WANTED - TPG ARTICLES

Instructions to Authors

The TPG accepts articles of modest length for publication. Submittals should be no more than approximately 1600 words, or six typed pages, double spaced. Longer articles may be divided into parts (e.g. part 1 and part II), but this is not encouraged. Articles may be technical or professional in nature. General topics are listed below. Articles containing news of importance to professional geologists will also be considered. Except for news articles, or articles containing dated materials, submittals should be sent to AIPG headquarters twelve weeks in advance of expected publication. Some technical topic issues are planned up to one year before printing, therefore early submittals will be preferred.

Manuscripts should have the following section:

Title
Author(s) with CPG number and address
Text
Tables if included
Figures with captions if included
Appendix(es) if included
Acknowledgements
References Cited

One original and two copies of each manuscript should be submitted. Whenever possible, text should also be submitted on diskette. Headquarters uses WordPerfect 7 for Windows '95, which is preferred, but Word, ASCII, RTF, or translatable files are acceptable. The program or format of the text should be clearly marked on the diskette. Articles can also be transmitted by e-mail.

Graphics should be clear, camera-ready, line drawings whenever possible. Photographs (color or black and white) are also encouraged. Whenever possible, drawings may be submitted on diskette in .pcx, .bmp, or .tiff, or other standard formats.

**TPG wants color photographs.** Photographs alone may be submitted for the cover. They should have a geologic theme and an informational caption.

**General Topics:**

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<th>Professional (any issue)</th>
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<td>Geophysical/Engineering (November)</td>
<td>Practicing Geology Internationally</td>
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Other suggestions: Forensic Geology, History of Practice in a given field, Book Reviews, and Geology and the Military, Unusual Applications of Geology.

Authors are encouraged to communicate with Headquarters via mail, fax, or Internet. Send your article and/or photographs, or communicate questions to:

The American Institute of Professional Geologists
Wendy Davidson, Publications Manager
7828 Vance Drive, Suite 103
Arvada, CO 80003-2125
Voice (303) 431-0831
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J. Dale Nations, Editor
Practicing Geology Internationally:
Eritrea East Africa

John S. Moore, CPG-6042

Variability in the Routine Laboratory Measurement of Total Lead in Soils and Potential Remedial Implications
David G. Angle, CPG-9874, Michael E. Pisani, P.E.,
David C. Upthegrove, P.G., and Karen H. Swartz

Legislative Reception
Colorado Section AIPG

Travis H. Hughes, CPG-3529

DEPARTMENTS

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NEW MEMBERS, APPLICANTS, ETC.

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J. Certificate
   $7.50
   Add $2 for mounting - plaque sold separately.

K. Self-Inking Stamp
   $28.00

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   $35.00
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   (position - left, right, bottom)
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STATE OF THE SECTIONS

AIPG relies much upon the effectiveness of its Sections to assist in serving its members and promoting the profession of geology. AIPG is comprised of 37 State Sections. The range in the number of members which comprise the Sections’ membership is from as small as 12 (Idaho and South Dakota) to as large as 694 (Texas) members. The number of AIPG members relative to the number of Sections is presented below.

<table>
<thead>
<tr>
<th>Total Number of Members</th>
<th>Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 50</td>
<td>10</td>
</tr>
<tr>
<td>50 - 100</td>
<td>11</td>
</tr>
<tr>
<td>100 - 200</td>
<td>9</td>
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<tr>
<td>200 - 300</td>
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<td>300 - 400</td>
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<tr>
<td>400 - 500</td>
<td>1</td>
</tr>
<tr>
<td>&gt; 500</td>
<td>2</td>
</tr>
</tbody>
</table>

What is clearly evident is that over half of the Sections are comprised of 100 members or less, with about 80 percent of the Sections being less than 200 members. The majority of the members are employed in the fields of environmental, engineering and hydrogeology, with a lesser number of members employed in the oil and gas and mining fields.

To check the pulse of the Sections, headquarters recently sent out a questionnaire to all Section Presidents inquiring as to just how active each Section is. Questions were posed as to whether a newsletter is published and at what frequency, and the Section’s degree of political and academic activity, among other activities such as whether a Section conducts periodic (or episodic) professional and technical meetings, social events and inter-society meetings. Questions regarding whether the Section resides in a State that has registration and, if not, whether attempts are being made to acquire registration were also posed. The results of this survey are summarized below.

It is pleasing to know that most of the Sections publish a newsletter. The format varies, with some, such as with the Northeast Section, being subsidized by companies, contractors and suppliers who advertise their services. Frequency varies greatly from infrequently to monthly, although many Sections attempt to publish, at minimum, on a quarterly basis. In addition to information that is generated at the Section level and of importance to the membership, an abundance of information is forwarded from headquarters and the Executive Committee to the Section officers, thus, making periodic publication of a newsletter instrumental in communicating this information to the membership.

Meetings allow for the exchange of ideas and discussion of issues facing our profession, among serving many other purposes. The frequency of meetings as with publication of a newsletter varies significantly, ranging from non-existent to episodic to periodic. Many Sections are faced with logistical problems due to their size or physical geographic features that prevent them from meeting on a regular basis or attracting many attendees. As a result, many have organized or co-sponsored inter-society meetings and/or field-trips with other professional groups such as the Association of Engineering Geologists (the most common professional group AIPG Sections jointly meets with at the Section level, excluding local groups and organizations), Society of Mining Engineers, and many of the local geological groups and organizations germane to their area. Such inter-society activities have provided an opportunity to introduce AIPG to many professional geologists who otherwise never knew that AIPG existed nor what AIPG was all about.

Political activity at the Section level includes pursuing legislation that affects the geological profession, attending legislative hearings representing AIPG and the profession, preparing opinion and policy statements to assist legislatures in their understanding of a particular bill and implementing a program to attend (or maintain in some cases) registration. Such activity varies from non-existent to high, with most of them being low to moderate. Those States that indicated the level of their political activity as being high, such as Texas and Colorado, do not have registration and are also two of the largest AIPG Sections. Some States have unsuccessfully pursued registration, and more than once in some cases. Due to the amount of time and notably cost involved in effectively monitoring state regulatory affairs, legislation and policies that affect our profession, some Sections have experienced the establishment of new organizations as in the case of California (the California Council of Geoscience Organizations or CCGO), among others, to help distribute the financial burden.

The level of academic activity also varies significantly, with barely a pulse being audible from most Sections. Some Sections have or are in the process of attempting to establish student chapters, following in the footsteps of the Ohio Section, while others such as Colorado, Nevada and Illinois/Indiana having organized very successful student career days.

In summary, it is obvious that the overall health of the Sections varies significantly. It is also evident that the actual size (or number of members) of a particular Section plays little role in how active and effective a
Section actually is, or could be. In addition, as with most groups, a few dedicated individuals often carry the burden for many, regardless of the size of the Section. These individuals deserve much credit for the efforts they set forth time and time again. Furthermore, although some officers are seasoned veterans who have previously served as officers or committee chairs of a professional organization, many have not participated professionally in this role.

There are certain activities that each Section should work toward accomplishing. Some of these activities, at minimum, include:

- Preparation and distribution of a newsletter on a periodic basis;
- Conduct of meetings and/or intersociety-meetings on a periodic basis;
- Establishment of a student-career day and student chapters;
- Establishment of a program to provide brown-bag presentations on professionalism at campuses; and
- Scheduling of, at minimum, annual meetings with your respective State geological survey, regional USGS representative, State Geology and Mining Boards, and local legislators to development professional relationships and provide a mechanism to discuss issues of mutual interest to the profession.

Although these activities as summarized above should be performed by each Section on a routine basis, not all Sections function at this minimal level, and many remain inconsistent in maintaining certain activities and programs. As a means of enhancing the level of activity of every Section and making them more effective, members of past Advisory Boards and Executive Committees have expressed interest in the preparation of a guidance manual for Section officers. This manual, whose preparation is currently being coordinated by Vice President William Siok, will serve to provide the tools necessary for each Section to perform in a more consistent, effective and efficient manner. Despite Section size, by improving the means in which we communicate and function at the Section level, we all benefit by enhancing society’s awareness of the role geology plays in everyday life.

New Geologic Mapping Funded for Laramie Area

The U.S. Geological Survey has awarded $18,500 to the Wyoming State Geological Survey to continue its mapping efforts in the Laramie area. These funds come from the STATEMAP Program of the National Cooperative Geologic Mapping Act. In this program, the State must match the Federal dollars.

According to the Wyoming State Geological Survey, the funds will be used to compile the Laramie 1:100,000-scale Geologic Quadrangle map, which covers the south half of the Laramie Basin and Laramie Mountains, including the city of Laramie. In earlier phases of the project, the State Geological Survey mapped the 1:24,000-scale Laramie, Red Buttes, and Howell Quadrangles to fill gaps in mapping and to correct outdated mapping. The compilation of the Laramie 1:100,000-scale map, which is the final phase of this project, will be completed in 1999.

Additional field work and new mapping, is still needed in some relatively small localized areas to better define the structure and Tertiary outcrops along the crest and flanks of the Laramie Mountains from the north boundary of the map to the south boundary on the Wyoming/Colorado line. The Wyoming State Geological Survey will initially release the map as a black and white Preliminary Geologic Map (PGM). Later a colored version of the map will be published in the Survey’s Map Series (MS) and the map will be digitized.

Disability Income Plan Credit Announced

Members insured in the AIGP Disability Income Plan as of April 30, 1998 will receive a credit of 15 percent of their semiannual premium due on the May 1, and November 1, 1998 renewals. These credits will effectively lower annual premiums by 15 percent, thus reducing the cost of coverage for eligible insured members. The disability Income Plan insures one’s most valuable asset, the ability to earn income.

For more information on any of the AIGP Insurance Plans please contact:

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Practicing Geology Internationally:
Eritrea, East Africa

John S. Moore, CPG-6042

The Natural Resources Conservation Service (NRCS), U.S. Dept. of Agriculture (USDA), is working in partnership with the U.S. Agency for International Development (USAID), to provide a variety of engineering specialists to assist the Ministry of Agriculture (MOA) of Eritrea, East Africa, in improving the technical skills of its engineers responsible for the MOA Small Dams Program. The program is an ambitious effort focused on the design and construction of many earthfill dams and diversion structures for irrigation water supply. Only three percent of the land in Eritrea is currently arable. Agricultural self-sufficiency and rural employment are high priorities in the world’s newest nation.

Between May and November of 1997 the NRCS sent specialists in hydrology, geology, irrigation, construction, design, and soil engineering: Each served one or two 4-week sessions in the country. As an NRCS geologist, I volunteered to spend two four-week periods in the capital city of Asmara to help train 14 recently graduated civil engineers responsible for design and construction of dams. Although primarily in a classroom setting, we were, to our mutual benefit, still able to visit a dozen sites that were either in planning, under construction, or in operation. While they were eager to learn how to apply state-of-the-art technology, contain costs and improve safety at structures, I needed to ensure that the training not lose sight of certain inescapable realities. Because Eritrea is a new and developing country in a relatively remote part of the world, resources and funding for projects can be scarce or nonexistent, and difficult to acquire. Construction equipment, such as sheepsfoot rollers and water trucks, are in short supply. Achieving necessary specifications on compaction is, therefore, extremely difficult. Often water itself is unavailable during construction. Manufacturing aggregate for concrete, or grading materials for sand and gravel drains and filters, are formidable undertakings. Drill rigs for geological investigations are generally not available. Even hand bucket augers and soil probes are difficult to find. Much work is conducted by hand labor; grading materials is often done by hand screening. Scores of men and women can be seen at some construction sites handling and placing concrete in “bucket brigades”. Examples of the limitations and challenges are seemingly endless.

