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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 I 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
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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 back and white) are also encouraged. Whenever possible, drawings may be submitted on diskette in .pcx, .bmp, .tiff, .gif, 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:

**Technical**
- Mining (January)
- Petroleum Geology (March)
- Hydrogeology (July)
- Environmental Geology (September)
- Geophysical/Engineering (November)

**Professional (any issue)**
- Government and the Geologist
- Ethics and Standards of Practice
- Public Perception of Geology and Geologists
- Definition, Certification, and Licensing
- Practicing Geology Internationally

Other suggestions: Forensic Geology, History of Practice in a given field, Book Reviews, and Geology and the Military, Unusual Applications of Geology.

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FEATURE: Hydrogeology

Peer-Reviewed Papers
How Much Water?

James T. Gross, CPG

Field Testing Some
Hydrogeologic Assumptions
Wayne A. Pettypjohn

Report on AIPG's
Washington, D.C. Fly-In

Jonathan G. Price, CPG and Jim Shotwell, CPG

Ethics in Professional Practice
Case-of-the-Month Program
Available via the Internet

Ronald E. Bucknam

FRONT COVER - Upper Falls of the Yellowstone River and the Fishing Bridge in Yellowstone National Park. Photograph by John T. Howard.

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James T. Gross, CPG-7289

As a geologist and a water supply planner, I am frequently asked the question of how much water is available for future uses. This simple and ostensibly disarming question has often been used to embarrass and harass the unsuspecting water manager, particularly at certain public gatherings. Many of my colleagues have grown somewhat cautious about answering this question in public. Sometimes, however, it is just an honest question.

But even when this question comes with no sinister intent, I often struggle to answer it. As a technical specialist, I spend much of my time trying to answer many other questions: what happens if we take so much water out of this aquifer? How long will it take before water levels drop to a certain point? It’s easy to get so bogged down in the technical details of one’s work that we are unable to answer an easy question. So I thought I would share, a story with you. This story helps me answer the “how much” question, and I hope it helps clarify some of the challenges we face as water supply planners.

A friend of mine who works in a planning department of local government recently said to me “Hey, we need to figure out how many more people and golf courses we can plan for. Everybody knows that water is the limiting factor. So,” she asked me, “how much do we have left?”

“It depends,” I replied.

“Depends on what?” she asked.

“It depends on what kind of water you are talking about,” I said.

“I know what you mean,” my friend suggested, “ground water and surface water.”

“No,” I said, “I don’t mean where the water comes from. I mean what kind of water it is.”

“Surely there is only one kind of water,” my friend insisted, looking somewhat confused.

“Oh, no,” I said, “there are many kinds of water. But generally they can be identified as one of three main kinds. There’s free water, cheap water, and expensive water. What kind of water are you interested in?”

“Free water,” she said without hesitation. “Yes, I’m interested in knowing just how much free water we have left to use.”

“Sure,” I said, “I’m not surprised. Costs nothing, crystal clear, and pure as mountain snow.”

“So, how much free water do we have left?” my friend inquired.

“None”, I replied abruptly. “Our ancestors used that stuff up generations ago, long before there were so many of us on the planet.”

She looked somewhat disappointed, and paused for a moment. “Well then,” she continued, “lets talk about the cheap water. There must be lots of that, right?”

“Not lots, but some,” I replied, “We’ve squandered a whole bunch of it, and most of the rest is being used on lawns, tomatoes, and you-name-it.”

My friend was visibly disturbed. She thought for a moment, and then said, “I suppose you are going to tell me that all of the expensive water is gone too?”

“Good news,” I told her. “There’s an unlimited supply.”

Whether or not this conversation ever took place (it has), there are three important points I would make:

1) Water is water to most people other than water managers. People generally don’t think about where water comes from or how much it costs;
2) Right or wrong, many local government planners, and developers, are focused, perhaps fixated, on the question of how much water is available, rather than on the impacts associated with water supply development. As water managers, we have to understand this. Even more, we must engage our customers in a continuing dialogue about these impacts, be they economic, environmental, or social;
3) It illustrates the nature of the information gap between water resource managers and our colleagues involved in land use planners.

