolution of the Paleoproterozoic Ashanti gold-belt of Ghana. Harcouet et al. use the specific example of Ashanti to demonstrate that thermal conductivity and geobarometry place constraints on heat flow values in space and time, which have an effect on metamorphism and mineralization. Among other things, they suggest that heat flows may have been higher in the Precambrian.

The uneven distribution of giant gold deposits (>100 tonnes Au) in space (tectonic environment) and time, that is noted in preceding papers, is addressed in detail in a paper by Leahy et al. They review four fluid types, deep magma-dominated fluids, shallow magma-dominated fluids, multi-source fluids, and basinal fluids. Then they define six

geodynamic orogenic terranes, some of which are favorable sites for giant gold deposits and others that are not. They use a database of giant gold deposits (as of 2000) as the basis for their findings. Leahy et al.'s database and general conclusions are quite interesting, not only in terms of giant gold deposits, but also in terms of the types of fluids that may affect other types of metal deposits (Mississippi Valley Type deposits) and even petroleum generation and migration. While not directly stating that they are doing so, Leahy et al. also present a major revision in the hydrothermal classification system initially developed by Lindgren and set out in his *Mineral Deposits*.

I did not find the papers by Lowry et al. on the use of sulfur isotopes northern Britain; by Herrington et al. on reassessment of the tectonic zonation of the Uralides; by Farquhar and Wing on the terrestrial record of stable sulfur isotopes; and by Raiswell and Anderson on reactive iron enrichment in euxinic bottom waters of particular personal interest and they are more specialized than general treatments. Likewise a paper by Grassineau et al. on distinguishing between biologic and hydrothermal signatures via sulfur and carbon isotopes in Archean mineralization and the isotopic evidence for Archean life suffered because only two areas, the 3.8 Ga Isua Greenstone Belt of western Greenland and the 2.7 Ga Belingwe Greenstone Belt of Zimbabwe, were studied. Data from other areas with other dates would help extend the story.

I found the paper by Bluck et al. on the diamond mega-placers of southern Africa and the Kaapvaal craton more interesting. The paper describes a generic sequence of transient and retained placers in various parts of a weathering basin or craton, including residual beach deposits, and the ultimate submarine terminal placers. The reasons for the unique character of the Namibia-Namaqualand diamond megaplacers are explained after considering the weathering history of the world's cratons. Anyone interested in placer deposits of any kind should review this paper.

The final paper by Heinrich et al. on the constraints on the formation of porphyry copper (-gold) deposits from microanalyses of fluid and melt inclusions is primarily based on studies at Argentina's Bajo de la Alumbrera deposit. Heinrich et al. conclude that: "emplacement mechanism, magma-chamber dynamics, and possibly as additional source of sulfur are probably more decisive for the formation of a large deposit than sheer pluton volume and elevated Cu contents of the melts."

Some papers clearly presented more material on how particular mineral deposit types provide evidence on the Earth's evolution. As reflected in the foregoing synopses of the individual papers, I found some more interesting than others. Undoubtedly other readers with differing backgrounds and interests will be drawn to different papers. The overall idea that mineral deposits can provide information on the Earth's evolution from a variety of perspectives is worth emphasizing. A huge amount of geologic data is collected at operating mines and these data can provide valuable information regarding questions beyond the immediate concerns of economic geology. This information is worth tapping.

AIPG Section Websites

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

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

Becoming Financially Independent

Kelvin J. Buchanan, CPG-06058

A worthy goal for young people just out of college, being financially independent is also critically important for organizations such as ours. I have often wondered over the past few years why some professional associations seem to be better at fund-raising than is AIPG. Why can't we borrow some good ideas from those successful groups and improve our own revenue sources? I raise this question because although virtually all of our annual meetings are a collegial success and very enjoyable for members and their guests, unfortunately only a few have made much in the way of a profit. One meeting in recent memory actually required a bailout from AIPG.

The fiscal issue has been a common theme running through the columns of many past-presidents: "AIPG needs to find a better source of funding other than dues." I remember Susan Landon addressing the issue as president in 1990, when she noted that the ratio of dues to all other Institute income was over 90%. Various efforts have been made since then, ranging from increasing the number of publications and advertising in TPG to increasing participation in continuing education courses. Despite these efforts, dues still account for nearly 90% of our income, as it did back in 1990.

I believe that now is the time to seriously consider increasing attendance at the annual meetings as a potentially profitable means of bringing in more revenue.

An excellent example is how the Society of Mining Engineers (SME) recently changed the venue of their annual conferences with that same aim in mind. SME publishes a significant amount of information for its 10,000 members, but it relies mainly on the attendance at annual meetings for the bulk of their corpus increase. Over the past seven years, however, attendance has been fickle, a fiscally worrisome trend. After an in-depth review, SME found that meetings held east of the Mississippi River were poorly attended and broke even at best, compared with those held in the West. Of course, they have now changed the venue of all annual meetings, and are looking forward to better attendance figures in the future.

There were undoubtedly other problems with the poorly-attended SME meetings, but the leadership found out what was working and then fixed it. One factor was the number of exhibitors: Once an event reaches a "critical mass" of exhibitors, this attracts new companies and the number keeps growing.

Since the SME meeting this year is in Denver, we AIPG members who plan to attend can pay attention to how it's organized and perhaps pick up some additional good ideas about running successful annual meetings.

Not to be overlooked are our own successes at the individual section level. What is the common denominator in those local meetings? Procuring sponsorships in advance: several sections have made profits of between $50,000 and $100,000 this way. For example, the Nevada Section's 1992 meeting was so profitable that office and mailing expenses are now covered, a nice change from the days when we had to take up a collection just to buy stamps for the newsletter.

This year's annual meeting is in Travis City, Michigan, the last meeting to be solely organized by a state section. It will held in a beautiful part of Michigan, and the field trips alone will be reason enough to attend. Next year, the Grand Canyon meeting in Arizona, which coincides with the International Year of Planet Earth, is being organized by the AIPG Executive Committee.

The AIPG Foundation

Here in Reno, the local Geological Society of Nevada (GSN) holds an annual Christmas dinner and meeting, to raise funds for its Foundation. The attendance is very impressive for the busy holiday season: Out of 955 members (an ever-increasing number), over 200 participated, donating a record $13,132 through silent auction and raffles, according to their January newsletter. The funds will be used by the GSN Foundation to "increase their endowment to a self-sustaining level for philanthropic activities." They have set for themselves a goal of $250,000, and have raised over $65,000 so far.

Compared to the GSN Foundation, the AIPG Foundation is presently self-sustaining, and has provided several state sections and the Institute with matching grants this year totaling over $22,000. Unlike the GSN Foundation, the AIPG Foundation does not receive money from the parent organization; rather, it gives money to the parent, where possible.

The Foundation board very much wants to continue to provide financial support to state sections that have good projects. Some use the funds for field trips for K-12 teachers and students, while others support student interns. We welcome your Big Ideas: Contact any Foundation board member this spring with an idea for a project. Make a difference in your state!

Great News, and a Roadmap for the Future!

William J. Siok, CPG-04773

Dear Colleagues, it's a privilege to advise you that it is now official. The merger of Florida Association of Professional Geologists (FAPG) with AIPG is a fact as of January 1 of this year!

All who worked to effect this merger are elated with the outcome and more than anxious to move forward to continue the important work of AIPG and all its sections, especially the newly reconstituted and reorganized Florida Section. The AIPG Florida Section, now known as the FAPG Section of AIPG, has an ambitious year ahead. Details of legislative visits, section election activities, and appointment of regional coordinators can be found on the FAPG website (accessible through the AIPG webpage www.aipg.org).

First things first, however! On behalf of all members, the national Executive Committee, and headquarters staff, I am pleased to extend a wholehearted welcome to all the individual geologists who, through this merger, have joined the ranks of AIPG! We are all proud to welcome you as new members of the only professional association dedicated primarily to advocacy on behalf of the entire profession.

I'd like to provide a little background on the merger to place it in the proper context. Almost three years ago, a mutual interest developed in closer cooperation between the Florida Section of AIPG (which had become somewhat inactive) and the FAPG. A series of discussions between leaders of both organizations led to a formal meeting between the FAPG Executive Committee and AIPG officers in conjunction with the annual FAPG legislative visits.

Subsequent meetings reinforced the recognition of mutual interests and led to two years of negotiations. The negotiations were constructive and resulted in the merger. The new FAPG Section of AIPG benefits from the merger from administrative support consistently provided by AIPG headquarters and from the significant increase in Florida membership numbers which represent a potent voice in Florida professional circles and for advocacy efforts. AIPG also benefits from the increased membership resulting from the merger, particularly in its ability to advocate for the profession in Florida.

The new members of AIPG will all be accorded the status of general Member, except those who are currently AIPG CPGs. These CPGs will retain their certifications. The new Members will be encouraged to upgrade to Certified Professional Geologist, but achieving the CPG is not mandatory for their full active participation in AIPG affairs.

This is indeed a significant and extremely important development. All members can take heart from this merger, especially as an indication of the potential for further similar cooperative efforts in other sections. AIPG is vibrant, healthy, and proceeding into the future with constructive programs and real potential for increased visibility and enhanced success as an advocate for the profession.

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

Should a County Employee Write a "Remoteness" Letter? (Column 106, Nov/Dec '06)

I presented this topic as a conflict of interest question. But **Chris Dail**, CPG, provided a different view of the situation. Dail wrote, "I read with horror the letter regarding a CPG who is considering the ethics of writing a 'remoteness letter,' for a potential land donation in an apparent severed mineral estate situation—essentially stating that a tract of land has no mineral value due to its remoteness. The question asked at the end of the column is whether the CPG has a conflict of interest if he or she were to prepare the letter since the county employs the CPG.

"There are many issues with this particular situation that trouble me from the ethics standpoint. The most obvious is spelled out in the first sentence of the column which starts with '...a CPG who is employed by a county government in a capacity that does not involve the examination or valuation of mineral properties...' The column does not describe the CPG's skills and professional background, but even assuming the CPG has a background in mineral examination or mineral property valuation, the CPG should not be conducting work outside the scope of his or her employment, particularly in a situation where this is clear and definitive need for a properly documented and independent mineral examination and/or appraisal of the tract in question as is the case here.

"There are numerous examples in the mineral exploration industry, both in the US and overseas, where sites that were considered too remote for development during one commodity price cycle were found to be not only economic, but even robust in another. Compare the recent increase in commodity prices and the boom in exploration and development throughout Alaska for on-the-ground proof. Companies are considering operations at remote sites using unconventional gas sources and wind generated power at sites many, but not all, professionals in the industry would consider too remote for development just a decade ago.

"The skill set needed to make these kinds of professional opinions requires advanced technical training, a thorough understanding of the commodity markets and also a broad range of exposure to various mine development, mine extraction, milling and beneficiation techniques. This is exactly why the Federal government requires mineral-related title transactions (donations, exchanges, sales, easements, etc.) to be performed by Certified Mineral Examiners who must undergo rigorous training, pass a written and oral examination, and perform several examinations under the guidance of a Certified Review Mineral Examiner. Simply being a geologist with a little exploration or mining background is simply not sufficient background for the Federal government and nor should it be for the county in this case either.

"The main question regarding whether the CPG has a conflict of interest is mute since the first issue, in my opinion, makes the second a non-issue. The county should hire a qualified independent mineral appraiser or industry specialist to conduct an examination of the tract, document the findings and provide a report containing the data and indicating the assumptions and factors used to form the opinion expressed in the report."

Dail's comments address two issues, whether there is a need for an "independent mineral examination" and whether the person doing such an examination should be a "Certified Mineral Examiner." The first issue, that of "independence," addresses the conflict of interest question I posed. Dail believes that an employee of the county in which the property lies inherently has an unacceptable conflict of interest and therefore should not do the requested examination. I'm sure there are those who support Dail's opinion. But I also believe that there are those who are not sure that this degree of independence is required, provided that proper disclosure is made.

In the specific case that generated this topic, the CPG in question asked the County Attorney for his opinion. The County Attorney replied that if proper disclosure of the CPG's position with the county (working on computer programming) was made, then there would be no conflict of interest as far as the county was concerned. The attorney also pointed out that, assuming the tract in question was determined to have only a remote chance of future mineral development, then the county suffered a potential economic loss due to lower property tax assessments on the tract. However, this tax loss would be counterbalanced by the benefits of conservation easements in providing open space for public enjoyment. While the County Attorney's opinion does not satisfy the independence that Dail believes is required, it does satisfy the first requirements of Standard 3.1 and Rule 3.1.1 of the AIPG Ethics Code that the potential conflict of interest be identified and disclosed to the relevant parties. What the resolution of such disclosure should be depends on the circumstances of the individual case. In the actual case, the CPG involved did not undertake the examination although the County Attorney opined that he could. Assuming for the sake of discussion that the remoteness examination was undertaken and concluded that the chance for future mineral development was remote, then those objecting to the designation

would have the disclosed county employment as one of their bases for objection. Assuming an objection was lodged and sustained on conflict of interest grounds, then perhaps the county's conflict of interest rules would be changed.

I recently attended a relevant presentation by **Dan Plazak** on the controversy surrounding the over valuation of the Independence Mine in Victor, Colorado, one of the early mines in the Cripple Creek district, at the end of the 19th century. T.A. Rickard was the Colorado State Geologist from 1899 to 1901. The position of State Geologist at the time (1872-1905) carried no salary. The State Geologist was expected to earn his living by consulting for mining companies in the state and Rickard provided an examination of the Independence Mine whose accuracy was later questioned. This is not the place for an examination of what occurred and the reasons for the perceived problem with Rickard's valuation; those interested should read Plazak's book, *A hole in the ground with a liar on top: fraud and deceit in the golden age of American mining*, available through Amazon.com. What is relevant is the conflict of interest inherent in the state geologist's position at the time. There was public objection to the situation and the state geologist position was eliminated. When the modern Colorado Geological Survey was re-established in 1969, the position of state geologist is now paid a salary and conflict of interest rules are in place.[1]

Conflicts of interest and their resolution continue to be common matters of professional ethical debate. There are 75 separate entries for the "conflicts of interest" topic in the *pe&p index.xls* file of publications on ethics in the *TPG* between 1987 and the November/December 2006 issue; this file is available on the AIPG website under "Ethics." As this particular case illustrates, no ethics or morals code, including AIPG's, can resolve all questions. There will be instances where there are legitimate differences of opinion. The question of whether there should be complete independence from an affected county's government is an example.

Dail's second point is that such examinations should, in his opinion, be conducted by Certified Mineral Examiners. This designation is granted by the US Department of Interior, primarily for Bureau of Land Management and Forest Service personnel conducting minerals examinations related to mineral patent applications and mining claim validity exams. It is not a credential employed by or generally available to private mining consultants. My thanks to **Matt Shumaker**, CPG, one of the instructors at the BLM's school for Certified Mineral Examiners, for confirming the foregoing opinion.

Erosion of the Geosciences Curriculum (Student Column 18, January/February 2007)

Nancy Price, SA, author of the Student's Voice column, addressed a vital topic in the January/February *TPG*, determining what it is a student should study in order to be adequately prepared for a professional career. She contrasted those who are really interested in obtaining adequate professional preparation with those who slide by taking the easy way through their majors.

I was recently invited by a major mining company to give a talk in Santiago, Chile. My presentation was part of a multi-day conference attended by some of the top geologists and mine planning engineers involved in mineral resource and mineral reserve estimation. One of their sessions dealt with identifying the skill sets required for junior, intermediate, senior, and management positions within the company. Having identified the skill sets, they then were looking to identify courses, short courses, online courses, etc. that would allow their employees to meet these skill sets as they advanced in their careers. The skill sets identified were wide-ranging despite being focused on careers for those within a subset of the mining industry. Hydrology and environmental sciences were included along with the expected field mapping, mineralogy, structure, petrology, economic geology, etc. In addition to these geoscience courses, subjects like management skills, communication skills, writing, foreign languages, accounting, etc. were included for more senior-level positions.

One of the problems with collegiate education is the expectation that one will be able to receive a complete, basic professional preparation within four years of study. The problem is the ever increasing amount of knowledge that professionals are expected to know. While there are some skills, like use of a plane table, that are being supplanted by the use of GPS equipment (although not totally), generally, there are simply more things one must know about. This means that a four-year degree is increasingly insufficient professional preparation. In addition to this is the content of individual courses changes over time. The syllabus for physical geology that I took differs in some significant ways from the syllabus today. And it differs from the syllabus in the course my father took in 1935 (I have his class notebook).

The best advice I can give to students is to recommend that as soon as they start thinking about a geoscience career that they start talking to a variety of potential employers about the skill sets that employers seek, and then make sure they acquire the courses recommended by potential employers as well as those recommended by professors. AIPG provides an excellent mechanism for students to meet geoscientists who practice the whole spectrum of the profession and who work for the whole spectrum of employers. Admittedly, the distribution of professional practice is not geographically homogeneous. But within the whole Institute, everything is covered. Use the membership directory to seek out those who can give you advice.

Science and Ethics by Bernard E. Rollin, 2006, Cambridge University Press

Bernard Rollin is University Distinguished Professor of Philosophy, Biomedical Sciences, and Animal Sciences and University Bioethicist at Colorado State University. It is therefore not surprising that he focuses on the types of issues he sees in his daily practice. These issues involve various types of animal studies (laboratory animals, animal production studies, etc.) and the treatment of the animals used in such studies. The problem with this focus

1. The potential conflicts between the activities of the state and federal geologic surveys and private firms did not disappear with the adoption of various conflict of interest rules and regulations. See Dawn Garcia's article "Competition between public agencies and the private sector" in the December 1998 *TPG* and related articles and a proposed AIPG policy statement on the issue in the June. July, and November 1999 issues of the *TPG*, which are available in PDF form to AIPG members on the AIPG website.

occurs in generalizing the book's scope to all scientific ethics. Rollin's concerns regarding animal treatment don't apply to fossils. Nevertheless, Rollin's first two chapters, "The Waxing and Waning of Faith in Science" and "Scientific Ideology and 'Value Free' Science," do address some important issues affecting all scientists.

Rollin points outs that those of us who grew up in the 1950s and early 1960s can recall the belief that science and technology would continue to free the world from most, if not all, of its ills. Nuclear energy would be a great and wonderful new source of power. A golden age would arrive in the near future. As Rollin notes, "One popular Sunday evening program sponsored by Dupont featured Ronald Regan promising—with absolutely no irony—'better things through better living through chemistry,' a slogan that evoked much hilarity during the drug-soaked [late] 1960s."

Although scientific and industrial progress during the 19th and first half of the 20th centuries generally supported the public's optimism and faith in science, there were opposing stories like Mary Shelly's *Frankenstein*, *The Sorcerer's Apprentice* segment in Disney's *Fantasia*, and anti-utopia books like George Orwell's *1984* and Aldous Huxley's *Brave New World*. Rollin points out that these stories and others such as the legend of Daedalus and Icarus and the Garden of Eden story from the second and third chapters of *Genesis* warn us about "deep-rooted fears about advancing human knowledge and control over nature not being unequivocal goods." The development and growth of the environmental movement from the late 1960s onward helped shatter the public's belief in scientific and industrial progress. During the same period a resurgence in "alternative medicine" and other "more naturalistic" approaches to life and spirituality, including the mystical powers of crystals, marked a resurgence of a mystical, anti-scientific streak in society now shared by millions of educated people throughout the western world. Rollin has called this fear of science and technology the "Frankenstein Syndrome," which is the title of one of his earlier books.

The Civil Rights movement's broad appeals during the 1960s subsequently gave rise to demands for the rights of many groups and demands for acceptance of diversity of all types. Rollin points out that these societal changes highlighted a variety of ethical issues and at the same time challenged traditional ethical views. Rollin asks "Do I support black student demands for black dormitories (after I marched in the 1960s to end desegregation)? Am I a bad person if I do not wish to hire a transsexual? Can I criticize the people of Rwanda and Bosnia from the bloodbaths they conduct without being accused of insensitivity to cultural diversity? … Commonality of values has give way to plurality and diversity; traditions are being eroded; even the church is no longer a staunch defender of traditional ethical norms."