A visitor soon realizes that water is precious here. The rainy season lasts but a few weeks in June and July; the rest of the year is dry. The climate near Asmara is pleasantly moderated by its 7800 ft. elevation;
nearby mountains exceed 10,000 ft. Daytime temperatures hover around 80 degrees Fahrenheit and drop to the 60s at night. The coastal plain along the Red Sea, however, is extremely hot and humid. Agriculture is being developed where the rivers exit the mountains onto broad alluvial fans in the coastal plain. The traditional method for watering crops is by spate irrigation. This method entails the annual windrowing of soil by oxen to divert the five to 10 ephemeral flows per year across the cultivated land. The windrows typically wash out after each season, and there is virtually no control over timing and application rates. The land gets a few good soakings and whatever crops manage to survive are then harvested. There are new demonstration projects underway using highly efficient drip irrigation. Crops include sorghum, wheat, corn, cotton, papaya, melons, citrus fruits, mangoes, coffee, bananas, potatoes, and various other garden vegetables.

After more than 30 years of bitter struggle against an oppressive military regime in Ethiopia, Eritrea gained its hard-won freedom in May, 1993. One of my first impressions of what freedom means to Eritreans occurred my first day in Asmara. I stepped outside the hotel to buy bottled water and to survey the surroundings that will be my home for eight weeks. It was early evening, not yet dark, and the street bustled with end-of-day traffic, mostly crowded red city buses, small yellow Opal taxis, and ubiquitous dilapidated bicycles. But what really struck me were the throngs of people, walking arm in arm, or hand in hand, in twos, threes, or even four abreast. They seemed very much to be enjoying each other in their promenade up and down Independence Avenue. I had to zigzag through this peaceful populace to find a small corner market to get my water. On the wall outside was a large hand-painted sign with 4 words: “Welcome to Free Eritrea”. I heard a put-putt sound, and looked back toward the street. Is it a powered tricycle, or a motorized wheelchair, I wondered? The driver was a double amputee below his knees. I learned later that the government of Eritrea provides these vehicles to their disabled veterans. A few years ago, this avenue would have been naked and silent, lights out under a strictly enforced curfew. In this city of 400,000 souls, I think I understand the mood now—the cheerful-
• Selection of drilling/digging equipment
• Determining gradation of sand and gravel filters
• Compaction
• Differential settlement
• Dispersive clay soils
• Ground water flow nets under dams and reservoirs and in the watershed
• Reservoir sealing methods
• Determining reservoir seepage rates and water table mounds
• Determining hydraulic gradient and ground water flow direction at sites

One time a student went to the chalkboard to argue a point with a colleague. The discussion soon got heated and the two slipped back into Tigrinya, their native tongue. Much to everyone’s amusement, I jumped into the fracas with nonsensical gibberish, pretending to be speaking intelligently in Tigrinya. We had a lot of fun like that. The class also enjoyed learning American phrases. One of their favorites was “Diddly Jack Squat”. When asked what it meant, I explained that this was a minimalistic quantity, the amount being equivalent to what they would probably learn from me as an instructor. Dry humor always bridges the cultural gaps.

This has been a rare opportunity to visit a remote part of the world and to assist a people in their efforts to attain self-sufficiency. I found the people in Eritrea to be extremely hard working, hospitable and gracious, and eager to make their new country work. Most of all, they know first hand the meaning and value of freedom. Welcome to Free Eritrea!

John S. Moore, CPG-6042, National Hydrogeologist, Natural Resources Conservation Service, USDA, Box 2890, Washington, DC 20013.

Acknowledgments: Dale H. Rezabek, CPG-9285 and Robert A. Stewart, CPG-8332.

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The American Institute of Professional Geologists is Accepting Applications for the Position of EXECUTIVE DIRECTOR

The American Institute of Professional Geologists (AIPG), a non-profit organization with over 5,000 members dedicated to the advancement of geology and the geologic profession, seeks a full-time Executive Director. At the time of appointment, the appointee must be Certified by AIPG as a Certified Professional Geologist, have ten years or more of technical and management experience at increasing levels of responsibility, and be aware of the key issues affecting the geological profession and AIPG. A team-oriented leader with strong communication and interpersonal skills is sought, with appreciation of policy issues impacting geologists at Federal and/or state levels, the ability to attract non-dues revenue, and enthusiasm for service as a geoscience representative.

The Executive Director will be responsible for Headquarters operations including publications and membership services. The Executive Director works under the direction of an elected Executive Committee to help formulate and undertake initiatives including such things as budgets, publications, membership and revenue enhancement. He or she shall maintain good relationships with appropriate professional and technical organizations.

The Executive Director must travel as needed. Salary is competitive with non-profit organizations of AIPG’s budget and size. The position will remain open until filled, preferably during spring 1999.

Applicants should submit a complete resume, the names and addresses of at least four references (three CPGs minimum) and a two-page essay explaining applicant’s interest in the position and what the applicant could bring to it. Applications should be received no later than 30 June 1998 by the:

Search Committee, AIPG
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AIPG is an equal opportunity employer.
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Introduction

Elevated levels of lead in surface (zero to six-inches) soils are ubiquitous in urban areas, along major roadways, in and around mining and smelting sites, and near industrial areas. The contaminant lead is at or near the top of both the Environmental Protection Agency (EPA's) and the Agency for Toxic Substances and Disease Registry (ATSDR's) list of chemicals posing potential serious health problems (Xintaras, 1992). Lead has arguably become the “asbestos of the 1990s” in the environmental arena. Both federal and state agencies have developed different action levels for lead in surface soils. EPA's current screening level is 400 mg/kg (EPA, 1994). State action levels can vary from several hundred mg/kg to 1,000 mg/kg or more depending on property usage.

EPA-directed cleanups have called for the excavation and removal of lead-affected soils to concentrations ranging from 500 mg/kg in residential areas to greater than 10,000 mg/kg in industrial or mining areas. Typically, these remedial actions are guided by extensive soil sampling and laboratory analyses. EPA may require that each individual grab sample meet the specified cleanup standard and does not allow for a statistical analysis of several grab samples from the same general area. This rigid approach can have significant remedial implications considering the potential for great variability in laboratory results.

As demonstrated by this study of routine laboratory procedures, significant variability can result from the inherent bias in the standard soil sample preparation process as well as other potential sources of variability. This variability can have a dramatic impact on site cleanups and should be considered during any investigation and potential remediation of soils containing lead and possibly other heavy metals.

Purpose and Objective

The purpose of this study is to demonstrate the wide variability in standard laboratory results generated by following widely-accepted, EPA-specified methodology. The objectives of this paper are to provide regulators, industries, consultants, and the public with a better understanding of the inherent variability resulting from the routine analysis of soil samples for lead. The variability in the data and the decisions made that are based on these laboratory results can have serious implications on the need for remedial action and the potential cost.

Background

Over 100 surface (0 to 6-inches) soil samples were collected from a swamp area along the Gulf Coast as part of a large investigation of the impact of a lead release. The swamp area is located adjacent to an operating refinery and other industries that previously discharged wastewater into a bayou that traverses the swamp. The swamp soil consisted of dark brown to black clayey organic matter with abundant roots and rootlets. The moisture contents of soil samples ranged from approximately 25 to over 80 percent and averaged approximately 60 percent.

Each sample was collected with a hand trowel, homogenized by mixing and kneading in-place, and then placed in a properly labeled, laboratory-supplied container. The samples were placed in a cooler maintained at approximately 4°C with ice and transported to the analytical laboratory.

Each sample was prepared by the laboratory for acid digestion following SW-846 standard preparation Method 3050A and then analyzed for total lead by SW-846 Method 6010 using Inductively Coupled Plasma (ICP) instrumentation.
Table 1

Analytical Results

<table>
<thead>
<tr>
<th>Relative Location of Sample With Respect to Source</th>
<th>Sample Preparation Without Consultant Oversight</th>
<th>Sample Preparation With Consultant Oversight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample SS-1</td>
<td>Total Lead (mg/kg) in Original Composite Sample SS-1</td>
<td>Aliquot</td>
</tr>
<tr>
<td>Aliquot A1</td>
<td>19,900</td>
<td>B1</td>
</tr>
<tr>
<td>Aliquot A2</td>
<td>14,400</td>
<td>B2</td>
</tr>
<tr>
<td>Aliquot A3</td>
<td>8,490</td>
<td>B3</td>
</tr>
<tr>
<td>Sample SS-2</td>
<td>Total Lead (mg/kg) in Original Composite Sample SS-2</td>
<td>Aliquot</td>
</tr>
<tr>
<td>Aliquot A1</td>
<td>283,000</td>
<td>B1</td>
</tr>
<tr>
<td>Aliquot A2</td>
<td>2,330</td>
<td>B2</td>
</tr>
<tr>
<td>Aliquot A3</td>
<td>208</td>
<td>B3</td>
</tr>
</tbody>
</table>

Two of the 100+ samples had extremely high (6 to 100 times higher) lead concentrations in comparison to the rest of the samples. Subsequent, multiple re-analyses of subsamples of the two original samples yielded drastically different results. In an attempt to understand and quantify the reported variability, the following methodology was implemented to evaluate how the method-specified laboratory preparation procedures could affect the reported results.

Laboratory Preparation Methodology

The EPA SW-846 standard soil sample preparation Method 3050A calls for the laboratory technician to extract and then weigh an aliquot of one to two representative grams of soil from the sample jar using a small spatula, and then digest the soil in nitric acid and hydrogen peroxide. One gram of soil represents 2 percent of the contents of a two-ounce jar and only 0.9 percent of a four-ounce jar. The digestate is then refluxed with hydrochloric acid. Typically, if the soil is clayey and/or contains pieces of gravel, organic matter, debris, etc., the technician will routinely collect a sample of the finer-grained, loose soil that is readily available in the container. This collection process can ultimately result in a significant bias in the reported results, since such a small quantity of soil is relied upon by the laboratory method for the determination of the representative container concentration.

During the initial phase of this study, three approximately one-gram samples were extracted independently by the laboratory technician from each of the two jars with the reported variability. Method 3050A specifies that the technician thoroughly mix the entire sample to achieve homogeneity prior to transferring the approximate one-gram aliquot to a beaker. However, laboratories do not routinely maintain records on this homogenization and sub-sampling process. Furthermore, since typical sampling protocol for metals calls for field homogenization, the laboratory may even assume that this step had already been completed. Therefore, the possibility exists that the technician may not have homogenized the entire contents of the jar, and extracted one gram of soil from only one spot in the jar.