James T. Gross, CPG-7289, Senior Supervising Hydrogeologist, Planning Department, South Florida Water Management District, West Palm Beach, Florida.

Geological Society Appoints New Chief Executive

The Geological Society has appointed Mr. Edmund Nickless to be its next Chief Executive Officer. He will take over from Mr. Richard Bateman on July 1st.

Mr. Nickless, 50, is currently Head of UK Business Development at the British Geological Survey (BGS), where he began his career after graduating in Geology from Queen Mary College, University of London, in 1968.

The Geological Society is the UK organization representing the interests of professional earth scientists and is the UK’s premier forum for debate in the geosciences. It is the oldest geological society in the world, and was founded in 1807. It has over 8,600 members worldwide. More information on The Geological Society is available on their World Wide Web home page:

http://www.geolsoc.org.uk

JULY 1997 • The Professional Geologist
Field Testing Some Hydrogeologic Assumptions

Wayne A. Pettyjohn

Abstract

An assumption is not necessarily true, and in many cases they have not been tested. This is particularly the case with a number of hydrogeologic assumptions. Field investigations involving fine-grained, unconsolidated sediments indicate that fractures and other macro pores, as well as transpiration, play a major role in ground-water flow and mass transport.

Introduction

An assumption is something taken for granted or accepted as true without proof. All of us have made assumptions concerning ground-water quality or the manner in which an aquifer system functions. Not uncommonly these suppositions are based on past experience, hearsay, published information, a single sample, perhaps on the basis of several samples representing a considerable difference in both space and time, or an equation formulated to simplify a physical phenomenon.

From these generalized assumptions, the next step to using them as the basis for some plan, effort, initiative, guideline, or regulation is a natural one. On the other hand, some of these impressions might lead one down a muddled road because the data collected do not appear to conform to the manner in which the physical system is visualized to function or the data may be incorrect.

Perhaps one of the reasons that our generalizations can lead us down a troubled pathway is that so many of them are exclusively based on theoretical concepts or laboratory studies, or are required to simplify a mathematical model; few have ever been extensively tested under field conditions. Not only are detailed field studies unusual, but adequate, long term ground-water monitoring, even of contaminated sites, is rare.

Many of the following general assumptions have been tested over a period in excess of eight years at a field site in north-central Oklahoma. Others have been encountered during ground-water investigations here and there throughout the country.

Assumption

Ground-water recharge only occurs when field capacity is exceeded.

When a soil or rock unit has been saturated and then allowed to drain by gravity, it is said to be holding its field capacity of water. The basic idea implies that ground-water recharge can not occur if the soil-moisture content is less than field capacity because the earth materials will absorb all of the water that infiltrates. Although the idea of field capacity is a useful concept, many soil scientists have been reluctant to use it, largely because it ignores flow through preferred pathways, such as macro pores. Macropores include fractures, insect and worm burrows, decayed rootlets, the space between soil pedds, and other large openings.

![Graph showing the relation between a rainfall event and water-table rise in an unconfined aquifer that consists of fine-grained material.](image-url)
Figure 2. Precipitation and hydrograph of a well 14 feet deep showing the response to rainfall.

A graph of precipitation and water-table elevation is shown in Figure 1. This rainfall event occurred in July, 1989 at a site where the unconfined aquifer consists of a nearly homogeneous mixture of very fine sand, silt, and clay (silt loam). The unconsolidated, fine-grained alluvial materials forming the aquifer contains soil characteristics and structures, including an abundance of macropores, throughout the entire thickness (43 feet) of the valley-fill deposit.

At the start of the rain, the soil-moisture content at the site was well below field capacity, and the water-table was about 7.5 feet below land surface. Most of the precipitation, amounting to nearly 3 inches, took place within an hour. After 30 minutes of heavy rain, the water-table began to rise, suggesting flow through the unsaturated zone at a rate of about 15 feet per hour. At the A-well cluster, which lies in an open area and contains five wells of different depths, drainage from the unsaturated zone largely ceased after about 7 hours. At the D-well cluster, which lies under a line of large hackberry and pecan trees, the water-table rise was less than occurred at the A site, but the water-table continued to rise for several additional hours. This is probably related to interception by the trees, a greater fillable porosity at this location, and natural recovery of the water-table during hours of darkness.