Rollin asserts that the foregoing led to a view within the scientific community that "ethical issues can be approached only emotionally, never rationally." He points out that research funding has been driven by public fears. Laws and regulations against cloning and stem cell have been passed. Advances in biotechnology are resisted due to the public's Frankenstein syndrome fears. Scientists of all stripes are distrusted and are accused of bias of one sort or another (sometimes with better justification than others). Rollin concludes his first chapter by stating, "If we do not produce a generation of scientists who can think in ethical terms and lead public ethical discussions of science, we may lose countless real benefits of scientific advances, as well as public support of science."

In his second chapter Rollin addresses the issue of what he calls "scientific common sense" or "scientific ideology." By "scientific ideology" Rollin refers to "a set of fundamental beliefs, commitments, value judgments, and principles that determine the way someone embracing those beliefs looks at the world, understands the world, and is directed to behave towards others in the world." Rollin points out that attraction of ideologies is their providing of pat, simple answers to complex questions. Those following an ideology are able to filter out arguments countering their beliefs. Marxist ideologists are one classic example in our culture, but they are by no means the only ideologists; consider the questions Rollin asked above regarding cultural diversity issues.

Rollin asserts that the "ideology underlying modern (*i.e.*, post-medieval) science has grown and evolved along with science itself. And a major—perhaps *the* major—component of that ideology is a strong positivistic tendency, still regnant today, of believing that real science must be based in experience, since the tribunal of experience is the objective, universal judge of what is happening in the real world." In short, science is value free, it is objective. As Rollin points out, "ethics is not a part of the furniture of the scientific universe. You cannot, in principle, test the propo-

sition that 'killing is wrong.' It can be neither verified nor falsified." Indeed, as Bernard Gert has pointed out, ethical study and debate cannot resolve all ethical questions (see column 55, June '00, and column 99, September '05). Rollin notes that the goal of science is to provide facts relevant to making decisions, not to make the decisions, at least not those having an ethical component. The result is that science students are not taught about the potential ethical components of their work, something reinforced by the practice of scientific research in academia and elsewhere. A prime example is the Manhattan Project, whose job was to build the atom bomb, not to decide whether it should be used. The result is that when scientists are asked about the ethical aspects of their work, they are as unprepared and react as emotionally to the issues as any member of the public. They often don't even recognize the questions and resent their being asked. After all, science is "value free," isn't it?

The ideology of value-free science results from the reductionist and mathematical ideological domination of the sciences coming from the purely intellectual study of mathematics and mathematically dominated physics. All the other sciences, and even the social sciences, suffer from mathematics and physics envy. If you can't quantify it, you don't know what you're talking about. There are no ethical questions in mathematics. Philosophy, of which ethics is traditionally a part, is manifestly unscientific and unmathematical (except for logic). So why should there be ethical questions in mathematically dominated science? But there are.

This outlook has been rejected by a society that does ask the ethical questions. Rollin points out that where professions and their professional ethical codes fail to address the ethical issues raised by society, then society imposes laws and regulations to address its concerns. A result in the life sciences is that society has required the establishment of ethical advisor panels to review research protocols, particularly in those sciences using human and animal research subjects. Ethicists like Rollin and Gert have become actively involved in such committees and studies.

Having thus established a need for ethical study in the sciences, Rollin goes on in his third chapter to discussing ethics. Unfortunately, I find that Rollin does not go deeply enough into ethical or moral basics. While he recognizes and distinguishes between general morals (applicable to all), personal morals (*e.g.* religious obligations), and professional ethics (applying only to members of the profession), he fails to distinguish, as Gert does, between moral rules and moral values. Nor does he delve into the process of making moral decisions or recognize that different people can ethically arrive at opposing views. Current debates over the degree of security required at airports, ports of entry, etc. provide an example of unresolvable tension between public security and personal freedom, both ethically or morally desirable goals. These are topics that Gert has explored and are critical issues when addressing moral or ethical questions and why I believe Gert's *Common morality—deciding what to do* (reviewed in column 99, September '05) should be the basis for ethical inquiry.

So how does all this relate to the geosciences? Two thoughts come immediately to mind. First, to what extent are geoscientists as a group blind to the ethical questions they should be facing? What ethical questions is society asking us to consider? Are we addressing them and how? For example, is environmental regulation of the extractive industries in part a societal response to failure on geoscientists' part to ask not only is there a potentially economically extractable resource here but also, should this resource be exploited at all regardless of the profits that can be made from the extraction? Second, does the value-free ideology of science and the more encompassing academic ideology of absolute academic freedom contribute to the perceived lack of ethics in academia? Are all ideas truly of equal value as the academic freedom ideology suggests? Recognizing our ideologic blinders is the first step in determining whether some of our fundamental moral and ethical principles should be re-examined and possibly changed. Please ponder these questions and contribute your responses.

E-Mail Lists Etiquette

One of the local geological societies to which I belong recently sent an e-mail stating, "This weekend one of our members, instead of requesting that his name be removed from our email list, filed a complaint with AOL regarding "unsolicited" email. As a result, [the organization] has been blocked from sending any 'bulk' email from our email address. …As a reminder, if you wish to be removed from our email list, please notify the [organization's] office of your wishes and we will be happy to accommodate you. The emails have been our method of informing you of upcoming events which may be of interest." This is an example of how one individual's annoyance with what he or she considered spam inconvenienced a lot of people.

I get annoyed at unsolicited e-mail as much as the next person. But when you are a member of a group that is using e-mail to inform its members of events, they will respond to requests to delete your name if asked, unlike the commercial spam that is all too prevalent.

Organizations like AIPG and other non-profits have found that distributing news via e-mail allows for significant savings in printing and mailing while at the same time allowing the use of color in their publications. The Society of Economic Geologists this year offered a significant reduction in dues for those members willing to receive the *SEG Newsletter* and *Economic Geology* electronically. Personally, I like the savings is shelf space and the ability to word search the electronic files provided by electronic copies. I've been downloading *The Professional Geologist* every month since the option has been offered.

So if you're annoyed with organizational detail, please try sending a request to remove your name from its e-mail list before sending a "spam" message to your internet service provider.

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

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

Ethics and Risk Management

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

In David Abbott's Professional Ethics and Practices – Column 107, he presents the question "Does Professional Practice Lead to Ethical Practice?". I would argue that ethical practice is the basis of and leads to professional practice. In July 2005, I made a presentation at the National Society of Professional Engineers (NSPE) National Conference on the connection between Ethics and Risk Management. My premise was that ethical behavior leads to reduced professional liability. I illustrated this by using the NSPE Fundamental Canon's and used case studies from the NSPE Board of Ethical Review (BER), my own personal experience as well as real historical events (Did you realize that engineers were responsible for the downfall of Spiro Agnew? More on that later) to illustrate the connection between ethical behavior and risk management.

Canon 1 of the NSPE Code of Ethics states that engineers shall hold paramount the safety, health and welfare of the public. I used BER Case 98-9 to illustrate this point. This case appears to be the same situation that was discussed in David Abbott's column 107. The basic facts are that an engineer realized, post construction that an error in design calculations were made and that this error could result in building failure in severe wind conditions. The engineer advised the client and the architect of the problem and worked with the client, the architect, and the City to devise a remedial plan. The client and the architect wanted to keep the problem secret and the City engineer went along with the secret. The NSPE BER stated that it was not ethical for either of the engineers to maintain the secrecy requested by the building owner and the architect.

From a risk management standpoint, it was good that the engineer recognized and acknowledged a design error before a major catastrophe took place. It was also good that the engineer worked with the client and the architect to come up with the way to correct the problem. Where the engineer went wrong was maintaining the secrecy. Those actions could lead beyond the negligence claims to claims of willful misconduct in the event that something had gone wrong during the remediation phase of the project.

Canon 2 states that engineers shall perform services only in the areas of their competence. To illustrate this, I used BER Case 94-8. In this case, Engineer A was a P.E. working with a construction contractor on a design/build project. Engineer B was a chemical engineer hired to design structural footings. Engineer A had reservations about Engineer B's competence in structural design as Engineer B had no apparent training in foundation design. The BER found that it was unethical for Engineer B to provide structural services and that Engineer A has ethical responsibility to report his concerns.

From a risk management standpoint, the positive is that Engineer A voiced his concerns. The negatives are that Engineer B is exposing himself to negligence or willful misconduct for his actions. Engineer A, for his correctly questioning Engineer B's competence, may find himself the victim of a personal injury lawsuit from Engineer B.

I know of a "real-life" situation where a firm took on a project outside of their area of competence and found themselves with a real problem. The names have been changed to protect the guilty but Breaker Engineering, a process engineering firm specializing in pulp and paper mills was hired by Black Lung Coal Company to design a coal beneficiation plant. Breaker made an error in design calculations for a pressure vessel where a decimal point was read as a comma. The pressure vessel was undersized and the plant did not meet throughput requirements. The insurance carrier in this case paid the full $5,000,000 policy limit. I strongly believe that the calculation error would have been picked up if this was a type of project that Breaker had a lot of experience with. In areas that you have a lot of experience you can usually tell if your results are reasonable and within your expectations. In this case, it was a new type of project so there was no basis for using the "reasonableness" or what some might call a "gut check" of the numbers. Beyond the "gut check", it is clear that this firm's QA/QC check failed them as well but the root cause lies with taking on a project outside of their area of competence.

Canon 3 states that engineers shall issue public statements only in an objective and truthful manner. To illustrate this I used BER Case 99-8, where Engineer A won the RFP for a new dam for a small local agency. Engineer B from

the federal funding agency approves the drawings. Engineer C works for the contractor who was awarded the project. Engineer C noted that the drawings are deficient and part of the project is unbuildable. Engineer A agrees, but felt pressured by delivery date and didn't tell anyone about the incompleteness. Plus he feels that the federal funding will make up the difference. The BER cited all three engineers for unethical behavior: Engineer A for knowingly submitting incomplete drawings; Engineer B for approving those drawings; and Engineer C for submitting a bid knowing that portions of the project were unbuildable.

There are no risk management positives in this situation. Engineer A's work did not meet the standard of care. His actions could be considered willful which might cause the insurer to deny the claim. Engineer B was negligent in his review of the drawings. There was not enough information in the BER report to determine willfulness. Engineer C's actions would most likely be viewed as willful.

Canon 4 states that Engineers shall act for each employer or client as faithful agents or trustees. To illustrate this I used BER Case 93-4, where Engineer A was providing design and construction phase services. A dispute arose between the Owner and Contractor over acceptability of a concrete pour. Engineer A was asked to review the dispute. The Engineer found for the contractor as the owner had approved the change orders and the contractor complied with the change orders. The client complained that Engineer A should have sided with the owner citing the engineer's ethical duty of loyalty. The BER found that Engineer A would have been unethical to have found in the Owner's favor as none of the findings would have supported the Owner's position.

The risk management positive is that the engineer found as supported by the findings. There are no clear negatives but if the Owner is sufficiently aggravated at the Engineer they might file a negligence claim but it would be tough to prove.

Canon 5 states that engineers shall avoid deceptive acts. I was not able to find a BER Case to really support this. However, this is where I found out how engineers were responsible for the downfall of Spiro Agnew. Lester Matz was a principal engineer with Matz, Childs and Associates. In 1960, he befriended Mr. Agnew who was then Chairman of a County Zoning Board. Mr. Matz donated money toward Mr. Agnew's run for a county executive position. He provided kickbacks to Mr. Agnew in return for projects. Mr. Matz supported Mr. Agnew's run for governor. The kickbacks continued and the amount of state work increased. Mr. Matz even visited the White House to provide then Vice President Agnew with the kickback money.

The risk management positive is that Mr. Matz maintained a good relationship with his client and that there was no negligence in the actions of giving the kickbacks. However, it is obvious that this was an illegal activity. As a side note, Mr. Agnew ultimately left office due to a conviction on tax evasion charges; it seems he didn't claim his kickbacks on his tax forms.

Note: The NSPE BER cases that were cited in this article can be found at www.niee.org/cases/index.htm.

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

"I Hate My Website"

Duane A. Carey, CPG-10305

I hear this from virtually all of my clients. The reason is simple; most small-business websites aren't very good. Following are some common pitfalls that we see. How many apply to you?

Don't do-it-yourself – buying a circular saw at Sears doesn't make you Bob Villa, nor does a book on HTML make you a web designer. Hire a professional for this. After all, most people "check you out" on line before they hire you. If your site does not represent you well, change it. If you do not have a web site yet, what are you waiting for?! Even if you are adept at programming, you likely are not adept at graphic design – the two skills are usually mutually exclusive. An offshoot of this problem is looking around your staff and picking the one who is most computer savvy – Voila! – they are now your web master. The problem is, that person already has a full-time job, so he will always put a low priority on the internet work. We recently experienced this scenario with a client who owns a flooring store. His "web master" was a commission-based carpet salesman. Do you think he focused more on earning his paycheck every week or keeping the web site up to date? There are probably 40 web designers within a 5-mile radius of your office. Find one.

Don't use clip art – nothing shouts "I'm not really serious about this" like clip art. Use photographs, diagrams, renderings, etc., but please don't use free cartoons that you downloaded from the internet.

Don't mismatch URL and email addresses – if the contact information at www.joesremediationservice.com lists remediationguru69@hotmail.com as the email address, visitors will question your professionalism. You can always have your website email forwarded to your preferred email address. This way you can stick with checking only one account, but people will not doubt your professionalism.

Not having at least a landing page – if you don't yet have a website, you should at least purchase a URL (less than $20) and establish a landing page. This could be one page of text that shows your mailing address, phone, and email contact. You could also establish a presence on one of the internet yellow pages such as www.yellowbook.com. On these sites, you get the benefit of search engine access without even having a website. For about $30 per month, you can advertise your name, address, phone, etc. (even a map of your location) under certain keyword categories by which visitors search.

Too much flash – occasionally, one of the little movie clips at the beginning of someone's website will be interesting. Much of the time, however, these flash animations are just annoying. I almost always skip them (if that is an option) to get to the meat of the site. Most people are too busy to sit through a little video – they just want to find the information they came for. Moreover, there is one other pitfall with flash sequences on the opening page – they can make it difficult for some of the search engines to find relevant information on your site.

Too much me, not enough you – web visitors want to know what you can do for them. They don't necessarily need to know how great you are. Show them examples of how you helped someone solve a problem and let them figure out how great you are. It means a lot more to them when they figure it out for themselves. Show don't tell.

Too much blah, blah, blah – be succinct.

Not updating the site – it is usually obvious when you have not updated your site. If there is old information on the site, visitors are left to conjecture whether you are too busy or disinterested in keeping it up to date. If you are too busy to manage your web site, will you be too busy to help them with their problem?

Horizontal scrolling – if the visitor has to move a scroll bar to see the rest of the information to the right on the screen, it shows a sloppy design. They should be able to see the entire page on any browser.

Inconsistency – does the web site match the personality of your business? To use that same flooring company I mentioned previously, their showroom is very warm, inviting, and professional. It would easily appeal to the discerning buyer. However, their web site had a "discount" feel and gave the impression of customers walking through a cold, vast warehouse picking out their own carpet. Your site is your window to the world, it needs to reflect you accurately.

Nothing words - do you use "nothing" terms such as "State-of-the-art", "best", "cutting edge", "commitment to customer service" without really supporting them? I call these nothing words because everyone uses them. When everyone uses them, they're really worth nothing to the prospective client or customer.

Not submitting to the search engines - did you submit your site to the search engines? Have you provided the necessary metatags for each page for the search engines? Have you seriously thought about the words prospective clients use when searching for your type of service? Do you link to other sites and have them link back to you (search engines like to see this)? Search engine optimization (SEO) is a burgeoning business because it is so important. You have to make it easy for people to find you.

.net instead of .com – sometimes you cannot avoid this, because so many .com URLs are taken, but you should really try to avoid using the alternate extensions. For example, if www.joesremediationservice.com is taken, do not use www.joesremediationservice.net. It's too confusing and you will end up driving clients to your competitor's site. Instead, try something unique that relates to the benefit you provide, such as www.remedialcompliance.com.

The Cobblers Kids are Shoeless!

Okay, here's where I come clean. One of the primary motivations for this commentary about ineffective websites is the ineffectiveness of my own. Although we advise clients on how to improve their sites, ours is…,well, embarrassing. It violates many of the rules I have enumerated here. The fact is we just don't have the time to devote to our own site, and with a very localized focus for our business, the website has never been a priority. But that has to change, because "do as I say, not as I do" is not appropriate for a business consultant.

So we have embarked on the early stages of updating the site, with many of the strategies we present to our clients. With any luck, the new site will be up by the time you receive this issue. If that is the case, you will be able to view the old site by simply typing "/old" at the end of our web address. So it will be www.milkyourmarketing.com/old. We have been meaning to overhaul this site for well over a year. I hope that calling it to the attention of a national audience will give me sufficient motivation to make it happen. Drop me a line and let me know what you think.

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

The Many Styles of Field Mapping

Nancy Price, SA-0382

The ability to study rocks in the field is a skill that is learned. The first few field experiences can be traumatizing for many students. Taking that leap from the theoretical to the applied is difficult because being able to understand a concept does not necessarily translate into having the expertise and skill to apply it in the field. This is why field classes and field camp are so important. You need to learn how to do field work just as you would any other skill and it takes time to learn how to really do it well.

In field class, you are taught the basics of how to do field work, such as how to use a brunton, how to follow contacts, and how to make a cross section. Whether you realize it or not, you are also being taught the style of mapping that the instructor uses. If you take the time to talk to other geologists or take field classes under other instructors, you will learn that each geologist has his or her own style of data collection that suits that person's personalities, mapping needs, and personal preferences for data collection. Initially, you will most likely mimic the mapping style of the first person who taught you about field mapping, but as you get more experience and as you meet more people, you will also develop your own mapping style.

In my experiences as a student, there seems to be two main ways that most geologists approach their work in the field. You could add geologic contacts directly to the map as you follow them in the field or you could collect data at specific stations building your map outward from those stations. "Contact mapping" seems best utilized when trying to cover a lot of ground in a limited amount of time. I would consider this the best strategy when trying to map a new area for the very first time or when mapping at the level where a lot of detail would be excessive. It is important when doing this type of mapping to keep observations and interpretations identifiably separate. The line between interpreting what you see and looking for evidence to support your interpretation can be a fine one. A good field geologist is sure to support what they put on their map with direct observations and good data.

When walking contacts and focusing on creating the map, it is more difficult to keep track of all the individual bits of data collected. Usually, you put strike and dip readings and outcrop locations directly on the map as you go in the field, but it is also really important to collect a location, such as a GPS reading or UTM coordinates, in your field book just in case. You never know what may happen to your map during the day, and a day's worth of data could be easy to lose if something were to happen to your map. Many geologists swear by adding to a master map at the end of every day. The master map, which is left safely at camp, includes all of your confident observations and interpretations collected each day. Having a master map not only allows you to start each field day fresh on a map you can afford to lose but also forces you to identify which parts of your daily map you are confident enough to add to the master and which areas really need more time.

"Station mapping" on the other hand is great for people who are working on some detailed aspect of a field area. Essentially, you identify a specific outcrop to work on and you number and record that place on your map as a station. In your field book, all data collected in the area will be contained under a specific station heading (e.g. Station 1). This method seems impractical for large-scale mapping projects, provided there is a sufficient amount of outcrop, due to the amount of time it takes to log each station and the amount of attention and organization required to keep all the stations and their corresponding data straight on the map. However, some representative stations can be used in combination with a larger map in order to supplement the amount of information provided in that map. If outcrop is limited, station mapping may be the preferred method for large-scale mapping because there will be a greater need for more data from the limited amount of outcrop available to work with.

The trade off between "contact mapping" and "station mapping" is between the amount of time spent and the amount of ground covered. Obviously, the more time you spend at an outcrop, the less time you are spending covering ground. Personally, I like to incorporate a little of both into my field style. In areas where I need to map a contact or fill in a blank area on my map, I will walk contacts and add strike and dip readings as I go, but when I find a place that needs more attention, I stop and record it as a station. Areas identified for stations could include places where samples were collected, places where I made a rock description, places I took photos, or just places I felt were representative of what was going on in my field area and needed to be sketched or required more than one structural reading. The number of stations I identify is dependent on what questions I am trying to answer in my field area and how complex the area may be geologically.