A second, subsequent sub-sampling episode, which included the same procedure previously described, was also conducted. During the second sub-sampling episode the consultant observed the laboratory technician during the entire sub-sampling process. During the second episode the technician mixed the soil remaining in each of the two jars with clean wooden spatulas and then took multiple small clumps of soil from each to make up the approximate one gram samples that constituted the three additional aliquots from each jar. Thus, it was apparent to the consultant that a two step homogenization process also took place in the laboratory. The three aliquots collected from the two original samples were analyzed by the same method-specified standard procedures as before. Following the collection of each of these additional samples, the remaining container contents of each of the two sample jars were digested following Method 3050A and analyzed. The soil remaining in the jars was digested completely to compare the composite analysis to the aliquots prepared and analyzed with and without consultant oversight.

Results and Discussion

The analytical results for each of the sample analyses are presented in Table 1.

The moisture contents of samples SS-1 and SS-2 were 69 and 71 percent, respectively. Sample SS-1 was collected within approximately 500 feet ("proximal") of the potential lead source, which most likely explains the higher lead level. Sample SS-2 was collected approximately 2000 feet from the potential source ("distal"). The composite sample analyses yielded lead levels that are also notably different than the lead levels in the aliquots from the two original samples. Analyses of sample SS-2 indicate much greater variability than sample SS-1. Potential causes of the reported variability in the
samples could include homogenization procedures conducted in the field, laboratory homogenization and extraction procedures, variable soil matrix, and uneven lead distribution in the soil.

The first three analyses (A1, A2 and A3) of each sample that were run without consultant oversight exhibited the highest variability. The variability in the results from the three sub-samples (B1, B2 and B3) analyzed during the consultant oversight program may be partially explained by a variable soil matrix.

Soil sample bottles are routinely filled to the top with soil. By the time these jars get to the laboratory, there may be some settling or compaction of the soils (especially if clayey). If the laboratory technician were to take just one clump that weighed approximately one gram from the jar there exists the possibility that the sample result could be biased. If the sample jar is filled up with stiff clay and sand or silt, the technician may just extract the sample from the loose silty or sandy soil since it is much easier to extract a gram of loose soil than to extract pieces of clay from the jar.

A second possible source of the variability could be the homogenization process conducted in the field. Clayey soils can be very difficult, if not impossible to thoroughly and completely homogenize in the field, especially in an almost inaccessible swamp.

A third possible cause of the variability could be the result of the soil matrix, i.e. its lack of homogeneity. However, even a soil with an extremely variable matrix would probably not exhibit the extreme, several orders of magnitude concentration differences reported. Soil matrix variability could possibly account for some of the variability between the second set of samples (Aliquots B1, B2 and B3 from SS-1 and SS-2).

Finally, in the past several years, analytical laboratories have significantly reduced their prices, in some cases by several hundred percent. These price reductions most likely have placed internal pressure on laboratory personnel to provide rapid sample turnaround time at the least cost. This type of pressure could lead to a sub-sampling process that, although it meets the requirements of the method, may bias the end result (i.e. a one gram chunk of soil is extracted from one place in the very top, easily obtainable soil in the sample jar).

Conclusions

This study demonstrates that routine laboratory analysis using accepted EPA-methods could produce inconsistent data that may dictate remediation activities when, in fact, none are needed. The intrasample variability of lead observed in this study appears to reflect routine commercial laboratory preparation. Regulators, industries, consultants and the general public need to understand this variability and its potential implications, so that more informed and cost-effective decisions can be made on any potential remedial actions. It is recommended that a more explicit explanation of laboratory sub-sampling procedures be stated up front in the work plan and communicated to the laboratory to minimize potential bias.

References


The Continuing SAGA OF SUPERFUND

Submitted by John J. Dragonetti, CPG-2779

The Superfund program burst upon the national scene following the shocking revelations at Love Canal in Niagara Falls, New York. In a suburban subdivision built over a former industrial site, wastes buried in the 1940s by Hooker Chemical and Plastics Corporation were found to be causing serious health problems among the local residents in 1976. Public outcry was enormous when the U.S. Environmental Protection Agency (EPA) declared that thousands of similar abandoned hazardous waste sites probably existed, and it was realized that there were no federal laws to remedy such problems. The issue of abandoned hazardous waste sites appeared high on the public agenda and finally resulted in the passage of Public Law 96-510 entitled the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in December 1980.

The law authorized the government to clean up any site where there is an unremedied release of a hazardous substance, but critics complain that more money has gone into legal fees than into actual remediation. Overhauling the current system is a high priority in Congress, but intensive negotiations have yet to yield a workable compromise, and Senate leaders say that time is running out for reform this year.

How Superfund Works

CERCLA acquired its more familiar name – Superfund – from the $1.6 billion fund it established to expend for the clean-up of hazardous waste sites, chemical spills and releases of other environmental contaminants nationwide over a five-year period. Locations where hazardous wastes had been disposed of improperly were classified as Superfund sites. CERCLA also authorized several other undertakings: the restoration of locales where hazardous wastes were released from inactive waste locations if public health and the environment were endangered, the establishment of a Hazardous Waste Response Fund, and the power to affix liability to persons responsible for releases of hazardous materials from inactive sites. Responsibility for administering the Superfund program was assigned primarily to EPA, with the U.S. Coast Guard accountable for emergency response for hazardous waste releases within the nation’s navigable waters.

EPA then instituted a National Contingency Plan to describe how it intended to respond to hazardous substance releases. The two types of responses were: short-term mitigation for emergency situations, and long-term corrective action for sites identified through a Hazard Ranking System for placement on the National Priorities List (NPL). Once a location had been identified and a site inspection conducted, it was determined whether placement on the NPL was warranted. Over the years, EPA has evaluated thousands of sites requiring mitigation for possible inclusion on the NPL. Well over a thousand sites presently reside on the NPL, including nearly 200 at federal facilities. All 50 states and many of the territories have or have had sites on the NPL. New Jersey leads the list with 112 locations. The clean-up of NPL sites has been accomplished either by EPA or by private industry under EPA oversight. Restoration at federal facilities must be funded through appropriations secured within individual agency budgets.

Efforts to Reform Superfund

The process of fashioning Superfund into the optimum answer to the problem of abandoned hazardous waste sites has generated a stormy debate involving Congress, several administrations, the insurance industry, waste producers, and environmentalists. There has been general agreement that fundamental weaknesses exist within CERCLA, and there is a need for comprehensive modifications. The first such effort was a significant expansion of the original act by the 1986 Superfund Amendments and Reauthorization Act (SARA; P.L. 99-499) within which an $8.5 billion trust fund was established. The monies were to come from an environmental tax on corporations. There were also provisions aimed at accelerating the clean-up program. Within the 1990 budget reconciliation act, Superfund's program and taxing authorities were extended once again, but reauthorization is now long overdue.

Despite nearly universal public concern and high priority within the 103rd and 104th Congresses (1993-1996), neither the House nor the Senate was able to pass a comprehensive reform bill as a consequence of partisan differences over very complex issues. The dominant reason for inaction and the most controversial element of CERCLA seems to be its liability provisions. The program has many detractors who cite its slow performance, ineffectiveness, and excessive expense. According to the Congressional Research Service, the average clean-up period for a hazardous waste site is 12 years. Many assail the retroactive nature of the law requiring clean-up of activities that were legal prior to the enactment of CERCLA. While it is often thought that the law only affects big business and federal facilities, that is surely not the case. Small companies, social
organizations, school districts, and municipalities all have come under Superfund’s domain for discarding small amounts of waste. Polluting companies and the insurance industry believe clean-up requirements are too demanding and costly. State officials have increasingly concluded that their interests are not adequately represented in national policy making and have sought to increase their influence. Environmental groups are especially concerned for the provisions governing damages to natural resources.

**Current Legislation**

President Clinton adopted Superfund improvement as a 1996 campaign issue, claiming the Republican Congress maintained a pro-polluters stance. The 105th Congress, now in its second session, has joined the President in making Superfund reauthorization a top environmental priority. There are approximately fifty pieces of proposed legislation in the House and Senate aimed at amending one or more aspects of Superfund.

Over 20 of those deal with the issue of brownfields – lower-risk sites that tend not to get the program’s attention but which are a major stumbling block to urban renewal efforts. Congress has supported the program by appropriating $36.8 million and $85 million respectively in the 1997 and 1998 fiscal years. EPA administers the brownfields program as part of Superfund, although it is not specifically authorized under CERCLA. Hence, both specific and comprehensive reform bills seek to properly authorize the brownfields program.

Three comprehensive reform bills are being actively considered, all put forward by subcommittee chairmen with jurisdiction over Superfund: H.R. 2727 (Superfund Cleanup Acceleration Act). New York Republican Sherwood Boehlert, who chairs the House Water Resources and Environment Subcommittee, is the sponsor of H.R. 2727. The bill exempts generators and transporters of municipal solid waste and small businesses from particular liabilities, addresses prevention and clean-up of contaminated groundwater, and extends the time a state has to take remedial action on a governor-approved NPL listing. The bill has been the subject of intense negotiations with the Administration and Democrats in Congress and has bipartisan support as negotiations with the Administration have stalled, and Vice President Gore recently stated the Administration’s opposition to the bill in its present form, claiming it weakens clean-up standards, inhibits the restoration of natural resources, and dilutes the capacity of forcing polluters to pay for hazardous waste damages. The Administration intends to continue its negotiations with Chairman Boehlert and has assigned EPA Administrator Carol Browner and Interior Secretary Bruce Babbitt the responsibility for coordinating the formation of a process for natural resource restoration within the Superfund program.

Boehlert’s bill is competing for attention with H.R. 3000, introduced by House Hazardous Materials Sub-committee Chairman Michael Oxley (R-Ohio). H.R. 3000 has 39 co-sponsors – including many of the House Republican leaders – but it is strongly opposed by House Democrats and the Administration for its groundwater provisions and liability aspects. EPA Administrator Browner has argued that the bill would invite litigation thereby slowing down clean-ups. Only one hearing has been held on H.R. 3000, and it has made little progress through the legislative process.

The principal focus for Superfund reform in the Senate is S. 8, introduced by Superfund, Waste Control, and Risk Assessment Subcommittee Chair Bob Smith (R-New Hampshire). This bill is designed to streamline clean-ups, delegate authority to the states, and to provide liability relief in certain instances. Like H.R. 2727, it has been the subject of lengthy negotiations in an effort to craft a filibuster- and veto-proof plurality of support. The Environment and Public Works Committee expects to send the bill to the Senate floor in March, but Senate Majority Leader Trent Lott (R-Miss.) has already stated that there is not enough time left in the session to debate this bill.

Concern has been expressed within the geologic community over all three of these bills concerning whether or not geologists are considered environmental professionals for purposes of setting remediation standards. CERCLA does not have a definition of the term, and the only reference to the discipline is in a discussion of the brownfields program. Concern has also been raised about language in several of the major reform bills that endorses the use of American Society for Testing Materials (ASTM) standards, which may not have been developed with sufficient geoscience input. There is also concern within the oil and gas industry over the redefinition of hazardous waste to include oil field wastes. Currently, petroleum and liquified natural gas are not subject to CERCLA release reporting, but are governed by other laws such as the Clean Water Act. Whether or not these bills pass, they will be the starting point for future reform efforts, and it is important that these concerns are addressed.