This aquifer performs in a similar manner throughout the year, but whether or not, and how much, the water-table responds to rainfall depends on the amount, intensity, and duration of the event, as well as the soil-moisture content. Nonetheless, ground-water recharge can occur even though the unsaturated zone is well below field capacity. Furthermore, since ground-water recharge may occur during or within minutes or hours after a rain, one should expect that ground-water quality also would change at the same rate.

**Assumption**

The rise in the water-table following a period of rain can be used to estimate the amount of ground-water recharge.

One approach to calculating ground-water recharge is to multiply the amount of water-table rise by an estimated value of porosity or specific yield. On the other hand, a rain-induced response of the water-table in a fine-grained, unconfined aquifer is related to the soil-moisture content and the fillable porosity in the unsaturated zone. Calculated values of fillable porosity at the Oklahoma field site range from less than 10 to as much as 24 percent.

Dry earth material can absorb substantially more water than can wet material because, in the latter case, part of the storage space is already occupied by fluid. The infiltration of one inch of water in a dry unsaturated zone (fillable porosity of 25 percent) results in a water-table rise of about four inches, while the same quantity in a moist situation (fillable porosity of 10 percent) will cause a rise of nearly 10 inches.

A hydrograph of the water-table in a well 14 feet deep is shown in Figure 2. Notice that the rise of the water-table in early April totaled about 1.3 feet. This reflects infiltration of approximately 1.5 inches of rain at a time when the soil-moisture content was relatively high. By May, however, evapotranspiration had reduced the moisture content, which increased fillable porosity.

Figure 3. Hydrograph of a well 14 feet deep showing fluctuation caused by transpiration during the summer.
Consequently, two closely spaced rains, amounting to about 3.1 inches, caused the water-table to rise only about a foot. The rapid decline in the water-table after the April event, as well as through out the remainder of the summer, was largely the result of transpiration, and by August the soil-moisture content was very low. At that time nearly 5 inches of rain fell during a two day period, and the water-table responded by rising only 1.35 feet.

**Assumption**

Transpiration ceases after the first killing frost in the fall.

It is commonly assumed that removal of ground water by transpiration largely ceases in the fall after the first killing frost, the leaves have fallen, and the grass is dormant. This, however, is not necessarily always the case. Figure 3 is a hydrograph of the water-table based on pressure transducer data collected at five minute intervals. During the few summer days illustrated, the water-table was about 10 feet below land surface. Each day the water-table declined about .3 feet over a 12-hour period, starting about 6 a.m., only to recover again during hours of darkness. The aquifer was dewatered about .1 foot per day in the absence of recharge.

A similar pattern has been observed throughout the entire year, although the amplitude diminishes from late summer to mid-winter as shown in Figure 4. Since there are no pumping wells tapping the aquifer, these fluctuations must be caused by transpiration. Perhaps the diurnal fluctuations in the fall and winter are due largely to transpiration by evergreens, holly, and a variety of bushes that occur throughout the area.

**Assumption**

The water-table gradient is rather uniform, both in space and time, if the aquifer is not stressed by pumping.

In some surficial aquifers the direction and magnitude of the hydraulic gradient can change dramatically from one time to the next even though the aquifer is not stressed by pumping. The April water-table map, shown in Figure 5, indicates a flow direction to the southwest with a gradient of .003. By July (fig. 6) ground-water was flowing to the south-southeast and the gradient had doubled. Throughout the year the direction of flow ranges over an arc of about 125 degrees.

At this site, when the water-table is less than 7.5 feet below land surface, ground water discharges into a small stream that lies a few hundred feet to the west. When the water-table declines below the bottom of the stream, the direction of flow changes and all of the ground water discharges into a larger and deeper stream that lies several hundred yards southward. The major cause of the water-table decline, averaging about 8 feet from March to October, is transpiration by large trees.

**Assumption**

Unconsolidated fine-grained sedimentary strata are impermeable or nearly so.

Despite its appearance, the unconsolidated fine-grained alluvial material at the field site is quite permeable, both vertically and horizontally. A considerable number of three day constant rate aquifer tests, as well as slug tests, indicate that the hydraulic conductivity ranges from around 40 to 90 gpd/ft2, and averages about 60. This is similar to many sandstones. Tracer tests, velocity studies, the lack of head differences between wells of different depths during recharge events, and the ratio between horizontal and vertical permeability is about one. Wells can produce a sustained yield of as much as 12 gpm.