A mapping style not only includes how the data is collected but also the tools that are used to collect that data. The decision of whether or not to utilize technology fits into this category. Technology can include such basic devises as a GPS or a camera on one end and on the other

end more complex and expensive data collecting or storing devises, such as laptops. Electronics can make our lives easier and more simplified, but can also make us lazy, can bog us down, and can break when we need them most. I always include a digital camera and a GPS as parts of my field gear, but I never rely on just these things to collect my data. For every position point I store on my GPS, I also copy it into my field book for safekeeping. I sketch important outcrops in my field book before I take a picture of it so that I know what I am taking a picture of and why. You can't draw strike and dips on a digital photo in the field but you can on a sketch in your book. The decision to use technology is a personal one based on your own level of efficiency and accuracy. The key is to be sure that each piece of technology you are using is a tool to enhance your field experience rather than just a toy that controls it.

Work in the field really hinges on your own personal level of organization as well. For some people, a stable level of chaos feeds discovery and innovation. I am not one of those people. If I don't have focus in my day, then I don't get as much done. At the end of each field day while you are going over what you did that day and recording necessary information on your compilation map while it is still fresh, you can also be planning for your next field day. Identify those areas that still need your attention. What questions still haven't been answered and what needs to be done to answer them? Create a realistic goal for the next day and set yourself to achieving it. If you have something to work towards in the field, your mind will be focused instead of swimming. This will be one way to keep yourself from sitting on the outcrop agonizing over where you are going to go next.

Perhaps the most important advice that I received when preparing for my first field season, however, had nothing to do with field skills at all. I was told to take care of myself. It seems like an intuitive piece of advice, but it can be really easy to forget that a day in the field is more physically demanding than a day in the office. The more you hike around, the more calories you will need to take in. The hotter it is outside and the more you perspire, the more water you will need. It is essential to eat a good meal at least once a day and drink plenty of water (or even gatoraid) to keep up your mental and physical strength. Taking care of yourself is not limited to just eating right, it also refers to taking care of your body while in the field. For example, don't carry more in your pack than you can handle. Injuries only slow you down, make you uncomfortable, or could even cut your field season short. Also, it is unreasonable to think that you can spend 12 hours in the field everyday at your top performance for weeks and weeks at a time. Unless it is absolutely necessary, a long day spent in the field only wears you out and does not give you time to prepare for the next day.

Figuring out what your own field style is will take a lot of floundering. No one can tell you what works best for you and there probably won't be anyone around with the time available to really try. Your first field experience may not be pretty. You will make mistakes and spend more time than you want trying to figure out where to go next. The only real solace that I have for you is that everyone has to go through it and that you will get better every day you are out there.

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

STUDENT APPLICATION FORM

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

Date received: _____ Member #: _____
Amount paid: _____ Date approved: _____
For Headquarters use. Do not write above this line.

Application for Affiliation as a Student Adjunct

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

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

Last Name: First Name: Middle Initial :

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

Address: City: State/Zip:

School Phone: Home Phone: E-mail:

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

Applicant Signature: Date:

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

Faculty Sponsor's Statement

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

Name: Phone:

Sponsor: Signature: Date

NEW APPLICANTS AND MEMBERS (11/21/06 - 2/2/07)

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

Applicants for Certified Professional Geologist

CO Christian Clode
10101 E. Dry Creek Road, Englewood, CO 80112

NV Gary P. Edmondo
15540 Minnetonka Circle, Reno, NV 89521

MI Bruce E. Gillett
1515 Arboretum Dr. SE, Grand Rapids, MI 49546

NJ Alfred E. Moffit, III
6 Cambridge Drive, Rockaway, NJ 07866

NJ Brian T. Olin
41 Roosevelt Place, Somerville, NJ 08876

MI Robert J. Sadowski
3038 Richmond Drive, Rochester Hills, MI 48309

NM Stephen K. Stellavato
4713 Gibson, SE, Albuquerque, NM 87108

CO Thomas G. Van Arsdale
11195 W. 17th Avenue #302, Lakewood, CO 80215

Applicants Upgrading to CPG

OH Michael J. Orobona MEM 0051
Cleveland Cliffs Inc, 1100 Superior Avenue, Cleveland, OH 44114 2589

CO Lawrence W. Snee MEM 0940
24019 High Meadow Drive, Golden, CO 80401

New Certified Professional Geologists

OH Scott T. Hershberger CPG 10993
Emerald Envir., Inc., 1621 St. Clair Ave., Kent, OH44240

FL John C. Spurney CPG 11007
SJO 747, P.O. Box 25216, Miami, FL 33102 5216

AZ Scott W. Parks CPG 11009
3413 Nandina Lane, Tucson, AZ 85712

TN Vanessa C. Bateman CPG 11016
244 First Ave. S., Franklin, TN 37064

IL Patricia A. Feeley CPG 11020
732 N Kenilworth, Oak Park, IL 60302

ID Daniel H. Hussey CPG 11022
414 3rd Street, Wallace, ID 83873

Ontario Ludvig Kapllani CPG 11038
55 Marquette Avenue, Toronto, Ontario MGA 1X8 Canada

NV Richard L. Dixon CPG 11023
2580 Knob Hill Drive, Reno, NV 89506

TX Philip F. Pyle CPG 11024
14631 Carolcrest, Houston, TX 77079

NV Kathryn E. Umbarger CPG 11025
5444 Royal Vista Ln., Las Vegas, NV 89149

MT Thomas H. Chadwick CPG 11026
21694 MT HWY 35, Big Fork, MT 59911

NM Geyza I. Lorinczi CPG 11027
P.O. Box 3082, Taos, NM 87571

NY Kevin P. Murphy CPG 11028
215 West Ave., Patchogue, NY 11772

NV Gregory T. Hill CPG 11030
785 Andrew Lane, Reno, NV 89521

NV Steven L. McMillin CPG 11031
896 Parkridge Parkway, Spring Creek, NV 89815

CO David M. Cole CPG 11032
6624 Willow Broom Trail, Littleton, CO 80125

CO David B. Thomas CPG 11033
4670 Holly Street, Unit A, Denver, CO 80216 6408

ID Bart A. Stryhas CPG 11034
Rt 1 Box 132, Kooskia, ID 83539

RI David J.P. Foss CPG 11036
Fuss & O'Neill, Inc., 275 Promenade Street, Suite 350, Providence, RI 02908

MI Michael A. Brennan CPG 11037
Malcolm Pirnie, Inc., 645 Griswold Street; Suite 1950, Detroit, MI 48226

Manitoba Mark A. Fedikow CPG 11039
967 Windermere Avenue, Winnipeg, Manitoba R3T 1A2 Canada

IN Robert F. George, Jr. CPG 11040
5257 Norwaldo Avenue, Indianapolis, IN 462220 USA

NV William C. Howald, Sr. CPG 11041
9050 Spanish Trail, Sparks, NV 89441

MI Rodney A. Abke CPG 11042
5171 Moceri Lane, Grand Blanc, MI 48439

GA R. Hayne Palmer, Jr. CPG 11043
United Consulting, 625 Holcomb Bridge Rd., Norcross, GA 30071

CO Jeffrey A. Pontius CPG 11044
9939 S Clyde Circle, Highlands Ranch, CO 80129

MT Rene L. Foehl CPG 11045
P.O. Box 4801, Butte, MT 59702

NV Ellen D. Leavitt CPG 11046
2625 Monterey Circle, Reno, NV 89509

AZ William C. Feyerabend, Jr. CPG 11047
4218 Kachina Way, Prescott Valley, AZ 86314

NV Nancy J. Wolverson CPG 11048
P.O. Box 71594, Reno, NV 89570

WA Gerald A. Zieg CPG 11049
617 E 17th Ave., Spokane, WA 99203

New Members

KY Dale M. Burton MEM 0943
1039 Tyburn Lane, Frankfort, KY 40601

CO Joanna L. Lipske MEM 0944
Metallica Resources, Inc., 12200 E. Briarwood Ave., Suite 165, Centennial, CO 80112

CO Joel W. Rotert MEM 0945
12200 E Briarwood Ave. Suite 165, Centennial, CO80112

MT David A. Ryckman MEM 0946
P.O. Box 787, Absarokee, MT 59001

CO Lynne Carpenter MEM 0947
12136 W. Bayaud Ave., Suite 300, Lakewood, CO 80228

GA Lina K. Kodjo Wayo MEM 0948
2413 Shadowood Pkwy, Atlanta, GA 30605

AK Kevin Tarleton Rogers MEM 0949
P.O. Box 11 1155, Anchorage, AK 99511

TX Michael I. Wahl MEM 0952
CTL Thompson Texas, 8900 Shoal Creek Blvd, Bldg 400, Austin, TX 78757

MA Joseph P. Kopera MEM 0953
64 High Street #7, Greenfield, MA 01301

AZ Jan Carol Rasmussen MEM 0954
2550 W. Camino Del Venegas, Tucson, AZ 85742

AK Caryn A. Orvis MEM 0955
2600 Cordova Street, Suite 210, Anchorage, AK 99503

MI Peter A. Lepczyk MEM 0956
1102 Cass Street, Traverse City, MI 49684

FL Mark J Abbott MEM 1000
8267 NW 42nd Street, Coral Springs, FL 33065

FL Alan W Aikens MEM 1001
225 E Robinson St, Orlando, FL 32801 4322

GA Saadi Almaee MEM 1002
PO Box 72174, Albany, GA 31708 2174

FL Mohammad N Almasi MEM 1003
5833 SW 50th Ter, Miami, FL 33155 6313

FL Samantha Andrews MEM 1004
14603 Turtle Creek Circle #1104, Lutz, FL 33549

FL Eric Aserlind MEM 1005
6304 Caballero Blvd, Coral Gables, FL 33146 3219

FL Robert M. Baker MEM 1006
8600 Oldbridge Lane, Orlando, FL 32819

FL B. Rafael Barba MEM 1007
5931 SW 88th St, Miami, FL 33156

FL Henry Barker MEM 1008
6750 Fruitville Rd., Sarasota, FL 34240 9711

FL Patrick Barnes MEM 1009
3655 Maguire Blvd Ste 150, Orlando, FL 32803 3047

FL Michael Raymond Bateman MEM 1010
3301 State Road 574 W, Plant City, FL 33563

FL Bradley J Bayne MEM 1011
111 Evelyn Ave., Clearwater, FL 33765

FL Candace Beauvais MEM 1012
3676 Hartsfield Road, Tallahassee, FL 32303

FL Toby Benoit MEM 1013
6410 Southpint Parkway, Suite 120, Jacksonville, FL 32216

FL Art F Benson MEM 1014
17936 Country Squire Lane, Dade City, FL 33523

FL Bonnie Bergen MEM 1015
5259 Oxford Ave. N, St. Petersburg, FL 33710

FL Charles F. Beyer MEM 1016
1008 Osceola Street, Suite 4, Jacksonville, FL 32204

FL Allan Hubbard Biddlecomb MEM 1017
730 NE Waldo Rd Bldg A, Gainesville, FL 32641 5699

FL Vivian J. Bielski MEM 1018
2379 Broad Street, Brooksville, FL 34604 6899

FL Patricia Lurie Blackwelder MEM 1019
1455 Tyler St, Hollywood, FL 33020 5248

FL Paulette A Bond MEM 1020
903 W Tennessee St, Tallahassee, FL 32304 7700

FL Felicia Michelle Boyd MEM 1021
1402 Declaration Dr, Jacksonville Beach, FL 32250

FL Stephen Richard Boyes MEM 1022
601 S. Main Street, Gainesville, FL 32601

FL John Bradshaw MEM 1023
1882 Porter Lake Drive #105, Sarasota, FL 34240

FL Robert E Bretnall Jr MEM 1024
1706 SW 56th Lane, Gainesville, FL 32608

FL David Jerome Brown MEM 1025
6750 Fruitville Rd., Sarasota, FL 34240 9711

FL Jeffrey Brown MEM 1028
54 NW Beal Parkway, Fort Walton Beach, FL 32548

FL Melissa Brown MEM 1026
3676 Hartsfield Road, Tallahassee, FL 32303

FL Nicholas A Brown MEM 1027
1815 Tamiami Dr, Tallahassee, FL 32301 5848

FL Cynthia A Brunot MEM 1029
2755 S Federal Hwy., #3, Boynton Beach, FL 33435

FL Joe K Buerhop MEM 1030
PO Box 2286, Gibsonville, FL 33534 2286

FL Scott L Burgard MEM 1031
6821 SW Archer Rd, Gainesville, FL 32608 4720

FL Phil J Burguiere MEM 1032
6 S Lake Pleasant Rd, Apopka, FL 32703 4638

FL David Emerson Butler MEM 1033
3301 Gun Club Rd, West Palm Beach, FL 33406 3007

FL Julian Pedro Caballero MEM 1034
7887 Bryan Dairy Road, Suite 260, Largo, FL 33777

FL Matthew L Cain MEM 1035
PO Box 747, Lake Wales, FL 33859

FL Chris L Callegari MEM 1036
66 Cuna Street, St. Augustine, FL 32084 3619
FL Steven C Camp MEM 1037
2379 Broad St, Brooksville, FL 34604 6899
FL Kenneth M Campbell MEM 1038
903 W Tennessee St, Tallahassee, FL 32304 7716
FL Leon Jose Carrero MEM 1039
7667 Saw Timber Lane, Jacksonville, FL 32256 2354
FL Bryan D Carrick MEM 1040
920 McKenzie Rd, Lake Helen, FL 32744 2120
FL James H Cason MEM 1041
2750 Old St. Augustine Rd, Apt J100, Tallahassee, FL 32301
FL Jorge Rijard Caspary MEM 1042
3382 Capital Circle NE, Tallahassee, FL 32308 1568
FL Shelton Lee Cawley MEM 1043
604 E Carter Rd, Lakeland, FL 33813 4655
FL Angela Chelette MEM 1044
81 Water Management Drive, Havana, FL 32333
FL Jian Chen MEM 1045
19024 Silverbrook Dr., Tampa, FL 33647
FL Phillip J Ciaravella MEM 1046
808 North Forest Drive, Tallahassee, FL 32303 1175
FL William H Colona III MEM 1047
1625 Summit Lake Drive, Suite 200, Tallahassee, FL 32317
FL Julian C Cooey MEM 1048
6065 Old Bagdad Highway, Milton, FL 32583
FL Mark N Corbett MEM 1049
2301 Leu Rd, Orlando, FL 32803 1521
FL Roger Anthony Countryman, II MEM 1050
81 Water Management Drive, Havana, FL 32333
FL Douglas L Crowson MEM 1051
PO Box 280482, Tampa, FL 33682 0482
FL Mervin W Dale MEM 1052
3701 NW 98th Street, Gainesville, FL 32606
FL Joseph H Daniel MEM 1053
7887 Bryan Dairy Road, Suite 260, Largo, FL 33777
FL Scott A Davidson MEM 1054
7064 Davis Creek Rd, Jacksonville, FL 32256 3026
FL John J Davis MEM 1055
7825 Baymeadows Way, Suite B 200, Jacksonville, FL 32256 7590
FL Michael Joseph DeNeve MEM 1056
Post Office Box 2000, Mulberry, FL 33860 1100
FL Steven William Desmith MEM 1057
2379 Broad St, Brooksville, FL 34604 6899
FL Richard J Deuerling, Jr. MEM 1058
3774 Suffolk Dr, Tallahassee, FL 32309 3005
FL Rufus L Dickey III MEM 1059
3676 Hartsfield Rd, Tallahassee, FL 32303 1175
FL Beda C Dondi MEM 1060
1001 SW 46th Ave, Pompano Beach, FL 33069 0905
FL Kevin F. Dorsey MEM 1061
5300 West Cypress Street, Tampa, FL 33607
FL James R. Dozier MEM 1062
3903 Premier North Drive, Tampa, FL 33618
FL Douglas Dufresne MEM 1063
201 E Pine St Ste 1000, Orlando, FL 32801 2756
FL Michael Duvall MEM 1064
1712 Clydesdale Road, Loxahatchee, FL 33471 3914
FL Eric P Eshom MEM 1065
2379 Broad St, Brooksville, FL 34604 6899
FL William L Evans III MEM 1066
903 West Tennessee Street, Tallahassee, FL 32304 7700
MI Angelika M Farina MEM 1067
10112 E River Shore Dr SE, Alto, MI 49302
FL Mario J. Faz MEM 1068
424 SW 64 Avenue, Miami, FL 33144
FL Pedro Fierro Jr MEM 1069
14055 Riveredge Drive, Suite 400, Tampa, FL 33637
FL Michael R. Fisher MEM 1070
17743 Pine Needle Terrace, Boca Raton, FL 33487
FL Dora Florindo MEM 1071
6365 NW 6th Way, Suite 320, Fort Lauderdale, FL 33309
FL Dan W Foss MEM 1072
1950 Commonwealth Ln, Tallahassee, FL 32303 3196
GA Kendall Brian Fountain MEM 1073
355 Jennings Mill Parkway, Apartment 402, Athens, GA 30606
FL Joseph Franklin Fugitt MEM 1074
1414 Groveland Hills Drive, Tallahassee, FL 32317
FL Joseph M Fuhr MEM 1075
5147 West Clifton Street, Tampa, FL 33634
FL Roger G Gallop MEM 1076
PO Box 711, Ponte Vedra Beach, FL 32004 0711
FL Michael H. Garbee MEM 1077
1356 Willow Branch Avenue, Jacksonville, FL 32205
FL Keith Michael Garman MEM 1078
13617 North Florida Avenue, Tampa, FL 33613
FL Anthony Gilboy MEM 1079
2379 Broad St, Brooksville, FL 34604 6899
FL Todd Grant MEM 1080
Golder Associates, 9428 Baymeadows Rd Ste 400, Jacksonville, FL 32256 7979
FL Anthony Louis Grasso MEM 1081
5100 W. Lemon Street, Suite 114, Tampa, FL 33609
PA Richard E Gray MEM 1082
322 Black Walnut Dr, Greensburg, PA 15601 8863
FL Matthew Nelson Green MEM 1083
800 Mercy Drive, Suite 4, Orlando, FL 32808
FL Carllett Grey Wilson MEM 1084
110 SE 6th St. 20th Fl, Fort Lauderdale, FL 33301 5000
FL Glenn Eugene Gross MEM 1085
4338 Glennis Dr, Lakeland, FL 33813 1914
FL James P Guida MEM 1086
6750 Fruitville Rd., Sarasota, FL 34240 9711
FL Mark Jay Haberman MEM 1087
7601 Highway 301 N, Tampa, FL 33637
FL Melinda Hamsher MEM 1088
9608 128th Terrace #102, Largo, FL 33773 1223
FL William S Harvey MEM 1089
1804 Rocky Pointe Drive, Lakeland, FL 33813
FL Lyle Hatchett MEM 1090
3676 Hartsfield Rd, Tallahassee, FL 32303
FL Douglas James Hearn MEM 1091
953 Sunshine Ln, Altamonte Springs, FL 32714 3804
OH Jay Geiger Henthorne Jr MEM 1092
3927 Cleveland Rd, Wooster, OH 44691 1223
FL John R. Herbert MEM 1252
730 NE Waldo Road, Gainesville, FL 32641
FL Thomas A Herbert MEM 1095
PO Box 10129, Tallahassee, FL 32302 2129
FL Darrin W Herbst MEM 1093
7601 W. Hwy. 301 N., Tampa, FL 33637
FL Carlos Herd MEM 1094
6750 Fruitville Road, Sarasota, FL 34240 9711
FL James D Hirsch MEM 1096
6821 SW Archer Rd, Gainesville, FL 32608 4720
FL David Lyman Hoffman MEM 1097
14487 Cypress Trace Ct., Fort Myers, FL 33919
FL Loretta Holtkamp MEM 1098
6301 Running River Place, Temple Terrace, FL 33617
FL Jill Ann Hood MEM 1099
P.O. Box 10234, Brooksville, FL 34603
FL Marc V Hurst MEM 1100
121 Market St, Davenport, FL 33837
FL William Charles Hutchings MEM 1101
14011 N Nebraska Ave. #51, Tampa, FL 33613
WA Bert Q Hyde MEM 1102
2515 4th Avenue Apt 2205, Seattle, WA 98121 1470
FL Christine Jackson MEM 1103
2379 Broad St, Brooksville, FL 34604 6899
FL John Jennings MEM 1104
404 Pinehurst Avenue, Temple Terrace, FL 33617 4820
FL Cathleen Beaudoin Jonas MEM 1105
3903 Premier North Dr., Tampa, FL 33618
FL Mark J Jordana MEM 1106
9428 Baymeadows Rd Ste 400, Jacksonville, FL 32256 7979
FL Frederick Kaub MEM 1107
442 NW 35th St, Boca Raton, FL 33431 5708
FL Terry Keasler MEM 1108
3676 Hartsfield Road, Tallahassee, FL 32303
FL Richard Scott Keenan MEM 1109
9428 Baymeadows Rd, Ste 400, Jacksonville, FL 32256 7979
FL Michael Kelley MEM 1110
2379 Broad Street, Brooksville, FL 34609
FL Ralph Kerr MEM 1111
7601 Highway 301N, Tampa, FL 33637
FL Joel O Kimrey MEM 1112
3655 Maguire Blvd Ste 150, Orlando, FL 32803 3047
FL Granville H Kinsman MEM 1113
2379 Broad St, Brooksville, FL 34609 6899
FL Craig A Kovach MEM 1114
8214 Revels Road, Riverview, FL 33569
FL Eric Krebill MEM 1115
503 W. Central Blvd., Orlando, FL 32801
FL Thomas Kwader, Ph.D. MEM 1116
1625 Summit Lake Drive, Suite 200, Tallahassee, FL 32317
FL Scott Laidlaw MEM 1117
6750 Fruitville Rd., Sarasota, FL 34240 9711
FL Gregory John Lassi MEM 1118
4705 Old Highway 37, Lakeland, FL 33813
FL Andrew M Lawn MEM 1119
605 E Robinson St Ste 308, Orlando, FL 32801 2059
FL Jay C Lawrence MEM 1120
7775 Baymeadows Way, #102, Jacksonville, FL 32256
FL Carlos R Lemos MEM 1121
4610 Central Ave, St. Petersburg, FL 33711 1042
FL G Warren Leve MEM 1122
165 Sea Island Dr, Ponte Vedra Beach, FL 32082 3737
FL Alexandro G Levy MEM 1123
3560 Cardinal Point Drive, Suite 202, Jacksonville, FL 32257
FL Robert Daniel Lewis MEM 1125
1455 Treetop Dr, Palm Harbor, FL 34683 2837
FL Thomas Erik Lewis MEM 1124
701 East 8th Ave, Havana, FL 32333
FL Jackie M Lloyd MEM 1126
903 W Tennessee St, Tallahassee, FL 32304 7700
FL Andrew Brian Long MEM 1127
16702 Silver Moss Dr, Tampa, FL 33624 6721
FL John Lukasiewicz MEM 1128
1176 Lake Breeze Dr, Wellington, FL 33414 7945
FL Kathy Stewart Lukasiewicz MEM 1129
1176 Lake Breeze Dr., Wellington, FL 33414
GA Ronald Steven Lynch MEM 1130
PO Box 3670, Peachtree City, GA 30269 7670
FL Geoffrey Lyons Maddux MEM 1131
PO Box 5339, Navarre, FL 32566
FL Ronald D Maggard MEM 1132
7646 Richland St, Wesley Chapel, FL 33544 2624
FL Alireza Malek MEM 1133
9441 NW 10th Street, Plantation, FL 33322 4801
FL Lori Manuel MEM 1134
PO Box 1166, Brooksville, FL 34605 1166
FL Noel S Marton MEM 1135
6750 Fruitville Road, Sarasota, FL 34240 9711