It is clear that the Superfund program represents a difficult task in framing environmental policy. Despite the best intentions of Congress, the Administration and ardent public support, agreement on an ideal mechanism for mitigating the nation’s hazardous waste sites may not be achieved in the 105th Congress or in the foreseeable future. If reform legislation does pass and successfully reduces the amount of litigation, it could represent a significant opportunity for geoscientists involved in the discovery and remediation of abandoned hazardous waste sites.

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The Government Affairs column is a bi-monthly feature written by John Dragonetti who is Senior Advisor to the American Geological Institute’s Government Affairs Program.
February began with the release of the President’s budget request for Fiscal Year 1999 and concluded with several hundred scientists and engineers, geoscientists among them, visiting their congressional delegations in support of increased federal investment in research. As reported in an earlier special update, the President’s request includes strong boosts for many science agencies but created controversy over funding sources. Geoscience programs at the National Science Foundation and Department of Energy fared well as did parts of the U.S. Geological Survey, but the USGS Geologic Division would be reduced, including cuts to programs for geologic mapping, coastal studies, mineral resources, and energy resources. For more on these and other geoscience agencies, the special budget update is on the web at:

<www.agiweb.org/agi/legis105/budg99up.html>. Although not strictly a February event, Interior Secretary Babbitt announced yesterday that the USGS will stay in Menlo Park for at least another ten years. This monthly update includes:

- Strong geoscience contingent at congressional visits day
- Babbitt announces USGS to stay in Menlo Park
- AGI hosts ad hoc workshop on geoscience and public policy
- AGI testimony on DOE strategic energy plan
- Superfund legislation moves toward committee votes
- GAP staff meet with NSF geoscience directorate
- Concerns over field trip access to national forests
- Tentative schedule of upcoming GAP activities
- New material on web site

**Strong Geoscience Contingent at Congressional Visits Day**

Fourteen geoscientists were among the 200-plus scientists and engineers who visited Washington last week to participate in the third annual Science and Technology Congressional Visits Day event. On Wednesday, the group was briefed by both Administration and congressional leaders, among them outgoing President’s science advisor Jack Gibbons, National Science Foundation Director (and Gibbons’ replacement) Neal Lane, Senators Bill Frist (R-TN) and Phil Gramm (R-TX), and Representatives Vern Ehlers (R-MI) and George Brown (D-CA). On Thursday, the scientists and engineers visited their representatives and senators as well as committee staff. Geoscientists visited members from Colorado, Connecticut, New Hampshire, Oklahoma, Tennessee, and Virginia. The event was organized by the Science-Engineering-Technology Work Group and the Coalition for Technology Partnerships with overall messages emphasizing the value of federal investment in science and technology as well as the importance of partnerships between government, academia, and the private sector. Background briefing materials and other information on this event are available on the web at <www.agiweb.org/cvd>.

**Babbitt Announces USGS to Stay in Menlo Park**

Secretary of the Interior Bruce Babbitt announced a long-term lease that will keep the USGS in Menlo Park, California for at least another ten years. He made the announcement at an all-employees meeting at the Menlo Park campus and was accompanied by Rep. Anna Eshoo (D), in whose district the facility lies, and USGS Acting Director Tom Casadevall.

Due to high rent costs in the Bay area, Babbitt requested an internal review of the USGS Menlo Park leases last August. In October, a six-member External Review Panel formed to evaluate the alternatives developed by the internal team and to present a set of recommendations to the Secretary of the Interior about the future of the USGS facility. In addition to the renegotiated lease, which extends ten years, the Panel’s recommendations call for USGS to continue to consolidate its programs and operations into federally owned space and to develop a longer-term, integrated science and facility plan for Menlo Park.

**AGI Hosts Ad Hoc Workshop on Geoscience and Public Policy**

A two-day ad hoc workshop on the role of geosciences in public policy was held on February 17-18 at the American Geological Institute and the U.S. Geological Survey. The workshop was attended by representatives of the USGS Geologic Division, several directors of State geological surveys, and other geoscientists in public policy positions at the National Research Council, White House Office of Science and Technology, and the U.S. Senate. The purpose of the workshop was to carry out an informal discussion of how geoscience information could more effectively be used in policy decisions affecting natural hazards, resources, and environmental issues. Participants identified a number of recommended activities to improve public and policy awareness of the geosciences, including greater participation in the PPP 2000 natural hazard reduction forums, establishing a series of similar forums on geoscience issues, enhancing the use of interpersonnel agreements (IPA’s) to make geoscience expertise available to other mission
agencies and Congress, demonstration projects for end-user applications of geoscience information, and efforts coordinated by AGI to better market geoscience information. In response to these discussions, AGI is making arrangements to sponsor a PPP 2000 forum on real-time hazards monitoring.

**AGI Testimony on DOE Strategic Energy Plan**

On February 19th, AGI Executive Director Marcus Milling testified before Secretary of Energy Federico Pena at a hearing in Washington, DC on the Department of Energy’s draft national energy policy plan known as the “Comprehensive National Energy Strategy.” Two additional hearings were held in Houston, Texas and Davis, California to solicit input on the draft plan, which outlines five major goals. Milling’s testimony focused on the second of these — ensuring against energy disruptions — discussing the vital role of geoscience research, particularly in fossil energy. He also discussed DOE’s role in establishing the National Geoscience Data Repository System and the system’s potential benefit for maintaining domestic production. The draft plan is available on the web at <www.eren.doe.gov/nes.htm>. Milling’s testimony is available on the AGI web site.

**Superfund Legislation Moves Toward Committee Votes**

Republicans named Superfund reform as one of their top ten legislative priorities for this year, and committees in both the House and Senate are moving toward passage of reform bills. But Senate Majority Leader Trent Lott (R-MS) has indicated that the legislation is unlikely to make it through the full Senate in the time remaining, and leading Senate Democratic supporters have privately stated that the overall prospects for passage are dim. The operative bill in the Senate is S. 8, introduced by Senate Environment and Public Works Committee chair John Chafee (R-RI) and Superfund Subcommittee chair Bob Smith (R-NH). Despite marathon negotiating sessions between Chafee’s staff and both committee minority staff and EPA, serious sticking points remain, and a markup scheduled for the first week in March was postponed indefinitely while highway legislation is being considered by the Senate.

In the House, separate pieces of legislation are moving forward in two different committees. The Transportation and Infrastructure Committee’s Water Resources and Environment Subcommittee will hold a markup on March 4th of H.R. 2727, introduced by subcommittee chair Sherwood Boehlert (R-NY). The next day, the House Commerce Committee’s Finance and Hazardous Materials Subcommittee chair Michael Oxley (R-OH) will hold hearings on his bill, H.R. 3000. Geoscientists have raised concerns over several of the provisions in these bills, specifically its definition of “environmental professional” exclusive of geoscientists and the use of ASTM standards. AGI is working to learn more about the legislation and ensure that input from geoscientists is included in the discussions.

**GAP Staff Meet with NSF Geoscience Directorate**

Following the release of the President’s budget, GAP staff had an opportunity to meet with Bob Corell, head of the NSF Geosciences Directorate, and representatives from Earth, Atmospheric, and Ocean Sciences Divisions. Corell noted his pleasure at the 12.2 percent increase for the directorate in the President’s request, which will help to alleviate stresses on the system such as shrinking grant size and duration. Corell emphasized the directorate’s participation in several NSF-wide initiatives, including Life in Earth’s Environment, Knowledge and Distributed Intelligence, and education. The directorate remains heavily involved in the U.S. Global Change Research Program as well as the ongoing national climate assessment process. In addition to the good budgetary news, congressional concerns over the location of the proposed Polar Cap Observatory have been addressed, allowing the first two phases to go ahead as planned. The directorate is represented on an internal study team looking into the creation of a National Institute for the Environment within NSF.

The study was required by Congress as part of last year’s appropriations bill and is expected to be completed later this spring.

**Concerns Over Field Trip Access to National Forests**

AGI and member societies have received several complaints this past year from geologic field trip leaders concerning entry onto Forest Service lands, specifically incidents in which they were told that they were considered to be outfitters and would need to obtain permits to conduct field trips. Because of the importance of these activities to their membership, the Geological Society of America asked GAP to look into the matter. John Dragonetti then initiated contact with Forest Service geologists and other personnel in an attempt to determine the extent of the problem. A memo was developed for GSA along with an article that will appear in an upcoming issue of GSA Today.

As it currently stands, Forest Service regulations classify geologic field trips as recreational activities, hence field trips are subject to recreational rules. Because of mounting environmental concerns and the need to protect national resources and artifacts within the public domain, Congress and the Executive branch are insisting that public land managers substantially improve their supervision of federal properties. Therefore, in 1995, the Forest Service adopted more rigorous policies governing access to the National Forests. At the same time, Forest Service personnel have observed increased activities on their managed lands by numerous recreational, hobby and educational groups. The heightened occupancy and broadened con-
gessional mandate are expected to magnify the controversy. While the Forest Service has developed guidelines for use throughout the National Forest system, the manager of an individual Forest may feel the need to adopt more stringent requirements to limit overcrowding within specific areas. It is, therefore, highly recommended that communication be established between field trip organizers and forest personnel to increase their awareness and understanding of geoscience activities, and to establish a better working relationship between the geological community and forest personnel. In that context, AGI is maintaining its connection with Forest Service recreation managers at national headquarters with the prospect of developing an agreement to ease access to the national forests for geoscience purposes.

Tentative Schedule of Upcoming GAP Activities

The GAP Advisory Committee met on February 27, 1998 at AGI headquarters in Alexandria, Virginia. Minutes from the meeting will be available on the AGI web site in the near future. The next meeting will be at the AAPG annual meeting in Salt Lake City in May.

- March 4, House Interior Approps. Subcmt. Testimony, Washington, DC
- March 16-18, AASG Spring Meeting, Washington, DC
- March 19-21, AGI Foundation Meeting, Sedona, AZ
- April 2-3, GSA Geology & Public Policy Cmte. Mtg., Washington, DC
- April 4, AGI Congr. Fellow Selection Cmte. Mtg., Alexandria, VA

New Material on Web Site

The following updates and reports were added to the Government Affairs portion of AGI's web site <www.agi-web.org> since the last monthly update:

- Update and Hearing Summary on Global Climate Change (3-2-98)
- Update on Database Protection (2-24-98)
- AGI Testimony on DOE Comprehensive National Energy Strategy (2-19-98)
- Action Alert: DOE Holds Hearings, Seeks Comments on Energy Strategy (Posted: 2-5-98; Action Complete 2-28-98)
- Hearing Summary on Mitigating Natural Disasters (2-4-98)
- Special Update: President's FY 1999 Budget: Large Increases for Most Science Agencies, But Others Left Behind (2-4-98)
- Geotimes Political Scene (2/98): Scientific Consensus and Political Controversy Update on the Year of the Ocean (1-30-98)

This monthly update goes out to members of the AGI Government Affairs Program (GAP) Advisory Committee as well as the leadership of AGI's member societies and other interested geoscientists as part of a continuing effort to improve communications between GAP and the geoscience community that it serves. Prior updates can be found on the AGI web site under "Government Affairs" <http://www.agiweb.org>. For additional information on specific policy issues, please visit the web site or contact us directly at <govt@agiweb.org> or (703) 379-2480.

1997 U.S. Ground Water Industry Exports 10 Times Greater than Imports

Westerville, Ohio (2:24-98) — Exports in 1997 by U.S. producers of household water systems and water well drilling machines were nearly 10 times greater than imports of similar products, according to statistics recently released by the U.S. Department of Commerce and compiled for the National Ground Water Association. Exports equaled $30.8 million in 1997, while imports totaled only $3.1 million.

Exports of household water systems, including windmill pumps, totaled 67,157 units valued at $12,298,308 in 1997, while rotary water well drilling machine exports were 76 units valued at $13,597,340. The 133 non-rotary water well drilling machines were valued at $5,173,520.

U.S. imports of household water systems, including windmill pumps, totaled 1,036,413 units valued at Customs at a combined $2,527,482. Four rotary water well drilling machines were imported, at a value of $279,400, while 45 non-rotary water well drilling machines came to the United States, with a value of $317,698.

Key export markets in 1997 for household water systems were Canada (27,262 units); Taiwan (11,917); Ecuador (6,510); Belgium (4,440); and the Philippines (4,056). Chile (15); Sweden (15); and Australia (11) were the major markets for rotary water well rigs, while Mexico (33); Chile (24); Canada (15); and Korea (12) represented the key non-rotary rig markets.

Leading points of origin for U.S. imports of household water systems were Switzerland (905,709 units); the People's Republic of China (74,017); Israel (29,522); Taiwan (14,174) and Italy (9,898). Rotary drilling machines were imported from Canada, the United Kingdom and Italy, while non-rotary rigs came from Australia (17); Canada (16); the United Kingdom (7); and Mexico (5).
The Ethics of Scientific Debate

Science advances as new data and new interpretations of old and new data are proposed, modified, debated, subjected to testing with additional data sets, etc. While the process is supposed to be conducted with dispassionate logic, in fact, the debate is conducted by passionate humans. The consequence is that the "gentlemanly debates" envisioned by the founders of the Geological Society can degrade into very personal attacks.

Most of the great geologic controversies have included such personal attacks. Martin J.S. Rudwick's *The Great Devonian Controversy—the shaping of scientific knowledge among gentlemanly specialists* (1985, University of Chicago Press) provides a very detailed and readable account of one of the early geologic controversies, including the shifting positions of various participants and several of Sir Henry De la Beche's satirical cartoons. Other controversies include the debate over the origin of granite documented in *The Origin of Granite* (1948, Geological Society of America Memoir 28), which contains 5 papers and 26 discussions, the debates over J. Harlan Bretz's ideas on the channeled scablands of Washington, continental drift-plate tectonics, and the causes of the K-T extinction and mass extinctions in general. We all know of other debates, large and small.

The current debate over global warming and human contribution thereto (see the article by Ron W. Pritchett, CPG-7063, in the January 1998 *TPG*) differs from the other listed debates because it involves both scientific debate and public policy decisions. It is therefore a more 'public' debate than the origin of granite. Because of its 'public' character and its political component, the global warming debate has more than the usual amount of attempts to take and hold moral high-ground, personal attack, and name calling. These are the aspects of debate giving rise to ethical issues.

The primary ethical issues are honesty and respect for others, although other aspects of the AIPG Code of Ethics are involved as well. Relevant parts of the Code in one way or another (and, in particular circumstances, others might apply) include:

- **Canon 1. General Obligations:** Members should be guided by the highest standards of personal integrity and professional conduct.
- **Standard 1.1:** Members should pursue honesty, integrity, loyalty, fairness, impartiality, candor, fidelity to trust, inviolability of confidence, and honorable conduct as a way of life.
- **Canon 2. Obligations To The Public:** Members should uphold the public health, safety, and welfare in the performance of professional services, and avoid even the appearance of impropriety.
- **Standard 2.2:** Members should be accurate, truthful, and candid in all communications with the public.
- **Rule 2.2.3:** A Member shall avoid making sensational, exaggerated, and or unwarranted statements that may mislead or deceive members of the public or any public body.
- **Standard 2.3:** Members should participate as citizens and as professionals in public affairs.
- **Standard 2.4:** Members should promote public awareness of the effects of geology and geological processes on the quality of life.
- **Rule 3.3.2:** A Member shall not give a professional opinion or submit a report without being as thoroughly informed as might be reasonably expected, considering the purpose for which the opinion or report is requested.
- **Canon 4. Obligations to Professional Colleagues:** Members should respect the rights, interests, and contributions of their professional colleagues.
- **Standard 4.1:** Members should respect and acknowledge the professional status and contributions of their colleagues.

One's professional reputation and character form a significant part of the core of one's ability to practice geology professionally. Attacks on one's professional reputation and character are therefore very serious and can potentially serve as the basis for an ethics complaint in addition to legal complaints charging libel. Pritchett's article in the January 1998 *TPG* also discussed "junk science." While I recognize that various arguments are put forth in debates which are either poor science or are not science at all despite masquerading as science, I have seen instances where the accusation that someone is practicing "junk science" appears to be a personal attack and is used instead of good scientific debate. Indeed, some of those accusing others of practicing "junk science" were in fact the ones practicing junk science. Review of past geologic debates, such as those surrounding Bretz's ideas on the channeled scablands, suggest that a number of eminent geologists other than Bretz were the ones practicing "junk" science, or at least bad science. I think the term "junk science" is too easily applied, that it has become an excuse to avoid doing the harder work of engaging in real scientific debate.
Additional examples of this issue occur in subsequent sections of this column. David Wahl’s comments on the “Draft Policy on the Exercise of Professional Judgement” describe a problematic situation in Arizona and adjacent states with mining promoters and assayers. And I contribute some observations as well. Likewise, Greg Hahn’s comments on “Professional Ethics and Client Behavior” get into this matter of debate and having sufficient data to support a conclusion as well as his more immediate concern regarding client behavior.

In summary, when engaging in debate, do not engage in the same types of behavior you accuse your opponents of committing. Don’t call the kettle black while becoming a black pot. What are your views on scientific debate and “junk science”? 

“The American Institute of Professional Geologists believes that each professional geologist should be free to exercise professional judgment as guided by his or her past training and relevant experience with regard to the approach principles and methods most appropriate to the study or assessment of any particular site or physical location and situation and the relationship of the site to its intended use by a client. AIPG considers prescriptive professional practice standards in geologic practice as being contrary to the public interest in that their effect is to stifle innovation and to discourage the recognition or consideration contemplation of the geologic factors and circumstances which may be unique to a make each particular site or physical location situation unique. Furthermore, AIPG believes that prescribed standards may not always be appropriate or adequate for the a particular site or physical location and its proposed use situation, with the result that some unnecessary activities may be done, while other necessary activities may be left undone.

“Thank you for your consideration of the above suggestions. My reason for avoiding the word “prescribed” is that it resembles “prescribed” but has a much different meaning, as I found out when I looked it up in the dictionary. [Mr. Abbott misused it in line 4 of his Column 27.]”

Dixon is correct; I blew the difference between ‘prescribe’ and ‘prescribe’ in the first paragraph of column 27. To illustrate correct use of both words’ roots in a summary of the issue at hand: prescriptive approaches to professional subjects can lead to prescriptions on thinking and professional judgement.

I asked Robert Larson to send me a copy of his AEG News column that Dixon cites. Both Huyette and Larson discuss “standards of care” noting both the need for the flexibility to exercise professional judgement and the need to fully document what one proposes to do and how one performs on a particular job. Christopher Sexton also addressed this issue in his comments.

Christopher J. Sexton, CPG 9198, wrote “I understand the intent of your proposed policy statement, and in general agree that it is unlikely a workable checklist-type ‘Standard of Care’ could ever be produced that would address all geologic projects. Yet I still have concerns with how your policy statement may be interpreted by those whose ethics are not as great as they might be. I read your policy, and I see a statement that says Hey, very few geologic projects really have so much in common that they can adequately be designed and implemented using a checklist. Therefore, we must rely entirely on the professional judgement of the geologist for each individual project.” I agree with that. But as an engineering geologist working in Southern California, I see quite a bit of truly pathetic geologic work. There are many who support their poor work on the rather flimsy foundation of ‘geologic judge-
ment'. My response tends to be 'you mean poor geologic judgement'. My concern is that there are those who will see your statement as justification to compete with their peers by doing a lower quality of work.

"The fact is that 'Standards of Care' do exist in the geologic sciences. The problem is that they are not being established by geologists. Instead, they are being established on a case by case, almost arbitrary basis by judges, attorneys, juries, and experts. Many of the experts would be more appropriately referred to as advocates. Unfortunately for the geologist who finds himself on the business end of the legal bazooka, the subjective nature of geology leaves him a particularly easy target.

"Isn't it self-evident that as a group, our profession would be in overall better shape if every time an attorney poked in our direction, he found a thorough, defensible study? Of course we would. But how do we make sure all consultants are doing thorough, defensible studies...in short a good quality job? This is extremely difficult. Obviously it is not possible or desirable to police every consultant's work, but even if this could be done, who is to define quality? There are difficulties inherent in defining a standard of care for our industry. We know a quality job when we see it, but given the wide range of developments, site conditions, criticalities, and financial realities unique to each project, how do we go about defining and codifying an 'appropriate point of diminishing returns' that will cover them all with respect to research, exploration, analysis, and recommendations? Would it be possible to produce a single 'standard of care' document that consultants could use as a reference to see if a specific scope of work is in compliance? I doubt it.

"'Standard of care' in our industry is more about an attitude than it is about a codified list of conditions to be met. It is about the individual consultant's approach to his profession. This is something that develops early on as a function of the type of individual that is attracted to the profession, the way he is educated, the way he is trained, and the way he is licensed or certified.

"Although periods may occur when the academic competitive level heightens, the ability to deal with competitive stress and the degree of dedication required of the geology student does not typically approach that of students in more demanding disciplines such as medicine, where graduates are likely to be involved in such high-liability practices. Once the geology student graduates, there is little or nothing resembling an organized apprenticeship system that would tend to ensure the trainee develops good skills and a proper attitude toward the work. If a geology student manages to find work when he gets out of school, it may or may not be with the most reputable company. That company may or may not provide adequate training in geology or engineering geology or help foster a professional attitude.

"Things seem likely to get worse in the future. Some of the most important skills required by the engineering geologist are learned in field settings, under the direction of an experienced professional. Development of these skills requires diligent effort, and many hands-on hours in the field. Unfortunately, more and more universities seem to be curtailing their field programs. Core curricula are being cut or watered down to attract more students into the programs. Universities have their reasons for making these changes, but it does not bode well for the future of the profession.