NEW APPLICANTS AND MEMBERS (11/21/06 - 2/2/07)

FL David Scott Maxam MEM 1136
4819 Victoria Chase Court, Jacksonville, FL 32257
FL Gregory Mayfield MEM 1137
170 Century Blvd, Bartow, FL 33830 7700
FL Tamera McBride MEM 1138
P.O. Box 1223, Bushnell, FL 33513
FL Guerry H McClellan MEM 1139
3933 NW 29th Ln, Gainesville, FL 32606 6674
FL Thomas Michael McCormick MEM 1140
200 N. Andrews Ste 300, Fort Lauderdale, FL 33301
FL Henry J McCoy MEM 1141
1500 Monroe St 1st Fl, Fort Myers, FL 33901 5500
FL Kathleen M. McDonald MEM 1142
13617 North Florida Avenue, Tampa, FL 33613
FL Byron K. McElheny MEM 1143
13617 North Florida Avenue, Tampa, FL 33613
FL John P McGovern MEM 1144
863 Summerwood Dr, Jupiter, FL 33458 7561
FL Brian E McGurk MEM 1145
PO Box 1429, Palatka, FL 32178 1429
PA Bruno Michelangelo Mercuri MEM 1146
627 Hampton Ave, Southampton, PA 18966 3777
FL Andrew Hutcheon Merritt MEM 1147
15436 S County Rd 325, Cross Creek, FL 32640 7632
FL Susan J Metcalfe MEM 1148
9426 E Baymeadows Dr, Inverness, FL 34450 6271
FL Michael D Micheau MEM 1149
13518 Lk Magdalene Dr, Tampa, FL 33613
KY Ross Miller MEM 1150
PO Box 488, West Paducah, KY 42086 0488
FL Jason M Mills MEM 1151
2301 Maitland Center Pkwy Ste 300, Maitland, FL 32751
FL Richard J Mistretta MEM 1152
3035 Cross Fox Dr, Mulberry, FL 33860 8610
FL Luis R. Molina MEM 1153
1500 Monroe Street, Fort Myers, FL 33901
FL Ralph Francis Mongillo Jr MEM 1154
9428 Baymeadows Rd, Ste 400, Jacksonville, FL 32256 7979
FL Jorge A Morales MEM 1155
14411 Commerce Way, Suite 230, Miami Lake, FL 33016
FL Charles J Morgan MEM 1156
3420 Gustin Lane, Mulberry, FL 33860
FL P Greg Mudd MEM 1157
482 Keller Rd, Orlando, FL 32810
FL Mark William Mulligan MEM 1158
209 N. Moss Road, Suite 103, Winter Springs, FL 32708
LA Robert G Murphy MEM 1160
9 Stilt St, New Orleans, LA 70124 4403
FL Tauna Mai Murphy MEM 1159
9423 Oak Meadow Ct, Tampa, FL 33647 2526
FL Gail L Murray MEM 1161
18963 SE Fernwood Drive, Tequesta, FL 33469 1651
FL Lewis A Nelson MEM 1162
PO Box 810729, Boca Raton, FL 33481 0729
FL Sandy Nettles MEM 1163
201 Alt 19, Palm Harbor, FL 34683
FL Alan W Niedoroda MEM 1164
1625 Summit Lake Drive, Tallahassee, FL 32317
FL Jeffery S Northrup MEM 1165
10025 NW 116th Way Ste 12, Miami, FL 33178
FL Mark Anthony Novokowsky MEM 1166
12917 Water Point Blvd., Windermere, FL 34786
FL Clint A. Oakley MEM 1167
3071 S.W. 38th Avenue, Suite 554 9, Miami, FL 33146
FL James P Oliveros MEM 1168
9428 Baymeadows Rd, Ste 400, Jacksonville, FL 32256 7979
WA Edward Henry Owens MEM 1169
755 Winslow Way E, Bainbridge Island, WA 98110 2483
FL John Walker Parker MEM 1170
2379 Broad St, Brooksville, FL 34604 6899
GA Jeffery J C Paul MEM 1171
3730 Chamblee Tucker Rd, Atlanta, GA 30341 4414
FL James W Pease MEM 1172
5801 Benjamin Center Drive, Tampa, FL 33634
FL Kevin Mark Pepper MEM 1173
261 Live Oaks Boulevard, Casselberry, FL 32707
FL Christopher L Perry MEM 1174
250 S Ocena Blvd Apt 266, Delray Beach, FL 33483 6751
FL Jeffrey J Peters MEM 1175
2105 Turnberry Drive, Oviedo, FL 32765
FL Scott Thomas Petersen MEM 1176
6750 Fruitville Rd., Sarasota, FL 34240 9711
FL Janet Moll Peterson MEM 1177
10435 SW 96th St, Miami, FL 33176 2640
FL Stoddard M Pickrell Jr MEM 1179
1875 West Main Street, Bartow, FL 33830 7718
SC Earl C Pirkle MEM 1180
211 Boxwood Rd, Aiken, SC 29803 7873
FL Michael Planert MEM 1181
3676 Hartsfield Road, Tallahassee, FL 32303
FL David M Poe MEM 1182
PO Box 7681, Lakeland, FL 33807
FL Selwyn L Presnell MEM 1183
2150 Avenida De Las Flores, Bartow, FL 33830
FL Dennis J Price MEM 1184
Post Office Box 45, White springs, FL 32096
FL Bradford J Radloff MEM 1185
14578 Lagoon Dr, Jacksonville Beach, FL 32250 2322
FL Edward G Rahrig MEM 1186
8780 Brairwood Meadow Ln, Boynton, FL 33437 7814
FL Anthony F Randazzo MEM 1187
PO Box 14956, Gainesville, FL 32604 4956
FL Brian A Richards MEM 1192
30941 Suneagle Dr, Mount Dora, FL 32757 9784
FL Judith A Richtar MEM 1188
1015 W Ohio Ave, Tampa, FL 33603 5233
WY Henry R Richter MEM 1189
1252 Commerce Drive, Laramie, WY 82070
FL John D Riege MEM 1190
9280 SW 106th St, Miami, FL 33176 3614
FL Ernie Roaza MEM 1191
3676 Hartsfield Road, Tallahassee, FL 32303
GA Anthony O Roberts MEM 1193
PO Box 67279, Atlanta, GA 31146 7279
FL Barry Duane Robertson MEM 1194
311 N. Rosalind Avenue, Orlando, FL 32801
FL David S Robertson MEM 1195
26 NW 12th St, Delray Beach, FL 33444 2970
FL Eileen Rodriguez MEM 1196
1532 Gardner Dr, Lutz, FL 33559 3305
NC Dennis Michael Rogers MEM 1197
1921 Snowy Owl Lane, Cary, NC 27511
FL William G Rollins MEM 1198
PO Box 3547, Tallahassee, FL 32315 3547
FL Jack C Rosenau MEM 1199
1177 Old Fort Dr, Tallahassee, FL 32301
FL Dan Rothenberger MEM 1200
5215 W Laurel St Ste 110, Tampa, FL 33607 1728
NY Paul H Roux MEM 1201
20 Lloyd Point Dr, Huntington, NY 11743
FL Victoria A Rushing MEM 1202
2287 Cork Oak Street, Sarasota, FL 34232
FL Merlin Duane Russell Jr MEM 1203
6507 Donerail Trl, Tallahassee, FL 32308 1671
FL Paul Steven Safko MEM 1204
3355 Copter Rd Ste 8, Pensacola, FL 32514
FL Eric Sager MEM 1253
3014 US Hwy 301 North, Suite 500, Tampa, FL 33619
NC Gary K Sawyer MEM 1205
9307 Monroe Road, Suite. K, Charlotte, NC 28270 2438
FL Eric William Schinsing MEM 1206
6420 Congress Avenue, Suite 2000, Boca Raton, FL 33487
FL Robert Hans Schuler MEM 1207
270 NE 123rd St, North Miami, FL 33161 5333
FL John Rolf Sego MEM 1208
14555 Mossy Hommock Lane, Myakka City, FL 34251
FL Fred A Seguiti MEM 1209
3820 Northdale Blvd Ste 210B, Tampa, FL 33624 1834
FL Gregory Alan Self MEM 1210
409 NW 138th Terrace, Newberry, FL 32669
FL Keith E Sibley MEM 1211
2711 W 15th St, Panama City, FL 32401 1366
FL Thomas A Sirna MEM 1212
7501 N Jog Rd, West Palm Beach, FL 33412 2499
FL David L Slonena MEM 1213
4911 Crockett Ct, Tampa, FL 33625 6621
FL Douglas L Smith MEM 1214
PO Box 14956, Gainesville, FL 32604 4956
FL Daniel Spector MEM 1215
421 NE 110th St, Miami, FL 33161 7148
FL Jeff Spicola MEM 1216
123 W. Indiana Ave. Room 202, DeLand, FL 32720
FL Stephen O Starke MEM 1217
3740 Executive Way, Miramar, FL 33025 3946
FL Michael F Stephen PhD MEM 1218
3106 Horseshoe Dr S, Naples, FL 34104 6139
FL Mark Randall Stephens MEM 1219
2031 East Edgewood Dr Ste 5, Lakeland, FL 33803 3601
FL Chris Alan Stolze MEM 1220
12625 40th St N, Clearwater, FL 33762
FL Rick Stransky MEM 1221
6241 NW 23rd Ave., Gainesville, FL 32653
FL John Gardner Strasser MEM 1222
2379 Broad St, Brooksville, FL 34604 6899
FL Justin Earl Strickland MEM 1223
1752 Thomasville Rd, Tallahassee, FL 32303
FL Jeffrey S Swartz MEM 1224
1711 Verina Ct, Tallahassee, FL 32303 4328

AIPG Membership Totals

	As of 2/17/06	As of 2/1/2007
CPG - Active	3,680	3,642
CPG - Retired	468	446
Member	588	833
Registered Memb.	14	11
Associate Memb.	22	35
Student Adjunct	494	582
Honorary	23	23
Corporate Member	4	3
TOTALS	5,293	5,575

FL Christopher L Sweazy MEM 1225
422 E McCormick Rd, Apopka, FL 32703 8951
FL Herman W Taube III MEM 1226
8203 SE Cumberland Circle, Hobe Sound, FL 33455
FL Roy H Therrien MEM 1227
30941 Suneagle Dr, Mount Dora, FL 32757`
FL Susan Klinzing Tobin MEM 1228
27751 Lake Jem Road, Mt. dora, FL 32757
PA Daniel R Toder MEM 1229
313 Paxson Ln, Langhorne, PA 19047 8217
CO Paul Bertram Trost MEM 1230
1511 Washington Ave, Golden, CO 80401 1988
FL Jeremy W Turner MEM 1231
6420 Congress Avenue, Suite 2000, Boca Raton, FL 33487
FL Robert G Tyson Jr MEM 1232
6750 Fruitville Rd., Sarasota, FL 34240 9711
FL Lisa Joy Ullman MEM 1233
6420 Congress Avenue,Suite 2000, Boca Raton, FL 33487
FL Robert M Viertel MEM 1234
335 East Van Fleet Drive, Bartow, FL 338303833
FL Jeffry R Wagner MEM 1235
3676 Hartsfield Rd, Tallahassee, FL 32303 1175
GA Wayne L Warburton MEM 1236
3730 Chamblee Tucker Road, Atlanta, GA 30341
VA Jack Warren Ward MEM 1237
5000 Page St, Chesapeake, VA 23324 1048
FL Kenneth A Weber MEM 1238
2379 Broad St, Brooksville, FL 34604 6899
FL John R Wehle MEM 1239
PO Box 455, Placida, FL 33946 0455
FL Sarah M Whitaker MEM 1240
1028 W New Hampshire St, Orlando, FL 32804 5702
FL George Wiegand MEM 1241
3676 Hartsfield Road, Tallahassee, FL 32303
FL Michael Wightman MEM 1242
4610 Central Ave, St. Petersburg, FL 33711
FL David A. Wiley MEM 1243
10014 North Dale Mabry Highway, Suite 20, Tampa, FL 33618
FL Charles T Williams MEM 1244
PO Box 4667, Jacksonville, FL 32201 4667
FL Robert Michael Wojcik MEM 1245
9428 Baymeadows Rd, Ste 400, Jacksonville, FL 32256 7979
FL Walter Wood MEM 1246
599 Heather Brite Cir, Apopka, FL 32712 4036
FL Edmand B Workman MEM 1247
9250 SW 178th Ter, Miami, FL 33157 5701
FL Vincent D. Yarina MEM 1248
7900 Miami Lakes Drive West, Suite 102, Miami Lakes, FL 33016
FL Lynn Benson Yuhr MEM 1249
10430 NW 31st Terrace, Miami, FL 33172
FL Thomas M Zankert MEM 1250
PO Box 3179, Winter Park, FL 32790 3179
FL Scott Charles Zednek MEM 1251
38 NE 20 Avenue, Suite 7, Pompano Beach, FL 33060
FL John R. Herbert MEM 1252
730 NE Waldo Road, Gainesville, FL 32641
FL Eric Sager MEM 1253
3014 US Hwy 301 North, Suite 500, Tampa, FL 33619
FL Brook Wood MEM 1254
201 E Pine Street, Suite 1000, Orlando, FL 32801

New Student Adjuncts

GA Mark Shaffer SA 1171
33 Bailey Drive, Lilburn, GA 30047
GA Dustin Minchew SA 1172
3586 James Loop, Blackshear, GA 31516
GA Jordan Copeland SA 1173
99 Grady Johnson Road, Lot 30, Statesboro, GA 30458
GA Daniel McCloy SA 1174
2600 Bethany Creek Court, Alpharetta, GA 30004
VA Scott T. Hutchins SA 1175
232 Pheasant Run Drive, Blacksburg, VA 24060
CO Jan E. Gautreaux SA 1176
208 Edgemont Blvd., Alamosa, CO 81102
GA Jonathan B. Stogner SA 1177
173 Central Heights Road, Carrollton, GA 30116
WI Christopher V. Knuteson SA 1178
100 Grant Street, Suite 1192, De Pere, WI 54115
KY Amy E. Edwards SA 1179
1906 College Heights Blvd., Bowling Green, KY 42104
IN Linda Sylvester SA 1180
3426 Cheswick Court, Apt B1, West Lafayette, IN 47906
CA Nicholas M. Nelson SA 1181
1839 Sandpiper Lane, Apt. 165, Mckinleyville, CA 95519
FL Gordon H. Brown SA 1200
4611 NW 30th Street, Gainesville, FL 32605
FL Jake Halfhill SA 1201
1343 Airport Drive, Tallahassee, FL 32304

New Associates

FL Claire Dempsey AS 0041
5680 K West Cypress Street, Tampa, FL 33607
FL Ronald L. Donadio AS 0042
2815 W Horatio Street, Unit 3, Tampa, FL 33609
FL Randy Kenyon AS 0043
6440 Southpoint Pkwy, Ste 150, Jacksonville, FL 32216 8003
FL Harley Means AS 0044
903 W Tennessee St., MS 720, Tallahassee, FL 32304 7700
CA Christine J. Meyer AS 0051
2033 N. Main Street, Suite 340, Walnut Creek, CA 94596
KS Ernie Morrison AS 0045
306 N Bookwood, Derby, KS 67037
FL Josh Patterson AS 0046
7220 Financial Way, Suite 100, Jacksonville, FL 32256
FL Michelle M. Regon AS 0047
5300 W Cypress Street, Suite 201, Tampa, FL 33607
FL J. Drew Robertson AS 0048
9013 Mahan Drive, Suite 101, Tallahassee, FL 32309
FL Giulio Italo Scarzella AS 0049
5300 W Cypress Street, Suite 300, Tampa, FL 33607 1768

PROFESSIONAL SERVICES DIRECTORY

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.

ANSWERS TO QUESTIONS ON PAGE 21

Answers:

1. The answer is "a" or "$KAlSi_3O_8$" or potassium feldspar.

   Oceanic volcanic action related to the mid ocean ridge typically yields a mafic or basaltic lava. Olivine "$(Mg,Fe)_2SiO_4$" and anorthite or calcium-rich plagioclase feldspar "$CaAl_2Si_2O_8$" are common mineral components of mafic rocks, whereas potassium feldspar is more common in acidic or felsic rocks.

2. The answer is "b" or "ostracodes."

   Radiolarians are actinopods (protozoans with protoplasmic extensions radiating from the main spheroid-shaped body) characterized by siliceous skeletons. They are marine, pelagic organisms.

   Foraminifers are protozoans belonging to the subclass Sarcodina and order Foraminifera, typified by the presence of a test consisting of one to many chambers. Commonly, the test is made of secreted calcite, but they may also be composed of agglutinated particles and, rarely, of aragonite or silica. Foraminifers are mostly marine, but fresh water forms are known to exist.

3. The answer is "c" or "h = H[(S-W)/W]" as shown below:

   The effective stress approaches a value of zero as the "quick condition" or "liquefaction" occurs. Thus:

   $P = H (S-W) – hW$

   $0 = H (S-W) – hW$

   $hW = H (S-W)$

   $h = H [(S-W)/W]$

4. The answer is "b" or "orthorhombic." In the orthorhombic system $a \neq b \neq c$ and all angles are 90^o.

   In the isometric system $a = b = c$ and all angles are 90^o.

   In the tetragonal system $a = b \neq c$ and all angles are 90^o.

SCIENCE IN THE NEWS

from Sigma Xi,
The Scientific Research Society

Ancient Global Warming Was Jarring, Not Subtle, Study Finds from the Los Angeles Times

Foreshadowing potential climate chaos to come, early global warming caused unexpectedly severe and erratic temperature swings as rising levels of greenhouse gases helped transform Earth, a team led by researchers at UC Davis said Thursday.

The global transition from ice age to greenhouse 300 million years ago was marked by repeated dips and rises in the amount of carbon dioxide in the atmosphere and wild swings in temperature, with drastic effects on forests and vegetation, the researchers reported in the journal *Science*.

"It was a real yo-yo," said UC Davis geochemist Isabel Montanez, who led researchers from five universities and the Smithsonian Museum of Natural History in a project funded by the National Science Foundation. "Should we expect similar but faster climate behavior in the future? One has to question whether that is where we are headed."

To read more: http://www.latimes.com/news/science/la-sciclimate5jan05,1,5178647.story or: http://tinyurl.com/ybslbc

Flood Maps May Have Out-Of-Date Data from the San Francisco Examiner

WASHINGTON - Maps used to calculate flood danger in the U.S. rely on data that are decades out of date, according to a report that calls for a new national program to remap land levels. The National Research Council on Thursday proposed an "Elevation for the Nation" program to produce up-to-date data.

The most immediate need is for the Federal Emergency Management Agency's flood mapping program. Those maps are used by mortgage companies and FEMA's National Flood Insurance Program to determine whether property owners should be required to purchase flood insurance.

The report notes that FEMA has been working with state and local governments in a $200 million-a-year effort to replace paper floodplain maps with digital ones. Generally, it is up to state and local governments to provide the data upon which the maps are based, the report said. The new report was requested by Congress so it could consider the recommendations in upcoming appropriations decisions.

To read more: http://www.examiner.com/a-542192~Flood_Maps_May_Have_Out_Of_Date_Data.html or: http://tinyurl.com/2hepqs.

SPRING FLOW RESTORATION

Stephen E. Laney, CPG-07519

Abstract

The hydrogeologic flow path of a commercial spring water source was breached while excavating a pipeline right-of-way on a dairy farm in western New Jersey. Spring water was diverted into the trench excavation and spring flow subsequently decreased from approximately 150 gpm to less than 50 gpm in the commercial Spring House. Water quality also decreased due to the presence of fecal coliform bacteria. Spring water was derived from dolomite bedrock belonging to the Allentown Formation of Cambrian age.

A seal was designed to attempt to reconstruct the confining layer and restore the spring flow to the Spring House. Granular bentonite was placed into the trench then overlain by a bentonite liner over a length of 150' of the trench bottom and down-lapped at the lower end. Sand was placed above the liner then a 42" diameter pipeline installed and backfilled into the trench. Spring flow then increased to approximately 100 gpm. In an attempt to recover more of the flow, a cement grout curtain was installed at the lower end of the seal. Flow steadily increased over the next six months to near 90% of the original flow. The concentration of fecal coliform also decreased.

Introduction

A commercial spring water supply is located on a dairy farm in Hunterdon County, west-central New Jersey. For the purpose of anonymity to the owners of the farm and the spring water business, the site will be called ABC Spring Farm (ABC). The artesian spring water discharge is located within a Spring House from where it is pumped through a treatment system (see Figure 1). Spring water treatment utilizes a sediment filter, granular activated carbon and ozonation. The treated water is then stored in a water tower for loading into tanker trucks for delivery to commercial bottling plants by the clients. Spring water pumped from the Spring House has been used for the farm operations and commercially for at least 100 years. Flow from the spring has historically ranged 150-200 gallons per minute (gpm).

During June 2002, while excavating a trench into which to install a 42" steel pipeline for the transport of natural gas, the excavation contractor dug into a zone of saturation, which caused spring water to begin flowing into and down the trench. The pipeline was being installed by the XYZ Gas Pipe Line Corporation in a right-of-way across ABC. The real name of the contractor also remains anonymous in this paper. Spring water flow to the Spring House decreased from approximately 150 gpm to 40 gpm following the damage to the spring flow path. Approximately 100 gpm were estimated to be flowing down the trench, accumulating in the lower end then flowing into an adjacent stream.

Geologic Setting

The study area is located in the valley west of the Musconetcong Mountain and approximately 2.0 miles north of interstate highway I-78 in northwest Hunterdon County, New Jersey. The Musconetcong Mountain is part of a Paleozoic thrust sheet comprised of oligoclase-quartz gneiss belonging to the Losee Formation of Precambrian age. The older gneiss was thrust west during the Alleghenian orogeny approximately 250 million years ago.

Bedrock in the valley west of the mountain and upon which ABC Spring Farm is located consists of the Allentown Formation, a fine to medium-grained, light-medium gray, rhythmically bedded dololutite, doloarenite and dolorudite. The dolomitic bedrock is of Cambrian age. The rock is overturned toward the northwest in the study area due to drag folding beneath the Losee thrust sheet (Drake et al, 1996).

The soil overburden consists of silt loam soil developed over limestone (Duffield silt loam; U.S.D.A. 1974). A typical profile would consist of dark brown silt loam 9" thick; a friable, dark yellowish-brown silt loam subsoil approximately 32" thick; and a lower substratum of gray loam with 70% dolomite clasts. Bedrock is located 6-8' below grade.

Hydrogeologic Setting

The origin of the ABC spring is believed to be near the top of the Musconetcong Mountain, where a large spring resurge area is located. Spring water flows down the west side of the mountain and then disappears beneath regolith. The spring resurges at the base of the mountain as a small stream, but it is believed that the majority of the water continues underground as part of the local groundwater flow system. A fracture trace analysis (Lattman & Parizek, 1964) conducted in the study area revealed an orthogonal fracture pattern having major fractures developed in the dolomite bedrock striking northwest and northeast. The described source of the spring near the top of the Musconetcong Mountain is hypothesized to be connected to the ABC spring by underground channel flow through intersecting fractures within the regional bedrock fracture system.

The flow path for groundwater supplying the ABC spring is believed to be along a northeast striking fracture zone, which connects the spring inside the Spring House to the springs uncovered in the trench. The bedding strike of bedrock is also parallel to this fracture zone. During periods of high spring flow, another spring resurges in the barnyard between the Spring House and the springs in the trench. All three of these springs can be connected by a single line drawn paral-

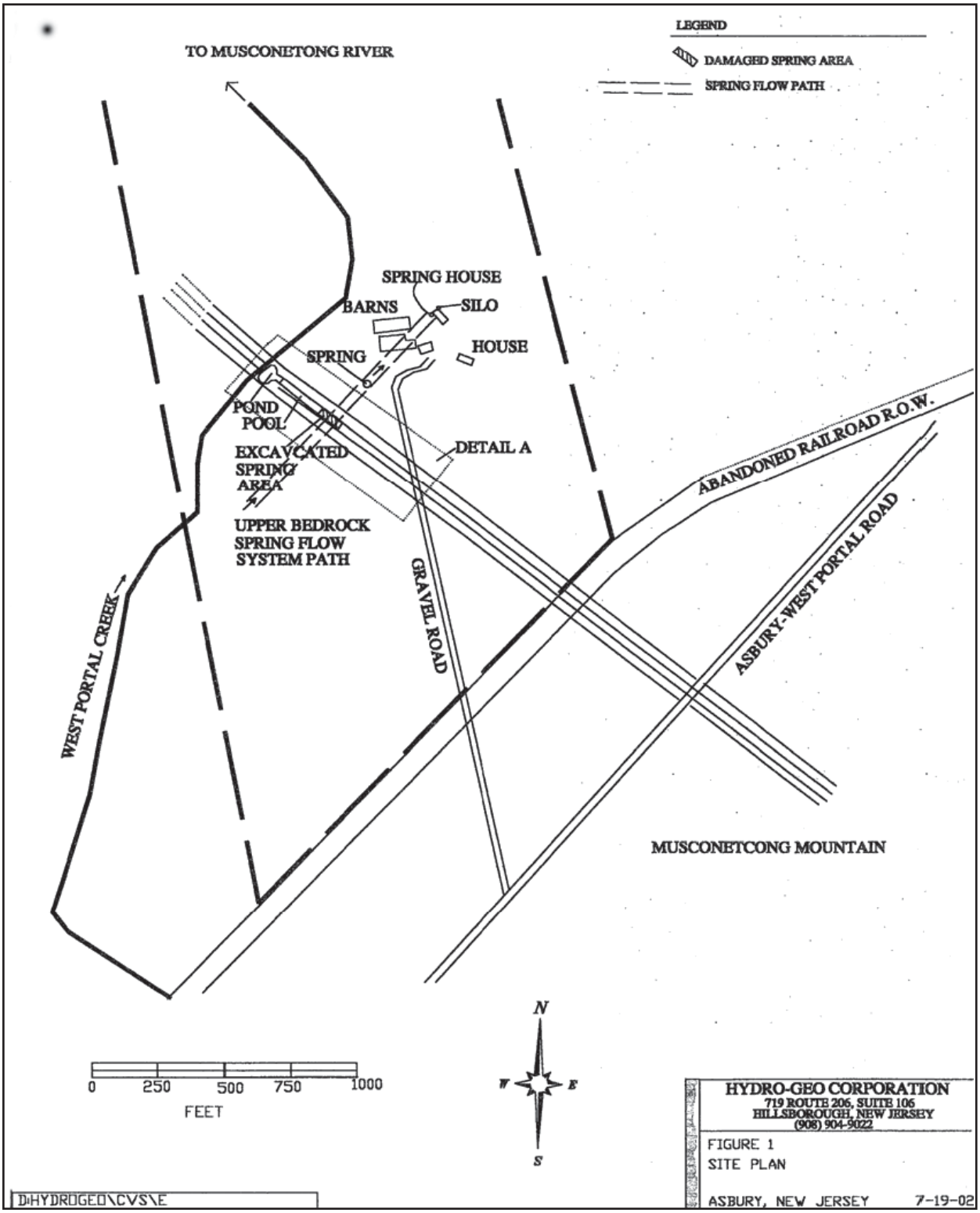


Figure 1. Site Plan. Shows major site features including the Spring House, barns, excavated spring area and location of Detail A shown on Figure 2.

lel with the strike of the fracture trace (see Figure 1).

Impact To Spring Water Quantity And Quality

As stated previously, spring water flow to the Spring House decreased from approximately 150 gpm to 40 gpm following the damage to the spring flow path caused by the excavation of the overburden confining layers. After the damage occurred, approximately 100 gpm were estimated to be flowing down the trench, accumulating in the lower end then flowing or being pumped into an adjacent stream.

The confining layer consisted of weathered bedrock within which solution channels had been dissolved between bedding surfaces in the fractured dolomite bedrock. Approximately 6' of overburden soil

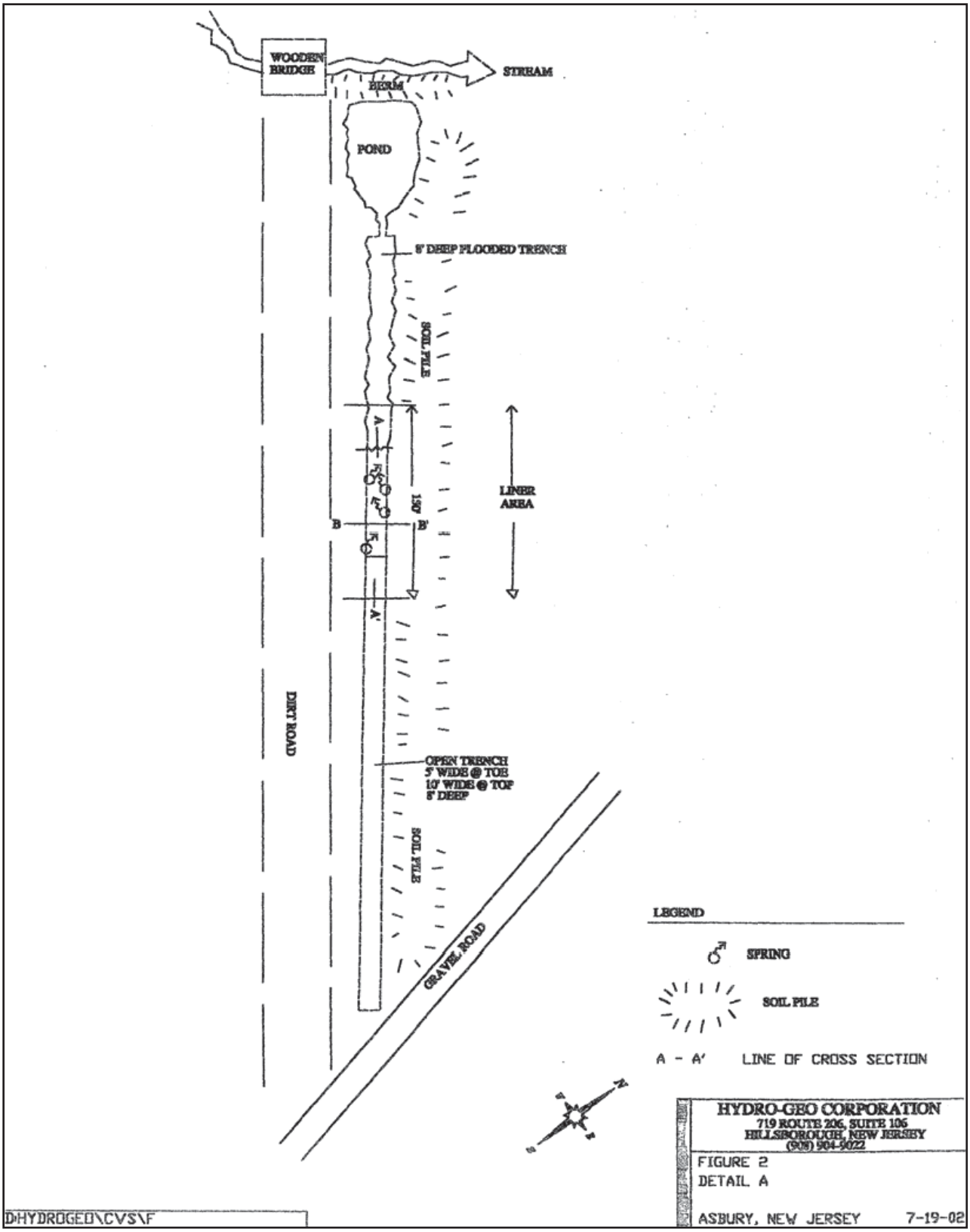


Figure 2, Detail A. Shows the locations of springs uncovered by the trenching and the location of sections A–A' and B-B', presented as the cross sections in Figure 3.

consisting of silt loam also contributed to the confining conditions. The proof that this flow path was the conduit that provided spring water to the Spring House is provided by the fact that the reconstruction of the confining layer increased the flow to the Spring House to near the predamage conditions during the six month period following the seal installation.

In addition to the decreased spring flow, fecal coliform bacteria began to

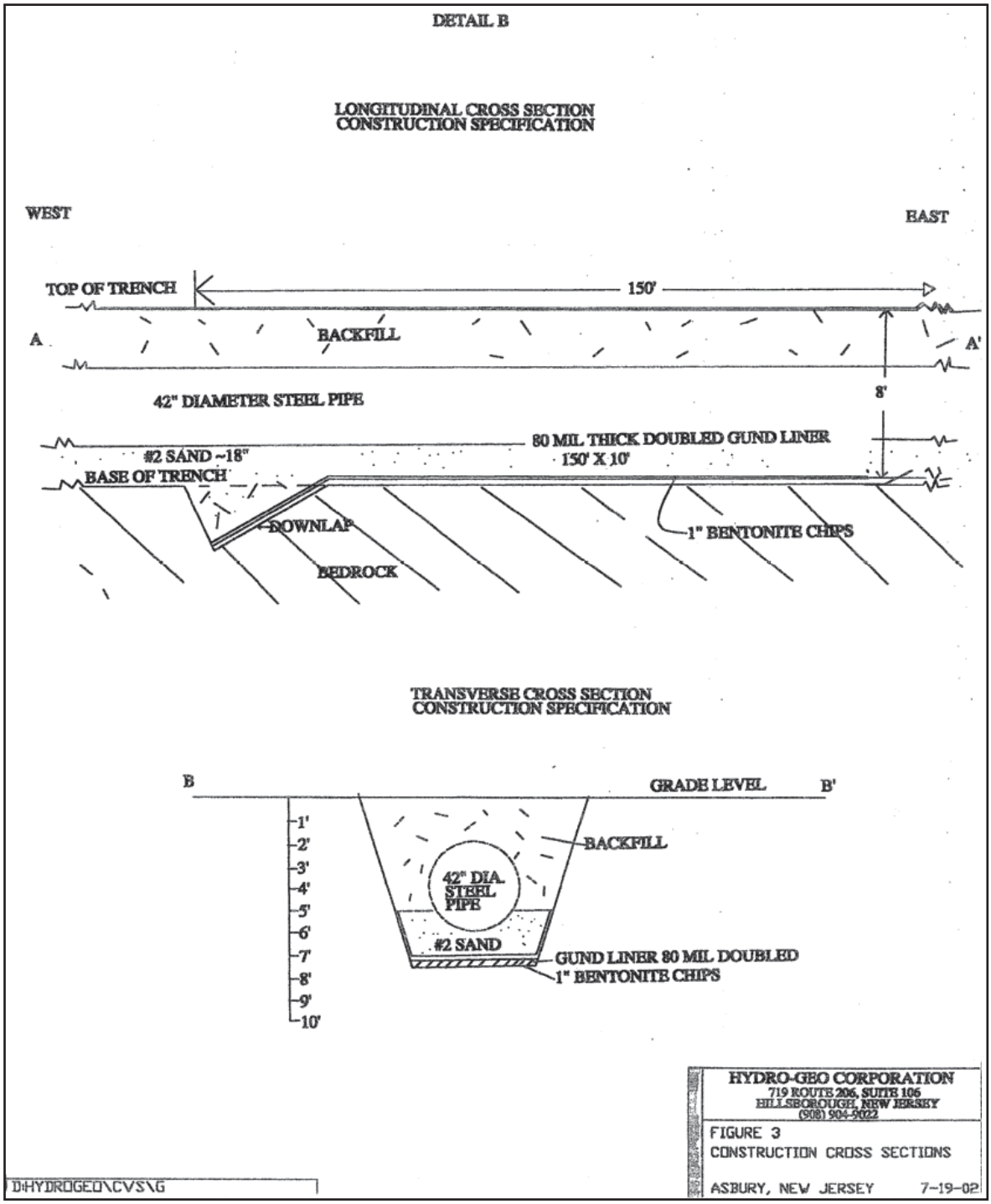


Figure 3, Construction Cross Sections. Detail B shows sections A-A' and B-B'.

be detected in the spring water. The commercial use of the spring water due to the quality impact was interrupted. The Spring House had to be sanitized using chlorine and the water tested daily before the bacteria were removed. The bacteria reappeared within days of the chlorine sanitation.