"I guess that what I am getting at with all this is that I believe we have a problem in our industry that needs to be solved from the ground up, and in a certain sense, your proposed policy statement may be putting the cart before the horse. I consider the philosophical underpinning of your proposed statement to be correct and noble. However, where a subjective industry such as geology is offered in a market driven by price-based competitive bidding, it may be a recipe for maintenance of the status quo. The status quo being not too good.

"Our policy statements need first to address the nature of population to which they apply. By this I mean we have to have statements that begin with a definition of 'professional geologist'. That means we have to address initial education requirements, licensing and/or certification requirements, requirements for continuing education, and requirements for disciplinary/enforcement procedures. These standards need to be strict because this is where it all starts. Call me quixotic, but I believe that if we take care of things in a strict manner at the front end, we won't need to worry about policy statements governing the product as we get further down the road."

Sexton's thoughtful discussion of the topic warrants further consideration. Clearly there are customary ways of doing things which developed because they are generally applicable and useful. But just as the customary methods should not be made inflexible prescriptions, there are limits to flexibility. Non-standard methods may indeed be appropriate to a particular situation, but their use must be justified using good science. That is part of what I like about the SEC's statement, "No specific method...is required, but the method used must be an orthodox method, in accordance with orthodox definition of terms, and the one best adapted to...the property in question" (SEC, Schedules A & C, 1939).

Huyette, in his AEG News contribution, defines 'standard of care' as "work which is defensible in terms of methodology or technique, accuracy, and reproducibility in order to complete to the detail required to meet the needs of the proposed project. A test [of] whether or not I have met the standard of care would be a report that clearly and concisely states and eliminates all other probable working hypotheses, by use of defensible data, leaving one geological site description. If other working hypotheses still remain at the conclusion of the investigation, then they should be clearly stated in the report along with additional recommendations appropriate to resolve conflicting hypotheses." Huyette's definition is a good one for the ethical practitioner. I also would allow
for the possibility that if the alternative remaining working hypotheses have the same impact on the project, then, further work to determine the correct situation may not be necessary.

The issue is really how to allow the ethical practitioner needed flexibility without providing the shoddy practitioner with a ready excuse. Unfortunately, as I’ve learned from the lawyers I worked with over the years, bad cases make for bad law. These are the cases with egregious facts, the ones where most of us would agree that a real travesty occurred, which lead a judge to write an opinion attempting to ensure that nothing similar ever happens again. Although the judge may be acting with the best of motives, the results are not. What are your thoughts on how to revise the proposed policy statement so that the issues Sexton, Larson, and Huyette raise are adequately addressed?

Sexton notes that the definition of “professional geologist”, certification/licensing requirements, mentoring, continuing education, and disciplinary/enforcement procedures are among the important issues which require attention as part of this issue. He is right. AIPG attempts to do many of these things in various ways. We certify members and define “professional geologist” in terms of the certification requirements. Consideration of continuing education is on the top of President-Elect Tom Fails’ agenda; see his report beginning on page 5 of the February 1998 TPG. This column provides a method of education and mentoring for all of us on a variety of issues. Other articles in TPG serve to highlight various aspects of practice standards. As chair of the Ethics Committee, I can assure you that I take complaints about unethical practice very seriously. However, in order for AIPG to do these things and do them better than it currently is, requires the active contributions of its members.

David E. Wahl, Jr., CPG-6725, commented on my example of Alberta’s prescriptive rule requiring that gold quantities be determined by fire assay. “I agree that fire assay of a raw place sample would be unacceptable. Perhaps Alberta is speaking to analysis of the final metal concentrate? The Alberta rule makes no distinctions; it simply requires fire assays. I would compare the weight of total ‘gold’ recovered via gravity concentration and/or amalgamation to weight of the total sample and then fire assay the ‘gold’ concentrate to determine its actual composition. Usually my concentrates are small enough such that a standard fire assay charge pretty much tests the whole concentrate.

“I think the Alberta rule attempts to rein in stock companies making claims of mineralization based on unsubstantiated assay methods. You probably have heard of the ‘desert dirt’ plays in Arizona and other southwestern states where immense amounts of gold and platinum group metals are reported via unconventional assay methods. One of these companies sued the Arizona Department of Mines & Mineral Resources regarding the Department giving opinions about the mineralization. The mining company won (sort of). We’re having some real problems in Arizona, and I hope actions by such agencies as the Arizona Corporation Commission, Attorney General’s Office, and State Board of Technical Registration can do something about it.”

Wahl’s procedure for determining the gold content of placer samples works and are similar to the methodology known as metallic screen fire assay, which is the method for dealing with hardrock samples containing coarse, free gold particles. My point was that the gravity concentration and/or amalgamation steps are required prior to the fire assay and that simply taking a split of the raw sample and fire assaying it yields erroneous results. This is an example of where professional competence and judgment are required and points out the dangers of prescriptive standards.

Wahl also correctly highlights a common reason why prescriptive standard approaches come into being. Some sort of abuse occurs and legislation or rules are passed to prevent reoccurrence. Because of my experience at the SEC, I’m familiar with the problems resulting from the use of nonstandard assaying techniques. However, in dealing with these very real problems, we should not fall into the trap of using ourselves the same bad science that we are accusing others of using. This is an example of the type of problem addressed in the “Ethics of Scientific Debate,” which begins this column.

For example, assume that a company is reporting assay results using a lab and/or methodology which seems suspect. What does one do? Stating that the methodology is unconventional in one’s experience is factual while stating that it is fraudulent is an opinion requiring substantiating evidence. Have you had samples of the same materials tested by the questioned lab or method independently tested? If not, what other bases would provide adequate support? And in the cases I know about, both the property being tested and the lab/methodology are independent variables. You have to perform check verification of both. Further comments on these issues are welcomed.

Professional Ethics and Client Behavior
(see column 27, February ’98)

Gregory A. Hahn, CPG-7122, commented on the summary of Douglas Silver’s presentation to the Nevada Section last fall. “I read your column on ethics with interest, as always, especially the section describing the dialogue between the Nevada Section members and industry consultant Douglas Silver. I wish I could have been there.

“I am always puzzled that many geologists in the employment of major companies appear to have no conflicts in ‘promoting’ their favorite exploration plays or concepts to their management for the purposes of budgeting and funding. However, when the employer or
client is a small exploration or 'blue sky' company which obtains its funds for exploration or development directly from the investing public, many geologists somehow get 'religion' about these same recommendations. In fact there is no difference between the two. In either case the shareholder's funds are being applied to a high-risk endeavor which may or may not return value for the investment. In actuality, the investor in the 'blue sky' company may receive a benefit from the recommended play through market excitement and increased share prices, which the shareholder in the major mining company might not, either because the play is not advertised or the market places no speculative value on the play. The fact that the major company's funds come from retained earnings and the junior company's funds come directly from the investing public shouldn't change the approach a geologist takes towards recommending activity on a play or project.

"The real ethical issue should be one of the actual recommendations and observations or conclusions a geologist is prepared to offer. I have had several investment advisors and analysts inform me that they do not want to know too many details; that may limit their ability to wave their arms and proclaim the potential of the play. I maintain it is the geologist's responsibility to place the attributes and potential of a property in an appropriate context (does it or doesn't it resemble a world-class deposit, is it reasonable for the deposit to extend completely across the county or extend half-way to the Moho). It is not sufficient for the geologist to agree that it might; within a reasonable geologic context, can it be expected to be the case? This is where some in our profession cross over the line, in allowing their names and reputations to be used to 'imply' something that the professional otherwise would not be willing to commit to himself/herself.

"As long as the professional is clear in his/her observations or recommendations, does it matter whether that information is used to raise money on the open market or to draw down treasury reserves in order to test a hypothesis? It is when the professional stretches the geologic limits or exceeds the boundaries (or in the case of Bre-X actually engages in fraud), to obtain funding from either source, that professional ethics are compromised.

"I'd be interested in reading other professionals' perspectives on this topic."

Hahn's statements regarding the geologist's responsibility to ensure that one's professional statements are not overextended by those promoting a project or company raises an interesting issue. To what extent can or should a geologist review, approve, or comment on a client's press releases? Consider the following example. A geologist is retained to conduct a drilling program and the results from the initial hole show promising alteration, variable but marginal gold grades, and a short interval (say five feet) of high grade, 6 grams of gold. The press release announcing these results emphasizes that assays "as high as 6 grams of gold were recovered from the initial hole." What would you do if this were your project? If you review press releases, what is your liability if you comment on statements that do not directly relate to a summarization of your work?

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**Alaska Cruise to 1999 AIPG Annual Meeting**

Several Members have asked if a cruise (e.g., sail up and fly back) might be arranged in conjunction with the AIPG Annual Meeting near Anchorage, Alaska, in early October, 1999. This is a survey to assess the interest in such an activity. If sufficient interest is indicated, an attempt will be made to determine the availability of a suitable vessel. The most likely port of embarkation would be Seattle, Washington. It is assumed that all participants would be geologists (or accompanied by geologists), who would be expected to understand what was being seen. Therefore, in order to minimize costs, consideration might be given to foregoing a lecturer to describe the geologic, etc., scenery along the coast and in the archipelago. Meanwhile, a suitable guidebook is being sought.

If you are interested in participating in such an activity, please send your answers to the following questions to AIPG Headquarters before June 1, 1998, by letter, fax, or e-mail. Attn: 1999 Alaska Meeting Cruise.

- This is a survey, not a commitment. Comments and suggestions are welcome.

**List of Participants:**

- A. Number of likely participants: Member(s)_____ Spouse(s)____ Other(s)____

- B. Would you insist on luxury accommodations? Yes____ No____

- C. Would you be satisfied with basic accommodations? Yes____ No____

  (If you answered "No" to both B and C above, it will be assumed that you would be satisfied with, something in between.)

- D. Would you be satisfied with forgoing the lecturer? Yes____ No____

- E. What price range should we seek? Max____ Min____ average/day.

  (A reasonable balance of economy and quality would be expected.)

- F. Your name (Your response will not count if it is omitted): _______________________

  CPG#______ Reg. Mem. #______ Mem. #______

  Student______ Associate #_________
OPINION

The article on “Junk Science” which appeared in the December issue of The Professional Geologist ignored what I believe to be an important and ugly facet related to the whole scenario of integrity in science. In short, paid “expert witnesses”. In June (6/17/97) of this year the Wall Street Journal carried an article which observed that many judges are taking the testimony of “expert witnesses” with more than a grain of salt. Some are ruling their testimony to be inadmissible. Two months after that article appeared, the Denver Post reported on “expert witness” testimony in Denver District Court which placed the “headwaters” of a mountain-born stream, Coal Creek, out on the plains some twenty miles and four thousand feet lower in elevation further downstream (midway in the course of the stream) because it was expedient for some legal interpretation. This blatant distortion was noted and reported by non-scientists.

No “junk science” was involved.