Prior to the damage to the flow path, bacteria were rarely detected in the spring water. As described earlier, the main spring flow path traveled beneath a section of the dairy barnyard before entering the Spring House (see Figure 1). When the hydraulic pressure in the confined spring water flow path was at its normal predamage conditions, the hydraulic head within the confined flow zone was greater than that in the overlying material resulting in an outward flow gradient. That condition precluded ground/surface water and any bacteria therein from entering the flow system. When this hydraulic gradient was reversed due to a major quantity of spring water being diverted from the normal flow path, surface water carrying bacteria from the barnyard was allowed to mix with the reduced spring water flow. The contaminated spring water then entered the Spring House resulting in the presence of coliform bacteria in the spring water.

Trenching Activities

XYZ contractors excavated an open trench across the farm that was approximately 8' in depth and 5' wide at the base and approximately 10' wide at the top (see Figures 2 and 3). The trench continued to the east off the property and over the Musconetcong Mountain and to the west across the valley and over the western mountains. The base of the trench was excavated 2-3' into the upper weathered bedrock surface using a trackhoe. As shown on Figure 2, at least four springs were noted as occurring in the base of the trench. These springs were open channel flow emanating from cracks between bedding planes in the dolomitic bedrock. These springs were located in an area approximately 20' in length along the base of the trench. The entire area including the springs was saturated and spring water was percolating to the surface, then flowing downstream and pooling at the west end of the trench. That part of the trench uphill of the springs was dry. Spring water was seeping into the trench by both open channel and intergranular flow.

Spring Repair

The repair of the damaged spring water flow path involved replacing the confining layer prior to the laying of the pipeline into the trench. The confining layer was reproduced using a layer of sodium bentonite clay placed below two layers of GUNDSEAL, a polyethylene/bentonite seal material used for covering landfills to keep rainwater out. The GUNDSEAL was obtained from GSE Lining Technology, Inc. in Houston, TX. The seal was then to be covered by sand onto which the 42" diameter steel pipeline was to be immediately installed and covered. Refer to the trench diagram (Figure 2) for a plan view of the affected area and to the construction cross sections (Figure 3) for details.

The following sequence of events was followed in order to construct the confining seal:

1. The ponded water in the trench was pumped out in order to expose the work area.
2. Using a trackhoe, the bottom of the trench was cleaned of loose soil for an area 150' in length and 5' wide, centered over the damaged spring area.
3. A layer of bentonite chips (Hole Plug) approximately 2" in thickness was placed wall to wall along the base of the trench in order to smooth out irregularities under where the GUNDSEAL was to be placed. As the bentonite was placed, it was partially hydrated with water.
4. After the bentonite layer was placed and hydrated, two layers of GUNDSEAL were placed into the trench. The GUNDSEAL consisted of a sandwich of bentonite approximately 0.5" thick having 80 mil (2 mm thick) outer layers of polyethylene sheeting enclosing the bentonite core. The layers of GUNDSEAL were 8.5' in width and 150' in length and weighed approximately 4,300 lbs. The edges of the seal were lapped onto the sides of the trench.
5. After the GUNDSEAL was placed into the trench, a 12" layer of bedding sand (#2, clean without rocks) was carefully placed above the seal.
6. When the seal had been placed into the trench for the entire 150' length, a downlap was constructed at the down gradient end. This was accomplished by excavating a ramped hole approximately 3' in depth into the trench floor. The bentonite and seal lapped downward into this hole and after backfilling, formed a closed end on the down gradient end of the seal. The downlap excavation was then backfilled with native overburden material (clayey silt, rock-free) then finished with sand. The purpose of the downlap was to allow hydraulic pressure to build up beneath the seal. The downlap was intended to prevent water from flowing beneath the seal then down the trench.
7. As soon as the seal was constructed and sand was placed, the pipe was to be placed into the trench and the remainder of the excavation backfilled with native soils, completing the confining conditions.

Unfortunately, the placing of the pipe into the trench did not take place until several days after the seal was constructed. This delay resulted in spring water flowing out from beneath the seal and around the edges of the downlap to pond at the lower (west) end of the trench. It is believed that this delay in the construction schedule allowed the spring water flow to wash out some of the underlying bentonite layer creating leaks beneath the GUNDSEAL. Within approximately two weeks after the pipeline was installed and the trench backfilled, spring flow within the Spring House increased from approximately 40 gpm and became steady near 100 gpm.

During September 2002, the soil at the lower end of the backfilled trench became saturated at the surface approximately 200 feet down gradient of the downlap end of the seal. It was hypothesized that some of the spring water was flowing around the seal downlap and resurging in the wet area. In order to attempt to repair the downlap and recover additional flow to the Spring House, a grout curtain was installed.

Four boreholes approximately 8" in diameter were augured adjacent to the downlap and the pipeline; two on either side to refusal at approximately 8' below grade. Each borehole was then used to inject a 1:15 mixture of sand and cement into the subsurface adjacent to the downlap. An inflatable packer was placed inside of the hollow-stem auger and cement was pumped under pressure by the driller through the bottom of the auger as it was slowly raised out of the borehole. It is estimated that at least 25% more cement was used than what was calculated for the volume of each borehole. A grout curtain was constructed using this method adjacent to the downlap and the pipeline. This curtain appeared to work since the saturated zone at the lower end of the trench area disappeared and the flow to the Spring House steadily increased to approximately 150 gpm over the next month.

Conclusions

There was a direct correlation between the increase in spring flow within the Spring House and the placement of the repair seal and later the grout curtain. This direct effect supports the hypothesis that the flow path along which spring water flowed to the Spring House was indeed along the fracture zone previously identified in the fracture trace analysis. Spring water quality also improved to pre-damage conditions after the confining conditions and hydraulic pressure gradients in the spring flow system were reestablished.

The restoration of spring water flow due to the reconstruction of the confining layer was successful in this case due to the shallow flow path of the spring system. The application of this method to other spring restoration attempts will depend upon site-specific hydrogeologic conditions.

References

Drake, A.A. et al, 1996. Bedrock geologic map of northern New Jersey, U.S.G.S. Map I-2540-A.

Lattman, L.H. and Parizek, R.R., 1964. Relationship between fracture traces and the occurrence of groundwater in carbonate rocks, Journal of Hydrology, vol. 2, pp. 73-91.

United States Department of Agriculture, 1974. Soil Survey of Hunterdon County, New Jersey, by C.F. Jablonski.

Stephen E. Laney, M.S., P.G., CPG-07519 received his B.S in geology from Arkansas Tech University in 1977 and his M.S. from the University of Arkansas, Fayetteville in 1980. Since graduating, he has worked as a mining geologist involving coal, base and precious metals exploration in Texas and Colorado and then as an environmental geologist, specializing in hydrogeology in New Jersey.

NEW FROM THE USGS...

SIR 2006-5298. OHIO. Use of Spatial Sampling and Microbial Source-Tracking Tools for Understanding Fecal Contamination at Two Lake Erie Beaches. By Donna S. Francy, Erin E. Bertke, Dennis P. Finnegan, Christopher M. Kephart, Rodney A. Sheets, John Rhoades1, and Lester Stumpe1, 29 pages. Available from the U.S. Geological Survey Earth Science Information Center, Open-File Reports Section, Box 25286, MS 517, Denver Federal Center, Denver, CO 80225, USGS Scientific Investigations Report 2006-5298, 29 p., 12 figs. http://pubs.water.usgs.gov/sir2006-5298/.

Fact Sheet 2006-3147. KANSAS. Harmful Algal Blooms. By Jennifer L. Graham, 2 pages. U.S. Geological Survey, Information Services, P.O. Box 25286, Denver Federal Center, Denver, CO 80225. http://pubs.water.usgs.gov/fs2006-3147/.

SIR 2006-5059 Ground-Water Quality in Unmined Areas and Near Reclaimed Surface Coal Mines in the Northern and Central Appalachian Coal Regions, Pennsylvania and West Virginia. Available from the U.S. Geological Survey Earth Science Information Center, Open-File Reports Section, Box 25286, MS 517, Denver Federal Center, Denver, CO 80225, USGS Scientific Investigations Report 2006-5059, 57 p., 12 figs. http://pubs.usgs.gov/sir/2006/5059/.

TM 5-B4 Determination of wastewater compounds in whole water by continuous liquid–liquid extraction and capillary-column gas chromatography/mass spectrometry. By Steven D. Zaugg, Steven G. Smith, and Michael P. Schroeder, 30 pages. Available from the U.S. Geological Survey, Information Services, Box 25286, Denver Federal Center, Denver, CO 80225. http://pubs.usgs.gov/tm/2006/05B04/.

SIR 2006-5307. KANSAS. Sedimentation and Occurrence and Trends of Selected Chemical Constituents in Bottom Sediment, Empire Lake, Cherokee County, Kansas, 1905-2005. By Kyle E. Juracek, 79 pages. http://pubs.water.usgs.gov/sir2006-5307/.

USGS Toll-Free Information
1-888-ASK-USGS (1-888-275-8747)
or http://www.usgs.gov

Aggregate Resources, Development and Extraction in the United Kingdom

Richard Fox, CPG-09571

Abstract

The quarrying of aggregates has always been the "Cinderella" of the United Kingdom mining industry, with little to impress the public, although it is the largest sector of the national mining industry with nearly 250 million tonnes of aggregate products sold annually. It commonly suffers from a hostile press and popular opposition when operational expansion or new developments are proposed. "Greenfield Projects" draw particular negative attack.

Regional Mineral Planning Authorities are charged to identify sufficient aggregate resources to supply local markets for decades ahead. There is a steadily growing market demand for sand & gravel, limestone, and granite to satisfy the demand for virgin aggregates. The "Aggregate Levy" introduced in 2002 has encouraged the use of recycled materials for some construction projects, but even combined virgin and recycled materials are now unlikely to supply adequate future aggregate needs.

Restored land-based quarries are today reclaimed for agriculture, forestry or industrial purposes as well as popular recreational settings such as nature reserves, fishing lakes or leisure activities for use as sailing and rowing facilities. Since the 1960's, sand & gravel dredged from the coastal seabed surrounding England and Wales has become an important source of aggregates in those parts of the country where port facilities are available.

Growing environmental regulatory legislation at both United Kingdom and European levels has resulted in increased operating costs. Various constraints such as ecology, hydrogeology, and archeology have become ever costlier hurdles to overcome. These are now common obstacles throughout the developed world as the public carefully scrutinizes any form of development that results in a change of land use.

Greater government and public support must be gained for the aggregate industry and its much needed development. Aggregate reserves must be replaced as the population increases for the United Kingdom to support its own future growth. Indeed, "sustainable growth" turns out to be just as much a responsibility for government and the public as for industry and the individual aggregate producers.

Introduction

Workers in the Aggregates Industry are discouraged that the public has little serious interest in aggregate production and availability and how they act to improve the quality of life in the developed and developing nations.

It is necessary first to be clear on what we mean by aggregates. The Geological Society Engineering Group working parties define "aggregates" (Smith & Collis, 2001) as:

"… particles of rock which when brought together in a bound or unbound condition, form part or the whole of an engineering or building structure."

Natural sand, gravel, and crushed rock aggregates are fundamental to the man-made environment and represent a large proportion of the materials used in the construction industry.

Recycling of aggregates has been well established for many years, and more recently the substitution of natural aggregates by artificial aggregates made from waste products of other industries is making its contribution to meet demand. This trend is being encouraged by United Kingdom (UK) and many European national governments.

Sadly, the public takes for granted the thousands of kilometers of gravel roads and paved highways covering the nation. Whether we travel by foot, horse, carriage or high-speed automobile, the need for road networks is never fully satisfied. Indeed, we are a society very dependent on ease of mobility, expecting to reach any destination conveniently and quickly.

The process of constructing transportation routes is not limited to present day society and can be traced back to the engineered roads of the Incas in South America and to even more prehistoric paths and tracks (Bobrowsky, 1998). We should also remember the impact of Roman road construction on the commercial integration of Europe some 2,000 years ago.

The important role of aggregates in society will not diminish in the future either. Available sources of aggregates are constantly under threat from competing land uses, encroachment by residential and commercial construction, and simply over-exploitation.

Aggregate resources rarely occur in convenient places, and costs involved in developing and transporting aggregates from source areas to sites of intended use are steadily increasing. By their very nature, aggregates are high-volume, low-value materials whose intrinsic value will not support high development and transportation costs.

Snapshot of the UK Aggregate Industry

The UK aggregate industry includes a range of enterprises, from multinational companies with staffs of thousands to small family-owned and operated businesses with just a handful of employees. There are more than 1700 quarries in the UK and indeed quarrying represents a major extractive business across the UK and Continental Europe.

Some recent statistics for Europe in Table 1 show the fluctuations that have occurred in the sales of aggregates over the past 14 years. Aggregate production in many countries has shown a downturn in recent years, except for France, Ireland, and Spain, where the European

Table 1
Construction Aggregate Sales Statistics in Europe
(Excluding Material Used as "Fill" in Construction)
Million Tonnes

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Austria									70.0	70.0	70.0	70.0	65.0	65.0
Belgium	49.0	40.3	39.5	42.0	42.0	52.0	54.0	50.0	39.3	37.0	42.0	42.4	35.0	36.0
Czech Rep.									45.0	40.0	40.0	42.0	44.0	47.1
France	386.1	395.4	401.8	370.0	340.0	367.0	366.0	337.0	346.0	357.0	375.0	399.0	395.0	387.0
Finland	96.0	88.0	81.8	68.0	60.0	68.0	68.0	64.0	n/a	n/a				
Germany	692.0	660.9	681.0	741.0	748.0	802.0	760.0	725.0	703.0	680.0	725.0	670.0	610.0	583.0
Holland	36.3	31.0	31.7	27.0	27.0	27.0	25.0	25.0	n/a	n/a				
Hungary									25.0	25.0	20.0	22.5	23.0	26.8
Ireland (Rep)	19.7	20.2	18.6	19.0	19.4	19.3	19.8	20.0	42.0	43.3	48.0	52.3	52.0	50.0
Portugal	Figures not available but aggregate market estimated at around 65 m.t.p.a								95.0	90.0	85.0	90.0	95.0	90.0
Spain	213.0	234.0	239.6	210.0	185.0	212.0	227.0	225.0	245.0	300.0	320.0	352.0	379.0	397.0
Sweden	99.0	100.0	92.7	80.0	72.0	83.0	83.0	83.0	n/a	n/a				
UK	318.5	295.6	264.2	252.5	239.0	259.0	241.0	215.0	220.0	218.0	208.0	205.0	206.2	200.0

Source - RMC Group plc

Table 2
Selected Aggregates Sales and Links to Population

Country	Population (millions)	Sales in 2002 (million tonnes)	Tonnes per capita
Australia	20.0	110	5.5
Canada	31.0	320.0	10.3
France	59.0	388	6.6
Germany	82.0	588	7.2
Ireland (Rep)	3.5	50.0	16.4
Norway	4.5	50.0 (approx)	11.1
Spain	39.4	397	10.1
UK	59.4	200	3.4
USA	273	2690	9.9

Union (EU) has apparently buoyed up the industry.

On a worldwide basis it is interesting to compare aggregate sales in 2002 to both population and the demand per capita to other countries well ahead of the UK in aggregate sales (see Table 2).

It is also significant that some of the larger companies with a worldwide spread of activities (see Table 3) have managed to survive the downturn in local markets as over-supply and low prices have affected profit-margins, in the increasing fragility of the major economies of the world (see Table 3).

Many companies in the UK have cut costs and streamlined operations, often leading to moth-balling of some plants and a severe curtailing of new project spending. The larger companies have also moved away from diversified operations, concentrating on their international "core business" and increasing their level of vertical integration. Companies are now producing cement, aggregates, concrete, and allied products together to gain greater entry to the available markets.

While working with the RMC Group, the author observed its expansion into waste disposal in the early 1970's, as well as diversification into fish farming, leisure park operation, farming and even viticulture in an effort to penetrate promising new markets and to survive (see Figure 1).

Figure 1. Industrial waste disposal in dry gravel workings with clay liner (Courtesy RMC Group).

The RMC Group pursued a strategy of vertical integration and concentration on the core business by acquiring the well-established Rugby Cement Group in 2000, making RMC the third largest

Table 3
Some of the Larger Companies Producing Aggregate, Readymixed Concrete, and Cement Worldwide (as at 2002)

Company	Turnover (£ million)	Aggregate Units	Cement Plants	Readymixed Concrete Plants
Aggregate Industries	1,378	142	-	164
Cement Roadstone Holdings	7,500	530+	12	327
Hanson	4000+	420+	3	830+
Lafarge	13,130	674	115	1,078
RMC Group	5000+	400+	55	1,500
Tarmac	1,800	130	1	243

building materials company in the world and the largest producer of ready-mix concrete. By way of comparison, in 2004 the Lafarge Group still holds the No. 1 position in the world in cement production and also No. 2 in production of both aggregates and concrete.

Planning Control and Development Constraints

Raw materials are the lifeblood of the UK quarrying industry – but without planning permission for extraction, they are worthless.

A key factor in any development plan is the geological availability of aggregate resources as inventoried by government surveys. The British Geological Survey has played a vital role in providing reliable data for assessment of aggregate mineral resources, specifically sand & gravel and hard rock, by private companies and government agencies. Many of the British Geological Survey's Mineral Resource Maps on 1:25,000 and 1:50,000 scales are unique in Europe.

In contrast, the French National Geographic Survey has produced 1:50,000 scale maps to show the distribution of aggregates and the location of principal quarries. In Germany, geologic mapping at a scale of 1:200,000 shows the location and types of surface industrial mineral deposits together with new types of thematic mapping based on archival data. In Norway, sand & gravel and hard-rock aggregate maps on a scale of 1:200,000 are available to assess the resources, and the national policy is to promote quarrying by tax incentives, particularly of coastal quarries to encourage exportation to the UK and mainland Europe (Sturt and Neeb, 1997).

Although conventional geologic maps are still their principal output, most national Geological Surveys have moved away from maps which cannot be modified after they have been printed. Instead, the geological survey methods are adapted to meet the requirements of information technology, and the data is now held in graphical/digital form immediately available and more flexible for users.

This flexibility has been a great advantage to current planning policy in the UK so that "aggregate demand can be met subject to the best balance of social, environmental, and economic cost." Knowing where the aggregates occur is vital to good planning, and more demand for quarried materials does not necessarily mean a degraded environment.

The constraints to development, however, are commonly lumped together under "environmental", "eco-terrorism," or the "anti-development lobby" in the UK and continental Europe. Similar attitudes are observed in North America, Australia, and New Zealand. These forces are quick to pin their hope on national or state legislation related to environmental impact to fight their causes. The common NIMBY (Not in My Backyard) Principle is given considerable support by the popular press and it has been very effective in preventing aggregate quarry development.

Types of Extraction

Land Based Extraction

The business of mineral extraction involves a number of technical and cost-sensitive steps including overburden/waste removal and disposal, blasting and excavation, and final product transport to markets. Judicious selection and scheduling of mining equipment, reclamation and overall environmental protection are important supporting steps (Smith and Collis, 2001).

The methods and equipment employed to extract aggregates depend primarily on the type of deposit or source rock being worked. The selection of particular techniques and machines requires consideration of a number of factors, especially the degree of consolidation or induration of the deposit.

Many types of sedimentary rock and most igneous and metamorphic rocks require drilling and blasting to reduce the rock mass to a fragment size which can be dug from a blasted face, as shown in Figure 2. In quarrying jargon, these deposits are usually known as "hard rock".

Figure 2. Carboniferous Limestone Quarry, at Wick, Near Bristol (Courtesy RMC Group).

Sand and gravel and some conglomerates are unconsolidated or weakly consolidated and may be excavated directly from the ground by high-powered machines without the need for blasting, as shown in Figure 3.

Figure 3. Drag-line excavation in glacial sands and gravels at Ware, Hertfordshire and transport by dumper truck to processing plant (Courtesy RMC Group).

The change and rapid growth in the aggregate industry in the UK and indeed most of the world have required considerable changes in the equipment used.

Output from sand & gravel pits in the UK is generally between 50,000 and 500,000 tonnes per year, although exceptional outputs exceeding one million tonnes are becoming common. Limestone

and hard-rock quarries typically have a wider range of production, from smaller units of 100,000 tonnes per year to "super quarries" capable of producing 10 million tonnes per year.

In the United States, sand & gravel pit outputs exceeding three million tonnes and crushed-rock quarries exceeding five million tonnes per year are becoming common. Some 478 operators produce over one million tonnes per year of crushed-rock aggregates compared to only 206 producing more than one million tonnes per year of sand & gravel (Langer, 2002).

The most significant changes are found in the developing countries of the world. Here the largely labor-intensive extraction and processing techniques of the past are being replaced by fleets of modern equipment and employment of modern mining methods to produce aggregates.

Factors which influence the selection of both equipment and the working methods employed include the physical properties of the rock, particularly density, impact strength, abrasiveness, and the required rate of production.

Regardless of the source of the aggregates, there are four basic steps to be considered in extraction:

1. Overburden removal and face preparation;
2. Primary fragmentation;
3. Digging and loading; and
4. Hauling to the processing plant.

Marine Aggregate Extraction

The formation of marine sand & gravel deposits varies according to their location on the continental shelf of Great Britain (BMAPA, 1995). During the Pleistocene Ice Ages, rivers including the ancestral Thames and the Rhine, together with their tributaries, extended across the continental shelf, transporting and depositing sand & gravel in their valleys. Since these former rivers also flowed on the present land mass of Great Britain, sand & gravel quarried in present river valleys commonly have the same characteristics and composition as those offshore, being simply the upstream equivalents of those deposits now submerged on the sea floor. Off-shore in the Humber Estuary, the sand & gravels largely originated from the glacial action during the Pleistocene epoch when huge ice sheets covered northern Britain and the adjacent continental shelf.

During the post-glacial period, when global temperatures rose, the ice sheets melted and retreated, allowing a massive release of water which resulted in a rise of sea level that ultimately submerged the entire continental shelf and shaped the coastline of Great Britain.

The greatest demand for sand & gravel in the UK is in the southeast of England and consequently present activity in the marine aggregates industry is concentrated in the North Sea and the English Channel (see Figure 4).

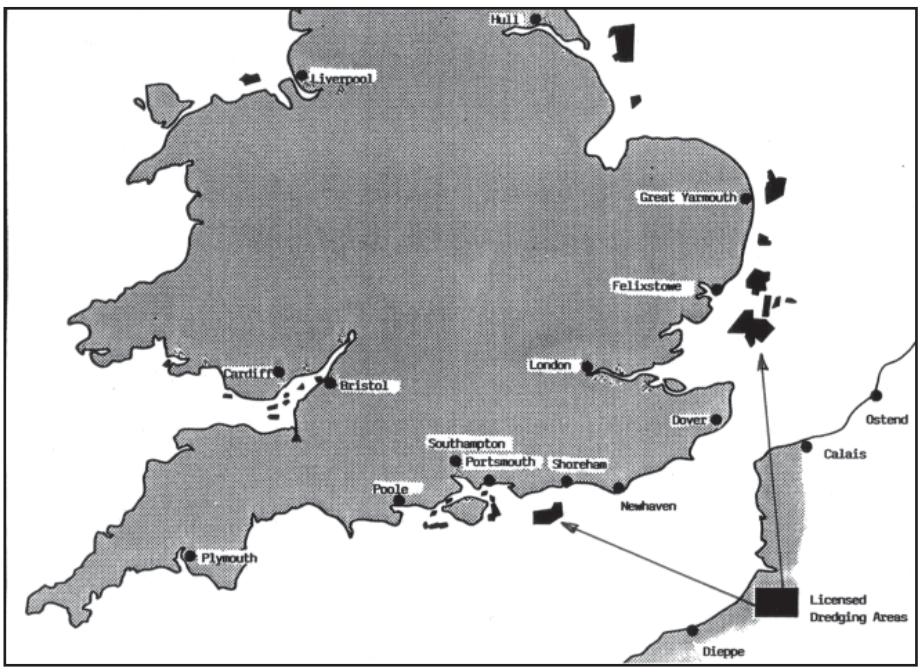


Figure 4. Location of the off-shore dredging areas on the UK shelf (After Fox, 1993).

There are strict controls governing marine aggregate extraction. Licenses to extract material are issued by the Crown Estate Commissioners, as landlords, and the current dredging areas are mostly in the Thames Estuary and along the south coast eastward of the Isle of Wight. (Fox, 1993). Other marine extraction areas to supply local markets are sited off the West Coast near Bristol and Liverpool. Some small licensed areas in Scotland in the Tay Estuary and Moray Firth were mined by marine dredging but are no longer active.

Two important factors that limit the amount of sand & gravel that can be economically extracted from the seabed are:

1. The depth of the water in which the deposit occurs; and
2. The distance of the deposit from the port to supply the market.

The government oversees the strict controls that govern marine aggregate extraction.

Two principal types of gravel dredgers have evolved over the past 50 years, namely the anchor (or stick) dredger and the trailer dredger (Fox, 1993) (see Figures 5 and 6). The former does not move other than to periodically winch itself across the seabed a few meters at a time to maintain a flow of sand & gravel. In contrast, the trailer dredger works "underway" in a process that resembles carpet sweeping, trailing the pipe along the seabed at a speed of 1 to 3 knots.

The modern dredger costs about £25 million and is a highly-sophisticated ocean-going vessel capable of sucking up to 2,500 tonnes per hour of sand and gravel from depths up to 50 meters. Prior to 1965 very few dredgers could transport 1000 tonnes, but the modern vessels have a capacity to load up to 10,000 tonnes into their holds (see Figure 7).

Increased pumping capability of the new ships now makes it possible to dredge in 50 meters of water, and currently a consortium of companies has been granted a license to dredge in the eastern English Channel where water depths are of that order. There are four ways a dredger can discharge its cargo at the ports:

1. Use a ship or shore-based grabbing or hydraulic crane;
2. Use a ship-mounted scraper and conveyor system discharging mate-

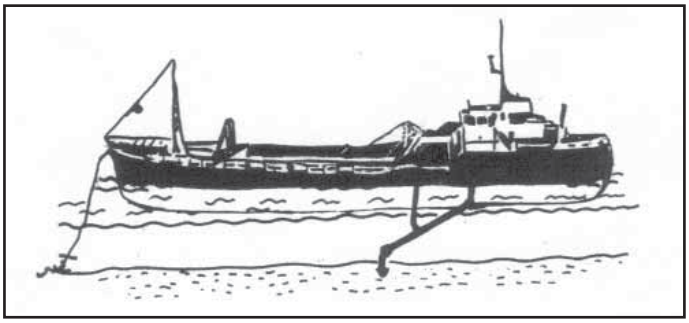


Figure 5. Anchor (or stick) dredgers (After Fox, 1993).

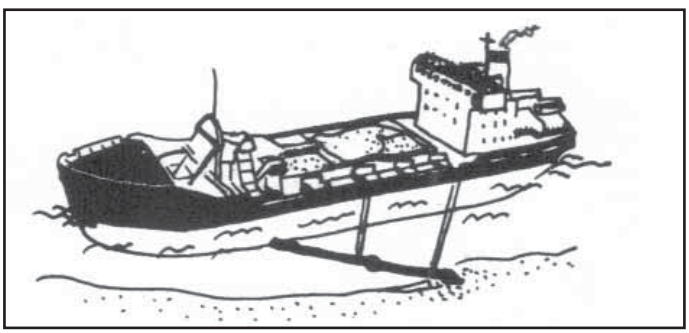


Figure 6. Trailer dredger (After Fox, 1993).

rial directly to the wharf or to stockpile using a shore-linked conveyor;

3. Use a ship-mounted bucket wheel excavator discharging to a shore-linked conveyor; or
4. By pump discharge.

Initially in the 1960's and 1970's there was concern that the use of marine aggregates in various forms of concrete could have negative long-term structural impacts, but their reliability has been proven over many years to meet British and European standards.

The supply of marine sand & gravel to the total market in England and Wales is currently some 20million tonnes per year, with an additional two to three million tonnes exported to the Continent.

The Future

An adequate supply of aggregates of the right quality is essential in the construction and maintenance of serviceable, safe, durable and cost-effective building and civil engineering works. Quarrying is a major industry with some 1,700 pits and quarries in the UK producing materials valued at £3 billion per year. Recycling currently contributes 45-50 million tonnes per year on top of primary aggregates of some 200 million tonnes (2002 production) for a total UK market of 250 million tonnes per year. Indeed, the construction industry contributes about ten percent of the nation's Gross Domestic Product (GDP) (Quarry Products Association, 2001).

Public opposition and concern to most quarrying not only constrains the future production capability of the aggregate industry but also derails the whole concept of "sustainable development" that industry is being urged to pursue for the future (Highley et al, 2003). Adding to the woes of the aggregate industry was the introduction of the "Aggregate Levy" by the UK Government in April 2002. At £1.60 per tonne on any primary aggregate (land-based, sea-dredged or imported) sold in the UK, this has had a significant negative impact on the costs of construction materials to the public. There has been continuing objection to the levy from the aggregate industry, as it ironically supports the environmental causes rather than help replenish future reserves!

Figure 7. Modern dredger with bucket wheel discharge facilities (Courtesy RMC Group).

As recently as 30 years ago an aggregate development could achieve planning consent within 6 to 12 months of a planning application being submitted. Today any attempt to obtain consent for a 'greenfield' site can take 5 to 10 years before development commences. A complex mix of specialist groundwater, ecologic, archeologic, etc. studies followed by a thicket of public comment and opposition complicates the permitting process. No relief from this is apparent in the future.

The possibility that coastal super quarries in Scotland, Norway, Ireland, and northern Spain will gain substantial aggregate market shares throughout northwest Europe in the future as demand increases is certain. However, it is likely to be the giant multinational companies who have the vision and patience to pursue investments needed for these projects that will dominate this international production and sales. Another daunting logistics problem facing international shippers is the off-loading of up to 50,000 tonnes into a market area, and the need to find wharves to handle such quantities as well as large numbers of trucks to move aggregate products from wharf to markets.

Conclusions

The aggregate industry in the UK effectively supplies the nation's construction materials needs through land-based and marine dredging operations. But increasing population and increasing NIMBY resistance and government reticence in permitting new sources is limiting the capability of the major aggregate producers to sustain this development into the future.

Greater government and public support must be gained for the aggregate industry and its needed development. Public apathy toward quarrying, why it is essential, and what it has achieved in the UK over centuries will reap decline in the construction industry when national growth is burgeoning and seeking long-term stability. Increasing aggregate imports from Scandinavia and other European countries may gradually replace domestic production – but to the detriment of the construction industry by higher costs and restricted availability.

Aggregate reserves must be replaced as the population increases for the nation to support its own future growth. Indeed, 'sustainable growth' turns out to be just as much a responsibility for government and the public as for industry and the individual aggregate producers.

References

Bobrowsky, Peter T., 1998, Aggregate resources in global perspective. In Bobrowsky (Ed) Aggregate Resources - A Global Perspective. A.A. Balkema, Rotterdam, Netherlands.

BMAPA, 1995, Aggregates from the sea. Why Dredge? British Marine Aggregate Producers Association Second Edition, London.

Fox, Richard A., 1993, The Offshore Aggregate Industry in the UK. Underwater Technology, Society for Underwater Technology, Vol. 19 No. 2 London, UK.

Highley, D.E., Chapman, G.R. and Bohel, K.A., 2004. The Economic Importance of Minerals to the UK, Keyworth Nottingham. British Geological Survey.

Langer, William H., 2002, An overview of aggregate resources in the United States. In Scott and Bristow (Eds). Industrial Minerals and Extractive Industry Geology. Geological Society, London.

Smith, M.R. & Collis, L. (Eds), 1993, Aggregates - Sand, gravel and crushed rock aggregates for construction purposes. Geological Society, Engineering Geology Special Publication, 9, Geological Society, London.

Sturt, Brian and Neeb, Peer-Richard, 1997, Norways coastal aggregates. Quarry Management, Nottingham, UK, March.

Quarry Products Association, 2001, What's in a quarry? London, UK.

Richard Fox is a Consultant Geologist specializing in construction materials through his Company, Richard Fox & Associates Ltd, based in Windsor in the UK and formed in 2000. He worked for over 30 years for the RMC Group before taking semi-retirement in 2000. He is an Honorary Member of the AIPG, a Certified Professional geologist, CPG-09571, a Fellow of the Geological Society of London, a Chartered Geologist, and a European Geologist. He is a Past President of the European Federation of Geologists, and has served on many Committees of the Geological Society and the European Federation of Geologists over recent years. He can be contacted via richard.fox@rfoxassociates.co.uk

Using Vapor Barriers to Prevent Vapor Intrusion

Robert Carvalho, CPG-10588 and Heather Martin

Abstract

Numerous construction projects in the United States have been built on sites that have a potential or real concern of vapor intrusion into buildings due to prior use or other concerns. Vapor barriers have become an important tool that is used to prevent the vapors from migrating into the structures. These barriers are often used in conjunction with traditional passive or active remediation systems as an added precaution for sites with vapor concerns. Two vapor barrier systems, high-density polyethylene (HDPE) sheet liners and fluid–applied Liquid Boot®, are outlined. Vapor barriers prevent hazardous gas migration and thereby reduce the liability of building on brownfield site.

Key Words

Vapor barrier, environmental liners, geomembranes, vapor intrusion, brownfields, landfills

Text

Brownfields are properties that are abandoned, idled, or under-used due to "real or perceived environmental contamination." Over the last decade, as the number of properties across the country characterized as brownfields rose to over a million, and as policy has shifted towards smart growth and limiting urban sprawl, there has been an increased implementation of current technologies to safely build on and redevelop these sites. A commonly used technology is the vapor barrier.

General Background – Vapor Barriers

Vapor barriers, typically used in conjunction with a soil vapor extraction [SVE] system, will prevent hazardous vapors from entering a building constructed on a site with contaminated soil or groundwater. This article will refer to these systems as gas vapor barriers, but these types of liners can be termed a brownfield liner, an environmental liner, a gas vapor barrier or membrane, or a geomembrane. While used primarily on new construction, these products can often be applied to existing structures as well.

Traditionally, sites that played host to known contamination were cleaned up to current standards and then built upon. As site conditions have become more extensively investigated and the affects of contaminants on human health have become more well known, the use of vapor barriers underneath buildings constructed on contaminated sites is both a scientific decision and a protection from future liability. As the industry and regulatory climate has shifted towards a more conservative approach to redeveloping brownfields, the use of gas vapor barriers in conjunction with venting systems is a key piece of creating a successful project.

While the use of vapor barriers may increase the upfront cost of site redevelopment, it is usually less expensive to install a liner prior to pouring the concrete slab, versus after the building is inhabited. By placing a vapor barrier below the slab, one can eliminate vapor intrusion, maintain compliance with standards, and limit future liability. It is important to note that vapor barriers do not substitute for traditional site investigations and remediation, but are often used in conjunction with these traditional systems to provide added protection from vapors. Vapor barriers, essentially, are a cheap form of insurance.

National Perspective on Vapor Intrusion

The New Jersey Department of Environmental Protection [NJDEP] and the NY State Department of Environmental Conservation [NYSDEC] are both implementing stringent guidelines for assessing the extent of vapor intrusion and its risk. Similar actions have taken place across the country. Brownfield re-use is encouraged and commonplace in many states, and regulations are reflecting that.

As brownfields and landfills are being revitalized across the nation, gas vapor membranes are specified as an integral part of the remediation systems. The precedent has been set by numerous projects built across the country. A recent evaluation performed at the Seaview Mall in Ocean Township, New Jersey which was built on a former landfill, showed that methane levels were lowered to non-detectable levels by placing a vapor barrier below the foundation in conjunction with a sub slab depressurization system or soil vapor extraction system. This site is one of many "Big Box Developments" that have used a similar system to mitigate vapors.

Public school agencies have recommended the use of vapor barriers in districts from Los Angeles to New York City as an added precaution against vapor intrusion.[1] Private developers are also using vapor barriers, both when regulatory bodies require it, and even voluntarily using them to limit their future liability in absence of regulatory action.

Much of Los Angeles is covered by what is deemed "the methane zone" by local regulators. The methane is naturally occurring in many locations due to old oil fields that generate methane gas. This situation has spurred the use of vapor barriers to ensure that the buildings constructed at these sites are safe for occupancy. In Southern California, liners are used on many of the single-family homes built on methane zones for large, well-known home builders such as Toll Brothers, Centex, and KB Homes.

1. Wilson, Janet and Kristina Sauerwein. "Methane is Out Before School Is In." *Los Angeles Times* 11 November 2003, Orange County Edition.

A confidential site in the Midwest was a former warehouse space that was rehabilitated into condominiums, and a vapor barrier was applied onto the existing slab in order to prevent trichloroethylene [TCE] vapors from migrating into the building.

The types of structures built on contaminated sites range from single-family homes to commercial warehouse space, retail and office buildings, in addition to numerous schools and universities. The key component of all of these redevelopments is that a gas vapor membrane was used to prevent harmful vapors from intruding into the structures.

Types of Contamination

There are numerous types of contamination that one might find at a brownfield or landfill sites, and their sources also vary. In some instances the vapor concern exists because of contaminated ground water or, as in the case of Los Angeles, old oil fields which produce naturally occurring methane gas. Methane gas is generated by the decomposition of trash at municipal and unofficial landfill sites. Other common vapors include chlorinated solvents originating from activities on the sites of former gas stations, tank farms, dry-cleaning facilities, and former manufacturing plants.

There are two choices for gas vapor barriers that are considered to be of the highest standard. High-density polyethylene [HDPE] sheets and the fluid-applied Liquid Boot® membrane are two systems well established in the environmental community to help prevent vapor intrusion. Both products are suitable for the prevention of methane gas, chlorinated solvents and petroleum bi-products to 20,000 parts per million (PPM), and radon gas. Most manufacturers will be happy to review a soil report for levels of contamination and compatibility, prior to an environmental professional's preparation of the specifications.

Gas Vapor Barriers as Remedial Solutions

The two vapor barriers, which have been in use for over 15 years, are High-density polyethylene [HDPE] sheet liners or the Liquid Boot® fluid-applied liner system.

The HDPE systems generally consist of a 40 or 60 mil HDPE sheet liner that is rolled out and secured to the grade beams or footings using a stainless steel batten bar (see Figure 1). The seams are sealed by heat welding. Plastic boots are shaped and heat-welded around pipes or other protrusions in the application surface and welded for adhesion.[2] Sheet products lend themselves very well to large, unobstructed areas such as landfill caps or containment caps on parks or golf courses.

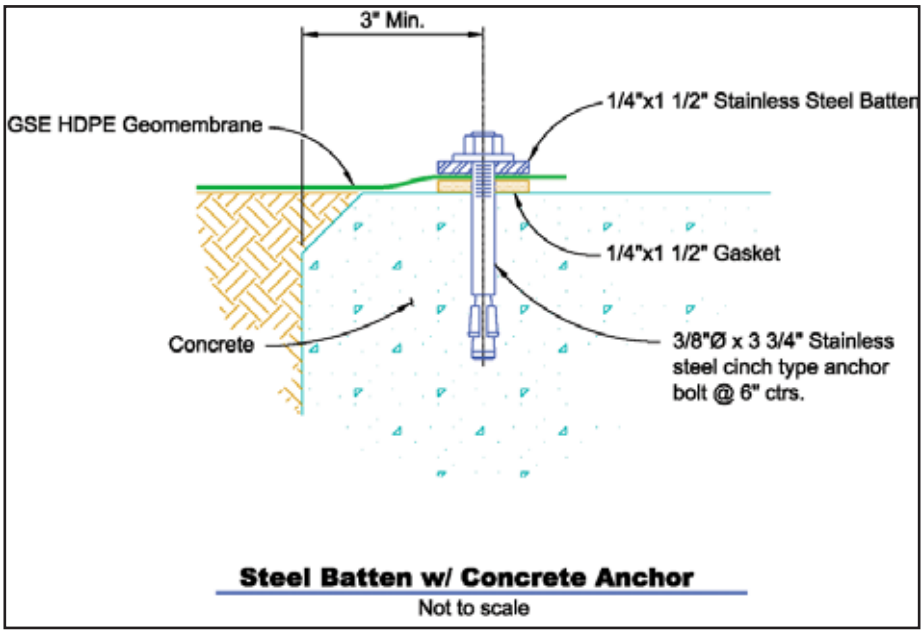


Figure 1.