Most expert witnesses come from the ranks of those who have achieved some recognition among their peers and the public. “Opinions for pay” in our courts seem to bring out the ultimate in “flexibility” in interpretations, even by legitimate scientists. I recall hearing the results of two colleagues testifying on subject matter which I deemed myself to be reasonably well informed. Earlier I had been approached by one of the parties in the suit to act as an expert witness. The way in which attorneys used the input of my two colleagues on opposite sides of the case made me cringe and pleased with the fact that I had not become involved. It was more a game of words and innuendo than it was an objective encounter. It was not “science” but rather scientists participating in a strange forum which used their testimony for other than science. There is obviously no practical method of imposing peer review on the expert witness selection process.

Peer reviewing of publications is lauded and advertised by those who are beneficiaries and dreaded and feared by those that are not. To assume that all good science emerges unscathed and all junk science is extracted is folly. The process itself demands constant reviewing.

In broadcasting “true science” many hold the sacred cross of “peer review” in the face of the public much as priests hold a crucifix in the face of a demon. Not all agree on the sanctity of the peer review process. To quote August Eppele from his book “Organizing Scientific Meetings”, as excerpted by SCIENCE magazine (Vol. 278, Oct. 1997, p 400).

The term “reviewed publication” has an appealing ring for the naive rather than the realistic... Let’s face it: 1) in this day and age of specialization, you may not find competent reviewers for certain contributions; (2) older scientists may agree that over the past two decades, the relative decline in research funds has been accompanied by an increasing number of meaningless, often unfair reviews; (3) some people are so desperate to get published that they will comply with the demands of reviewers, no matter how asinine they are.”

I would expand on his second point with another observation. In the days of big funding which focused on particular areas of science, “peer reviews” often amounted to mutual back scratching. In most cases no harm was done as lock-step progress was being made. If an outsider who might be perceived as “stepping out” of the club submitted a paper, the reviews might not always be as empathetic. I fear that when driven by the funding demon the peer review process ignores the possibility of a giant step being taken by someone out of the loop. In the arena of geology, Wegener, one of its greatest contributors, would have been (was) ridiculed by “peers”. In truth he had none.

Various species of doom-sayers, astrologists, quacks, UFO-ologists, magicians and the like were around centuries before “legitimate scientists” began fretting over them. They aren’t going to go away.

There is daily evidence in the media that junk science will continue to proliferate as science expands its boundaries. Legitimate scientists need not fear junk science... it’s quite harmless until it gets in the heads of media moguls and politicians. It seems that our efforts best be focused on the latter.

Science is; observing, measuring, interpreting, analyzing, testing recording, modeling and hypothesizing.

Science is not; policing, preaching, scolding, chastizing, castigating, admonishing, punishing or ridiculing.

Ramon E. Bisque, CPG 1595

Ron W. Pritchett -
Reply 3/2/98

Professor Bisque (Emeritus in Chemistry at Colorado School of Mines) took time to expand on the role of science in law, given light treatment in “Junk Science.” Geologists can provide evidence to form law, thereby helping to define civilization. The responsibility is great, the training is continuous, and the call for understanding science in law is worthy.

In “Junk Science I used the space to emphasize the need for a broader role - communications and geology. Improved communications with a non-technical audience is key to healthy use of geology and policy creation. Public policies, interpreted from a combination of scientific findings and political pressure can
be constructive or destructive, depending on the integrity in science, public enlightenment, and legal interpretation. In the Venn diagram (figure) combining Public Communications and Science, Applied Geology is the common area, defined most completely when findings in science are common knowledge. In other words, applied geology is incomplete unless the benefits are known to many voting non-scientists. If science and geology remain hidden in elite circles (industrial, academic, or professional), an ignorant public will destroy applied geology in law. Examples: zoning that prohibits or ignores mining and drilling; mineral lease moratoria on public lands; property law that allows severance of surface and mineral rights in sale.

Thank you, Dr. Bisque, for your perspectives from a career dedicated to the transfer of scientific knowledge through effective communications.

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**Diamond Exploration Continues in Southwestern Wyoming**


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**Tsunami Hazard Map for Yaquina Bay area shows Risk Zones**

The Oregon Department of Geology and Mineral Industries (DOGAMI) has released a new map of tsunami inundation hazard in the Yaquina Bay area. The map is intended primarily for planning for evacuation in the event of a tsunami but could also be adopted as a basis for planning and decisions in the areas of building code, construction, or insurance ratings.

Entitled Tsunami Hazard Map of the Yaquina Bay Area, Lincoln County, Oregon, the map has been released in the DOGAMI Interpretive Map Series as map IMS-2 (price $6). It was produced by Dr. George R. Priest in cooperation with scientists from the Oregon Graduate Institute of Science and Technology, the Center for Tsunami Inundation Mapping Effort of the National Oceanic and Atmospheric Administration (NOAA) at Newport, Oregon, and the Department of Geology at Portland State University.

The tsunami hazard map shows a black-and-white air-photo image of the coastal zone, approximately from Northwest 15th Street in the north to Henderson Creek and the south end of King Slough in the south with elevation contours superimposed. The scale of 1:12,000 (1 inch = 1,000 feet) allows identification of streets and medium-sized structures. Three different types of red lines mark expected tsunami runup elevations that serve to separate risk zones: high runup, moderately high runup, and moderately low runup. The map also identifies drill sites where cores revealed buried soils and, in some cases, tsunami sand layers from prehistoric events.

Detailed discussion of the map and its use, the development of the methods used to produce the map, and the geologic evidence of prehistoric earthquakes and tsunamis on the coast is provided in a separate publication, entitled Cascadia Subduction Zone Tsunamis: Hazard Mapping at Yaquina Bay, Oregon. Final Technical Report to the National Earthquake Hazard Reduction Program, and released in December 1997 as DOGAMI Open-File Report O-97-34 (price $10).

The new publications are now available over the counter, by mail, FAX, or phone from the Nature of the Northwest Information Center, Suite 177, State Office Building, 800 NE Oregon Street #5, Portland, Oregon 97232-2162, phone (503) 872-2750, FAX (503) 731-4066; and the DOGAMI field offices: 1831 First Street, Baker City, OR 97814, phone (541) 523-3133, FAX (541-523-5992; and 5375 Monument Drive, Grants Pass, OR 97526, phone (541) 476-2496, FAX (541) 474-3158. Orders may be charged to Visa or Mastercard. Orders under $50 require prepayment.
JOB OPENING AT GEOLOGY BOARD

ANNOUNCEMENT FOR POSITION OF EXECUTIVE OFFICER,
CALIFORNIA STATE BOARD OF REGISTRATION FOR GEOLOGISTS AND GEOPHYSICISTS

(March 2, 1998)

THE POSITION
The Executive Officer is the confidential, constitutionally exempt employee who serves at the pleasure of the Board to administer Chapter 12.5 of the Business and Professions Code. Under broad general direction of the Board, the responsibilities are to plan, organize and direct programs for licensing geologists, geophysicists, engineering geologists and hydrogeologists and to enforce the provisions of the Geologist and Geophysicist Act (Act).

The position is responsible for:
- implementing program priorities of the Board;
- planning Board and committee meetings;
- interpreting the laws, regulations and Board policies;
- acting as a representative of the Board at meetings and hearings;
- administrating the examination process for the four license categories;
- managing a statewide enforcement program;
- interfacing with the Legislature promoting the Board’s programs;
- evaluating proposed legislation affecting the Board; and
- managing and supervising the office staff.

SALARY - $4,656 - $4,796/month

LOCATION OF POSITION - Sacramento

DESIRABLE QUALIFICATIONS
- Knowledge of principles and practices of public administration and management, including those related to program planning and evaluation, fiscal and personnel management, staff development, budgeting, executive decision making and public relations.
- Ability to communicate orally and in writing to the public, the media, the Administration, the Legislature, other government agencies and the profession.
- Computer skills.
- Possession of a current California Registered Geologist or Registered Geophysicist license.
- Ability and knowledge to apply appropriate civil service laws and regulations.

HOW TO APPLY: Resumes may be filed in person, mailed or faxed to: Board of Registration for Geologists and Geophysicists, 2535 Capitol Oaks Drive, Suite 300-A, Sacramento, CA 95833, (FAX - 916 263-2099). Attention: EO Selection Committee

FINAL FILING DATE: April 30, 1998 - 5:00 PM

INTERVIEWS: Applications will be screened by the Board, and only the most qualified will be invited to an interview. Locations for the interview will be announced. Travel expenses for interviews are the candidate’s responsibility.

EQUAL OPPORTUNITY TO ALL REGARDLESS OF RACE, COLOR, CREED, NATIONAL ORIGIN, ANCESTRY, SEX, MARITAL STATUS, DISABILITY, RELIGIOUS OR POLITICAL AFFILIATION, AGE OR SEXUAL ORIENTATION.

EXECUTIVE OFFICER DUTIES STATEMENT
The Executive Officer’s (EO) responsibility to the Board involves five primary categories:
1. Relationship with the Board
2. Execution of Board policy and Board programs
3. Governmental relations
4. Administrative functions
5. Public liaison

The President of the Board is the immediate supervisor of the EO. Specific instructions for work by the EO on Board policy matters in the above-listed categories shall be submitted through the President of the Board.

RELATIONSHIP WITH THE BOARD
- Advises the Board and provides information regularly on all Board programs and administrative matters by complete, clear and accurate reports.
- Responds promptly to requests by Board Members for information on Board issues.
- Responds promptly to directions by the Board President.
- Treats Board Members in an impartial and professional manner and is readily available to Board Members.
- Provides orientation material of the Board to new Board Members.

EXECUTION OF BOARD POLICY AND BOARD PROGRAMS
- Understands and complies with the overall Board policies and provisions of the Act and the Board’s Rules and Regulations.
- Acts as liaison with Board Committees and the Board to implement Committee work.
- Implements Board policies that lead to accomplishment of goals.
- Directs all aspects of its licensing program and assures the Board in a timely manner on its current status and new developments.
- Monitors administration and validity of examinations and provides for the security of the examination process.
- Monitors and identifies trends in candidate qualifications including pass/fail rates and the appeal process.
- Ensures effective and efficient management of all Board enforcement programs and interfaces with Enforcement Oversight Committee.

GOVERNMENTAL RELATIONS
- Coordinates and acts as liaison with the State Legislature on matters concerning the Board.
- Coordinates with the Department of Consumer Affairs and keeps it informed of Board matters.
- Coordinates with the Legislative Committee on proposed legislation that may impact the Board and the Act.
- Maintains a positive working relationship with other state agencies.
- Acts as liaison to related national organizations.
- Recommends regulatory changes to the Board and is responsible for all aspects of the rulemaking process.

ADMINISTRATIVE FUNCTIONS
- Plans, organizes and directs Board administrative functions.
- Manages and oversees all staff personnel.
- Provides oversight, direction and management of the Board’s annual budget.
- Ensures compliance and enforcement of Board, departmental, state and federal policies and procedures.

PUBLIC LIAISON
- Manages the Board’s public information efforts and directs consumer outreach programs.
- Represents the Board before the public, governmental agencies, educational institutions, industry and professional associations to provide information on the Board’s laws, regulations, programs and policies.
CS/AIPG sponsors an Annual Legislative Reception to create an opportunity for geoscientists to meet with Colorado Legislators; and provide them with geologic information, data, solutions, and assistance, all of which affect the economic well-being, health, and safety of citizens of Colorado. The event is designed for educational purposes, no lobbying is permitted.