Liquid Boot®, a fluid-applied vapor barrier, is an ideal product to use for complex foundations that have irregular surfaces or numerous penetrations to seal.[3] The product is a rubberized asphalt emulsion that is cold, spray-applied. It is installed through the use of a two-part spray wand. The two parts mix right outside of the spray wand, and then, through a chemical reaction of the two parts, the product sets up as a solid, monolithic membrane (see Figure 2). The fluid spray is pliable and malleable, and readily conforms to the shapes of any building or structure making it easier,

Figure 2. Installation of a fluid-applied vapor barrier at a public school in Queens, NY.

2. GSE World. *29 June 2006* <http://www.gseworld.com/Literature/DetailDrawings /PDF/DDTerminations.pdfwww.gseworld.com>.
3. Liquid Boot. Methane Details. *29 September 2006*. <www.liquidboot.com>.

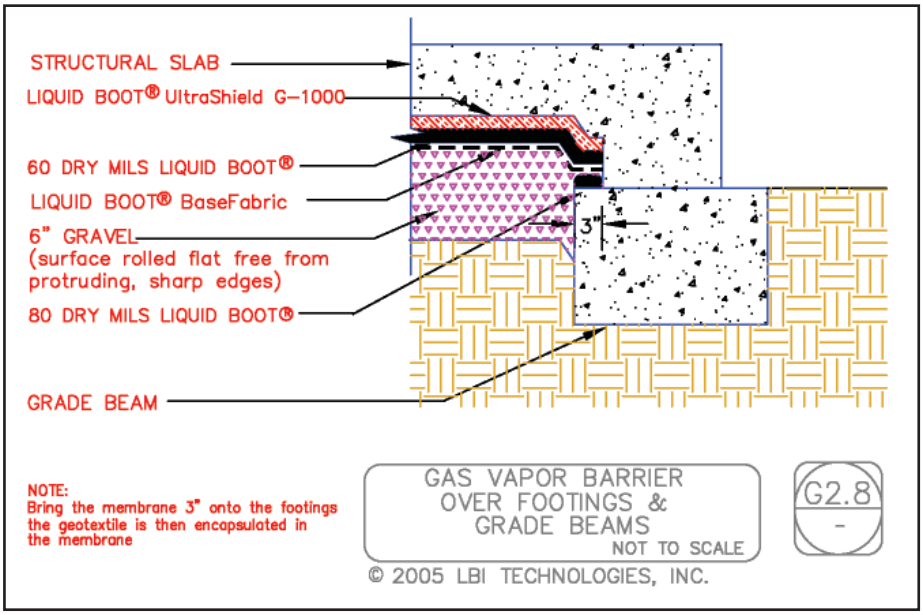


Figure 3.

and more cost effective, to install on such sites (see Figure 3).

Conclusion

Vapor barriers are commonly used because of their successful history of use, spanning more than 20 years. Vapor barriers prevent harmful gas from migrating into structures built on sites with a potential concern for vapor intrusion, and they limit the liability of owners and designers. Gas vapor barriers are becoming an integral part of specifications for projects where there is a known or suspected risk of vapor intrusion. The installation of these barriers is a long-term solution that helps to ensure the safety of buildings and human health.

References

GSE World. 29 June 2006 <http://www.gseworld.com/Literature/DetailDrawings/PDF/DDTerminations.pdfwww.gseworld.com>.

Liquid Boot. Methane Details. 29 September 2006. <www.liquidboot.com>.

Woll, Bryn, James Mack, Fred Ellersbusch, James R. Vetter. "Facilitating Brownfield Transactions Using Triad and Environmental Insurance." REMEDIATION. Spring 2003: 113-130.

Wilson, Janet and Kristina Sauerwein. "Methane is Out Before School Is In." Los Angeles Times 11 November 2003, Orange County Edition.

"What Lies Beneath: Vapor Intrusion At Contaminated, Redeveloped Sites." EHS Strategies Washington D.C. : Bureau of National Affairs, 2004.

Robert Carvalho is the President/CEO of EAI, Inc. which is based in Jersey City, NJ. EAI Inc. performs environmental consulting and specialty contracting services, which include the implementation and installation of various remediation systems.

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

Where In Michigan? Contest

Photo courtesy of Tye J. Black, CPG-06103. Photograph #4.

To help promote the 2007 Annual Meeting, the Michigan Section is sponsoring a contest similar to that held by the Colorado Section several years ago (Thanks for the idea!). The rules of the "Where in Michigan?" contest are simple. The first individual to correctly identify the photograph location, geologic formation depicted, and formation age wins a Michigan geologic memento. If anyone correctly identifies all six photographs, they will win a free registration to the 2007 annual meeting (please note that if the winner has already registered, the registration fee will be refunded, so do not wait to register). In the event that more than one individual correctly identifies all six photographs, a random drawing will determine the winner.

Only one entry per individual per photograph, please.
Entries should be sent to Adam Heft via email (hefta@fitzhenne.com) or fax (517) 887-6335).

The 'Where In Michigan?' photograph in the last issue of TPG (Photograph 3) was of the Republic Iron Mine. The Republic Mine is located in western Marquette County, just to the south of the Village of Republic in Michigan's Upper Peninsula. The mine operated from 1872 to 1937, and again from 1952 to 1981. A total of 75 million tons of iron ore were produced from the mine. The mine produced "hard ore" (high-grade specular hematite with 60-65% iron) and taconite (banded iron formation with 40% iron and 45% chert). The mined formation was the approximately 2.0 billion year old Negaunee Iron Formation. The vertical left wall of the pit is a diabase sill intruded into the iron formation and subsequently folded and turned vertical during deformation.

Congratulations to Peter H. Dohms, CPG-07141, for correctly identifying the photo.

Inside the World's Largest Hand Dug Well: Ground Water, Up Close and Personal

Thomas P. Clark, PG, CPG-06667

The time had come for this graybeard hydrogeologist to see the Grand Canyon for the first time. So, coincidentally, on our 37th anniversary, Cindy and I pulled the Subaru Forester out of the driveway in Minnesota and began a road trip to the desert southwest. We were headed first for the Durango, Colorado area to spend a few days on the Navaho Lake Alpaca Ranch, owned by our son-in-law's parents. A route across southern Kansas would be most direct. As I scanned the Kansas highway map of US 54 west of Wichita, my eyes fell on the small town of Greensburg with a point-of-interest labeled "World's Largest Hand Dug Well". It sounded like a "can't miss" attraction for a hydrogeologist.

Cindy has good-naturedly accepted my shunpiking detours to assorted caves, quarries and roadcuts over the years (just as I must have visited every quilt shop in the upper Midwest), but even she admitted that a trip inside a well might be interesting and something to tell the grandkids about. The story of the World's Largest Hand Dug Well began in the 1880's when the railroads were laying new track across the plains of Kansas. Steam locomotives required lots of water for their boilers and in an area of scarce surface water resources, the only dependable water supply was from a well. In 1887, the city of Greensburg approved a contract for a waterworks system in the amount of $45,000, a huge sum of money in those days (Figure 1).

Construction of the well was a masterpiece of pioneer engineering. Workers were hired at sunrise and paid at sundown, a dollar a day. Crews of 12 to 15 assorted farmers, cowboys and transients, working for a stake to head on west, dug the well. The only tools that were used were a shovel, pick, half-barrel, pulley and rope. Other crews mined and loaded native stone from a quarry south of town, to be used in casing the well. Horse-drawn wagons delivered the stone and the wagons returned full of dirt from the well which was used to fill ruts in the streets of Greensburg. An air of excitement filled the small town as people looked forward to having fire protection and running water to their homes.

Figure 1: Some facts about the "World's Largest Hand Dug Well" on a sign posted on the well house, Greensburg, Kansas.

Harry F. Hall, foreman of the railroad's Bridge and Building Division, was put in charge of the carpentry work necessary to construct the well. A wide shaft was cribbed and braced every 12 feet with rough wooden planks that reached from wall to wall in a wagon wheel support system as the digging progressed. Workers shoveled soil into half-barrels and hoisted them to the surface. The quarry stone was then lowered down the deepening hole and fit in place. The wooden braces were sawed off after the stones were fitted around them. When the water table was reached, numerous lengths of perforated pipe were driven horizontally at the bottom of the well into the water-bearing gravel.

When the well was completed in 1888, it was 109 feet deep and 32 feet in diameter. The well served as the city's only source of water until 1932. It was covered, fitted with a staircase (Figure 2) and opened as an historic attraction

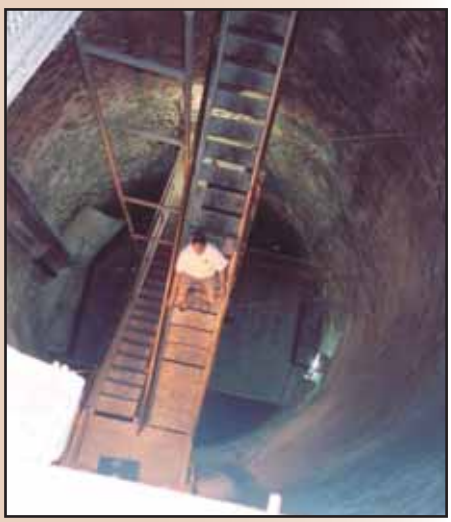


Figure 2: The author descending the staircase to the bottom of the well. Note the original stone casing and more recently installed ventilation pipe at the left.

in 1937. In 1972, it was designated as a National Museum and two years later, was named an American Water Landmark by the American Water Works Association. Over the years, more than three million visitors from every state and many foreign countries have descended the 105 steps to the bottom of the well. Water from the well is still used to irrigate the city park, which is adjacent to the well house and museum.

Tom Clark is a Senior Hydrologist at the Minnesota Pollution Control Agency, St. Paul, MN, where he has worked for 30 years helping to protect ground water in the Land of 10,000 Lakes. He has been active in the Minnesota Chapter of AIPG and is a licensed geologist in the state of Minnesota. This article originally appeared in slightly modified form in the December 2006 Minnesota Ground Water Association newsletter. Tom is a past editor of the newsletter and a current member of its editorial team. E-mail: tom.p.clark@state.mn.us

1st NORTH AMERICAN LANDSLIDE CONFERENCE

Landslides and Society:

Integrated Science, Engineering, Management, and Mitigation

June 3 – 10, 2007 ~ Vail, Colorado

http://www.mines.edu/academic/geology/landslidevail2007/

Be sure to sign up early as space is limited!

Registration

Conference registration will open the end of January 2007 for Professional, student , and accompanying persons. Registration fees are almost completely inclusive. Professional and student registrants will receive:
Conference Proceedings in published (book) form and on CD-ROM, as well as a conference program with abstracts

- Attendance at all Technical Sessions
- Attendance at the Welcome Reception (Sunday evening)
- Attendance at the Chuck Wagon Dinner (Tuesday evening)
- Four Complimentary Luncheons (including Exhibitors Luncheon on Monday and Lunch during Wednesday Excursion
- Access to a Hospitality Suite in the Conference Hotel as a meeting location
- Choice of 1-day Technical Excursion on Wednesday, June 6

The accompanying persons registration will provide:

- Attendance at the Welcome Reception (Sunday evening)
- Attendance at the Chuck Wagon Dinner (Tuesday evening)
- Four daily Luncheons (including Exhibitors Luncheon on Monday and Lunch during Wednesday Excursion)
- Access to a Hospitality Suite in the Conference Hotel as a meeting location with friends
- Choice of 1-day Technical Excursion on Wednesday

Plenary Session Topics

MONDAY – Theme: *Landslides and Society*

- Prof. J. Michael Duncan (USA) – "Landslides on the Panama Canal"
- Prof. Stephen G. Evans (Canada) – "Disasters in North America – Overview"
- Prof. Terry West (USA) – "Landslides and Society"

TUESDAY – Theme: *Mapping and Investigation*

- Dr. Cees van Westen (NL) – "Mapping and Modeling Landslides"
- Derek Cornforth (USA– "The Seven Deadly Sins of Landslide Investigations, Analysis, and Design"
- Prof. Sunil Sharma (USA) – "Limit Equilibrium Analysis"
- Prof. D. Vaughan Griffiths (USA) – "Risk and Finite Element Assessment of Infinite Slopes"
- Duncan Wyllie (Canada) – "Rock Slope Investigations"

THURSDAY – Theme: *Landslide Hazards and Responses*

- Prof. Stephen G. Wright USA) – "Submarine Landslides"
- Oddvar Kjekstad (NGI) – "Challenges with Landslide-Hazard Mitigation in Developing Countries"
- Prof. Robert Holtz (USA) – "Geosynthetics as Related to Slope Stability"
- Prof. John Turner (USA– "Ground Anchor Stabilization"

FRIDAY – Theme: *Risk Assessment and Loss Reduction Strategies*

- William J. Roberds (USA) – "Risk Assessment Methods"
- George G. MaderUSA– "Loss Reduction Strategies"
- William T. Laprade (USA) – "Effects of Urbanization and Development on Mass Wasting"
- Jeffrey R. Keaton (USA) – "Insurance & Liability: Thinking Outside the Shear Box"

Social Program

- **Welcome Reception** on Sunday evening
- **Chuck Wagon Dinner (cowboy western style) and Social Event at the 4 Eagle Ranch near Vail** Tuesday evening
- **Gala Dinner** on Thursday evening

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

POLAR FLEECE VEST - Sweat patch and double collar, 1" Double needle elastic waist and cuffs, taped contrast collar, 2 zippered front pockets, yolk front, double needle half moon sweat patch, system compatible with style TIO and TIJ jacket's. Embroidered AIPG lettering. Choose from Black, Navy, Royal, Charcoal, Red, Burgundy, Purple, Orange, Yellow, Forest or Khaki. Sizes XS - 6X, Tall Sizes LT - 3XLT. Tall sizes available in black and navy. (If ordering size 2X and up, please call the National AIPG office for special ordering at (303) 412-6205. An additional $1.50 will be added to sizes 2X and up). Price: $27.00

POLAR FLEECE 1/4 ZIP PULLOVER - Sweat patch and double collar, 1" Double needle elastic waist and cuffs, taped contrast collar, on-seam pockets, yolk front, double needle half moon sweat patch with embroidered AIPG lettering. Choose from Black, Navy, Royal, Charcoal, Red, Burgundy, Purple, Orange, Yellow, Forest, Khaki. Sizes XS - L Only. Price: $29.00

POLAR FLEECE FULL ZIP JACKET - Sweat patch and double collar, 1" double needle elastic waist and cuffs, taped contrast collar, 2 zippered front pockets, yolk front, double needle half moon sweat patch with AIPG embroidered lettering. This system is compatible with style TIO and TIJ jackets. Choose from Black, Navy, Royal, Charcoal, Red, Burgundy, Purple, Orange, Yellow, Forest, Khaki. Sizes XS - 6X, Tall Sizes LT - 3XLT. Tall sizes available in black and navy. (If ordering size 2X and up, please call the National AIPG office for special ordering at (303) 412-6205. An additional $1.50 will be added to sizes 2X and up). Price $31.00

DENIM OR KHAKI LONG-SLEEVE SHIRTS - A 6.5 oz. fabric, 100% cotton, garment washed, generous cut, double needle stitched, tuck-in tail, button-down collar, horn tone buttons, patch pocket. and adjustable cuffs. Embroidered AIPG spelled out with pick and gavel. Sizes: XS-4XL. Prices: $29.00 (XS-XL) / $31.00 (2XL) / $32.50 (3XL) / $34.00 (4XL)

Promotional Items
Polar Fleece Vest and
Marble Coffee Mug
Price: $29.00
SAVE $6.00!

MARBLE MUG - 11 oz., blue with matte gold lettering on both sides. Price: $8.95

CHECK OUT OTHER GREAT ITEMS AVAILABLE AT WWW.AIPG.ORG

CAP - Velcro closure. Embroidered AIPG spelled out with pick and gavel. Colors: black, tan, royal blue, and white with blue bill. Price: $12.50

ORDER ONLINE AT WWW.AIPG.ORG

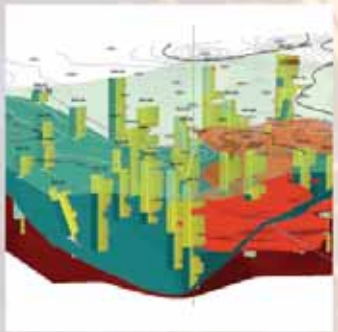
SWEATSHIRT - Hanes Printpro XP Ultimate Cotton Crewneck Pullover. Premium-weight 10.1 oz., 90/10 cotton/polyester PrintPro fleece. Sweatshirt comes slightly oversized with cover-seamed neck, armholes and waistband and set-in sleeves. Also has cotton/spandex neck, cuffs and waistband for fabulous fit. AIPG embroidered lettering. Colors: Red, Gray, Navy, Light blue, and Gold. Sizes: L-XL-XXL (other sizes available on request) Price: $32.00 (L-XL) / $33.50 (XXL)

It's Not Just Software. . .
It's RockWare.

For Over 23 Years.

RockWorks™

3D Subsurface Data Management, Analysis, and Visualization



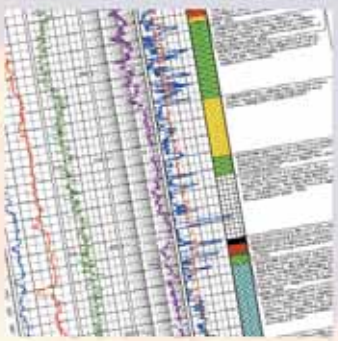
All-in-one tool that allows you to visualize, interpret and present your surface and sub-surface data. Now with Access Database for powerful queries, built-in import/export tools for LogPlot data, and LAS and IHS import.

Free trial avialable at www.rockware.com.

$1,999

LogPlot™

Powerful. Flexible. Affordable.



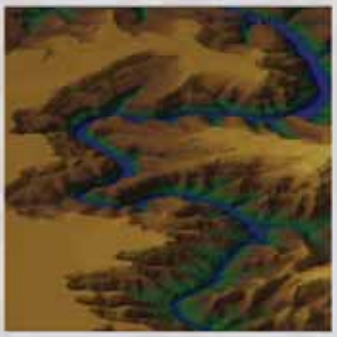
Display geotechnical, geophysical, mud logging, and oil/gas data as a graphic strip log. Plot single page logs for shallow borings, or multi-page/ continuous logs for deep wells.

Free trial available at www.rockware.com.

$599

QuickSurf DX™

Fast and Powerful Gridding and Contouring Software



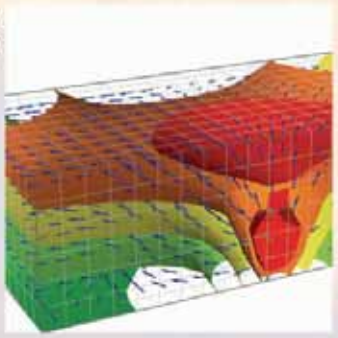
QuickSurf DX easily handles large datasets to generate grids, contour maps, and volumetrics with the fastes engine available. Sophisticated tools to manipulate modeled surfaces adn perform a variety of calculations with extensive import and export capabilities. AutoCAD version also available.

Free trial available at www.rockware.com.

$699

PetraSim™

A Preprocessor and postprocessor for TOUGH2, T2VOC, TMVOC and TOUGHREACT, TOUGH-FX/ HYDRATE, and TETRAD



- Model multi-component fluid flow, heat transfer and reactive transport processes
- Saturated and unsaturated conditions
- Fractured and porous media
- Mesh generation, parameter definition, and display of results

Call for Pricing

RockWare®

Since 1983

303.278.3534 • 800.775.6745

RockWare.com

ESRI Technology

AUTHORIZED BUSINESS PARTNER