In each of the past several years, the Colorado Section of AIPG has organized and served as the lead host at an annual reception for legislators of the State of Colorado. The goal of the “Legislative Reception”, as a stated policy is:

“To provide Colorado legislators the opportunity to communicate with professional geoscientists. Also, to demonstrate to the legislators the ability of geoscientists to solve problems quickly, efficiently, and economically, based on scientific methods, data, and technology; to anticipate geologic circumstances; and to prevent problems from occurring that endanger citizens’ lives and property.”

The annual session of the Colorado Legislature begins in mid-January. Therefore, the Legislative Reception is scheduled in late January or early February - early in the session, before legislators get bogged down in committee meetings and other activities. The Reception is scheduled during the week, typically on a Tuesday, because many legislators return home on weekends, and may leave on Friday or return late on Monday.

In order have an officially recognized function, the State of Colorado requires that an organization be placed on the “Legislative Social Calendar”. After attempting to eliminate conflicting dates for meetings of other geologic organizations, the Reception is scheduled through the Legislative Services Office in the State Capital Building at 7:30 AM on July 1, the first day of the legislative session. For example, the last two Legislative Receptions were at the University Club, which is only two blocks from the State Capital Building, and an easy walk for the Legislators. Parking facilities are available adjacent to the Club.

The Colorado Section attempts to use the Legislative Reception as a means to involve the broader geologic community in a mutual event, and as a means of fostering communication between and among ourselves, as well as with the Legislators. In September of each year we send over 100 invitations to State agencies, geologic organizations, universities, businesses, and consultants; and, of course, advertise in our own newsletter. Members of the Colorado Section play an important role by inviting their Legislators to attend, and by attending and supporting the Reception as individuals.

Several levels of involvement are available to potential attendees from the geosciences community; each with appropriate fees. Those who elect to serve as co-hosts can exhibit at the Reception, and are provided with an eight-foot table for their exhibit; and their organizations are publicized by listing on invitations to the Legislators, and by prominent signs at the Reception. Fees ($90) for exhibitors include attendance of three individu-
Eight co-hosts who were not exhibitors were: Amuedo and Ivey, Denver Geophysical Society, Denver Mining Club, Ground-Water Specialists, Hydrologic Consultants, Inc. of Colorado, John Himmelreich and Associates, University of Northern Colorado-Geology Department, and Women in Mining.

We believe the reception provides a rare opportunity for governmental agencies, universities, professional organizations, and private companies to congregate; and to communicate directly with our State Legislators. Our purpose is to provide a annual update of the potential knowledge available through the geologic community; and to offer access to that knowledge, as requested by the Legislators.

The Senators and Representatives, who attend the Reception, report that they enjoy the experience; primarily because of the informality, and exhibits that they can see, touch, and discuss. Many of the Legislators have become regular customers and attend each year to discuss geological scientific issues.

"Best Management Practices for Reclaiming" handbook revised

The Oregon Department of Geology and Mineral Industries (DOGAMI) has released a revised edition of the manual Best Management Practices for Reclaiming Surface Mines in Washington and Oregon, which describes reclamation and mining practices for landowners, land-use planners, and mine operators in Oregon and Washington. The report was published as DOGAMI Open-File Report O-96-2 and is now available in revised form for the price of $8.

The approximately 130-page, extensively illustrated manual provides information about planning a surface mine from start-up to final reclamation, incorporating water and erosion control during operation and reclamation, soil salvage and replacement, land shaping, and revegetation. The authors urge miners to use this manual as a resource in developing an environmentally and financially sound mine.

The new publication is now available from the Nature of the Northwest Information Center, Suite 177, State Office Building, 800 NE Oregon Street #5, Portland, Oregon 97232-2162, (503) 872-2750, FAX (503) 731-4066.

Researchers See Improvement in Nation's Air Quality

A study of long-term trends in ground-level ozone — smog that is formed through a series of chemical reactions between nitrogen oxides and volatile organic compounds in the presence of sunlight — shows significant decreases in summer afternoon ozone concentrations from 1980 to 1995 in the nation's three largest metropolitan areas: New York, Los Angeles, and Chicago. Details of the research conducted by Harvard University scientists was published in the January 20, 1998 issue of the Journal of Geophysical Research. A copy of the paper is available from the American Geophysical Union public information office, (202) 939-3212.

ARCADIS Geraghty & Miller
New Name of Integrated Firm

ARCADIS Geraghty & Miller, Inc. is the official name of the former Geraghty & Miller, Piedmont Olsen Hensley, Acurex Environmental Corporation, and Alternative Ferrenial Technologies. Contact: ARCADIS Geraghty & Miller, Inc., Denver, Judi Schoeck, Corporate Marketing Manager, (303) 292-1200.
PROFESSIONAL SERVICES DIRECTORY

This service is open to AIPG Members as well as non-members. The Professional Services Directory is a 12-month listing offering experience and expertise in all phases of geology. Prepayment required. Advertising rates are based on a 3 3/8" x 1 3/4" space.

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Executive Committee and Headquarters Activity

Members of the Executive Committee and/or of the Headquarters staff will participate in the following meetings, which provide opportunities for AIPG Members to exchange ideas with the Executive Committee and staff. We also welcome invitations from AIPG Sections to discuss AIPG programs and goals. If your Section would like to meet with members of the Executive Committee or Headquarters staff, please contact Headquarters to schedule a convenient time. Thank you.

May 3-6: Washington, DC  
AIPG Washington Fly-In (President Testa, President-Elect Fails and Advisory Board Representative Van Guild)

May 8-10: Arvada, Colorado  
Executive Committee Meeting  
(All Executive Committee and staff)

May 16-22: Salt Lake City, Utah  
AAPG Convention (President Testa, President-Elect Fails, Executive Director Knight and staff)

May 16-22: Salt Lake City, Utah  
AGI Council & Committee Meetings (President Testa, President-Elect Fails, Executive Director Knight)

Jun. 2-3: London, UK  
Geological Society Annual Meeting (President Testa, President-Elect Fails, Executive Director Knight)

Jun. 5-7: Cologne, Germany  
EFG Council Meeting (President Testa, President-Elect Fails, Executive Director Knight)

Jul. 20-23: Las Vegas, Nevada  
National Council of State Legislators (President Testa, President-Elect Fails)
CALAENAR

1998

May 4-5. Special Institute on Rights-of-Way, Denver, CO. Contact: Rocky Mountain Mineral Law Foundation, 7039 E. 18th Ave., Denver, CO 80220, Ph.: (303) 321-8100.


May 14-18. Linking Spatial and Temporal Scales in Paleocology and Ecology, Annapolis, MD. Contact: Lois J. Elms, Western Experience Penrose Conference Coordinators for the GSA, 4881 Evening Sun Lane, Colorado Springs, CO 80917, Ph.: (719) 597-9201, e-mail: ljeims@aol.com.

May 17-22. American Society for Surface Mining and Reclamation, Mining—Gateway to the Future!, St. Louis, MO. Contact: Diane Throgmorton, Coal Research Center, Southern Ill. Univ., Carbondale, IL 62901-4623, Ph.: (618) 536-5523, e-mail: diannet@siu.edu.


Jun. 2-5. The Environmental Sampling Field Course, Columbus, OH. Contact: The Nielsen Environmental Field School, Inc., 4688 State Rte. 605 S., Galena, OH 43021, Ph.: (614) 965-5026, fax: (614) 965-5027.

Jul. 14-18. Processes of Crustal Differentiation: Mantle Interactions, Melting and Granite Migration through the Crust, Verbania, Italy. Contact: Lois J. Elms, Western Experience Penrose Conference Coordinators for the GSA, 4881 Evening Sun Lane, Colorado Springs, CO 80917, Ph.: (719) 597-9201, e-mail: ljeims@aol.com.


Nov. 5-7. AAAS Conference in South Dakota to establish network of researchers in Great Plains states, Sioux Falls, SD. Contact: Ellen Cooper, Ph.: (202) 326-6431.


Nov. 12-17. AAAS Epic of Evolution Conference, Chicago, IL. Contact: Dave Amber, Ph.: (202) 326-6434.

Nov. 21-23. AAAS Conference on Guidelines for Anonymity interplay on the Internet, Irvine, CA. Contact: Dave Amber, Ph.: (202) 326-6334 or http://www.aaas.org/spp/anon

Send notices of meetings of general interest, in format above, to Editor, TPG, 7828 Vance Drive, #103, Arvada, CO 80003, e-mail: wjd@apig.com.

AIPG ANNUAL MEETINGS

October 3-8, 1998
Baton Rouge, Louisiana

October 5-8, 1999
Anchorage, Alaska

October 11-15, 2000
Milwaukee, Wisconsin

AIPG Membership Totals

As of 03/26/97 As of 03/19/98

CPG - Active 4,360 4,289
CPG - Retired 491 501
CFC 50 55
MEM 0 1
AP 5 5
AS 0 3
SA 36 43
Honorary 12 14

TOTALS 4,954 4,911

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APPLICATIONS RECEIVED - (February 21, 1998 - March 20, 1998)

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-Buckley, Keith D.

OH-Cunningham, Richard M.
565 N. Brancifort Dr., Canfield OH 44406. Sponsors: Joan Brassamie, Dave Claus, Dwight Williams.

NM-Dawson, Scott A.
2491 Sawmill Rd. #915, Santa Fe NM 87505. Sponsors: Jami C. Bailey, Jack Ford, Stephen Gunzelman.

NM-Haneberg, William C.

CO-Harp, Thomas A.

CO-Nahring, Eldon L.

Applicants for Member

MI-DeWyre, Robin S.
2123 Pless Dr., Brighton MI 48114. Sponsors: Mark Sweatman, John Rodwan.

New Certified Professional Geologists

ID-Halben, Charles W. Jr.
CPG-10223
606 N. Lincoln St., Moscow ID 83843-3248

NM-Haller, Timothy M.
CPG-10243
7201 Joyce Dr. NE, Albuquerque NM 87109, (505) 857-9109

IL-Hamper, Martin J.
CPG-10250
3643 West 61st Pl., Chicago IL 60629, (312) 263-6703

NV-Hendrickson, Robin E.
CPG-10256
Golden Phoenix Minerals, 3595 Airway Drive, Suite 405, Reno NV 89511, (702) 653-4919

NV-Ristocell, Steven J.
CPG-10257
393 Fricke Ct., Gardnerville NV 89410, (702) 856-5700

LA-Sierra, Amy L.
CPG-10253
4915 Millwood Dr., Baton Rouge LA 70817, (504) 473-5036

WA-Tomczyk, Thomas
CPG-10259
7316 124th Ave. N.E., Kirkland WA 98033, (206) 688-3831

New Candidate for Certification

TN-Sturdivant, Brock
CPG-0148
1607 Linden Ave., Nashville TN 37212, (615) 771-3690

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David E. Pope

(504) 342-5501
Baton Rouge, LA 70893
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For more information contact:

Convention Headquarters: Baton Rouge Hilton

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