At this site the fine-grained alluvial material fills a steep-walled valley cut into a massive shale unit. The tops of two buried soil horizons occur at about four and 27 feet below land surface; they are approximately 1,300 and 10,300 years old. Although only two A-horizons are evident, soil characteristics, including macropores, are abundantly evident throughout the entire 43 feet thickness of the alluvial material, and these account for the greater than expected values of hydraulic conductivity. For the most part, however, the soil features are apparent only
This suggests that laboratory analyses of unconsolidated material are, at best, open to serious question. This is of particular concern when the analyses are driven by regulatory controls. It is suggested that, where possible, far more reliable values can be obtained by conducting aquifer tests by means of discharging wells. The discharge rate, commonly only 1 to 5 gallons per minute, needs to be merely sufficient to stress the aquifer. The low rate also has the advantage of producing only a meager quantity of water, which in some cases must be drummed or disposed of by some approved method.

Assumption

Movement of solutes through a fine-grained unsaturated zone is very slow with residence time measured in months, years, or decades.

The idea that solute movement or leaching is exceedingly slow in fine-grained materials is a half truth. The rate of movement of chemical constituents through the unsaturated zone depends, at least in part, on permeability of the earth materials and precipitation. Migration commonly is envisioned in a manner similar to an intermittent wetted front moving through the bulk soil matrix (piston flow).

With the exception of a continuous source, it is suspected that leachate movement is not continuous, but rather one that operates as a series of individual movements in response to changes in soil-moisture content, infiltration, and ground-water recharge. The complete removal of a contaminant from the unsaturated zone probably will require many years, but individual, short

Assumption

Laboratory analyses of hydraulic conductivity of cores of unconsolidated fine-grained earth materials provide reliable or at least useful results.

Rather sophisticated laboratory analyses of cores from the field site indicate values of hydraulic conductivity that are three to six orders of magnitude smaller than values determined from aquifer tests (Melby, 1989). Regardless of the care used to prepare the samples for the permeameter tests, the macropores were largely destroyed, both during coring and packing, which resulted in exceedingly small values of hydraulic conductivity.
periods of flushing, each of which leaches a small percentage of the remainder, appear to be the mechanism at work.

Some preliminary data from abandoned oil-field brine disposal pits indicate that the rate of leaching from the unsaturated zone is in the vicinity of 10 percent of the remainder per year in an area of fine-grained sand where annual precipitation averages about 22 inches. At a site in central Ohio the concentration of chloride in a plume originating at an old brine disposal pond was reduced by half each year, on the average. At the Ohio location the alluvial sediments consist largely of clay and silt with some admixed sand and gravel, and precipitation is about 36 inches per year.

In fine-grained material, much of the flushing occurs through macropores, in which case the residence time may be measured in minutes, hours, or a day or two depending on the reaction rate of the system. The short-lived leaching process can cause significant but brief changes in ground-water quality during or immediately following a rain, and this phenomenon can have a major impact on the interpretation of chemical analyses of ground-water samples.

As Figure 7 shows, the concentration of nitrate in ground-water increased at least fourfold in less than two days following a rain that was immediately preceded by the application of fertilizer. Furthermore, the nitrate concentration decreased approximately five-fold to about half the pre-rain concentration within another two days. This event took place in September following a relatively long dry period. A similar event occurred during the following March, when the soil-moisture content was about twice as high as it had been in September (fig.8). This example illustrates the same time-related concentration distribution pattern but with a decrease in concentration with depth.

In both examples, the water-table did not rise with the original increase in concentration, implying that the volume of water that infiltrated was relatively small but of high concentration. The subsequent water-table rise, when compared with the concentration decrease, suggests infiltration of a more slowly moving but larger volume of water that was less mineralized with respect to nitrate but not necessarily other major constituents.

The implications relative to ground-water monitoring are significant. If the pattern is similar in other geologic terrains, then the concentration of some selected constituent in a monitoring well sample is related to well depth, construction, and when the sample is collected with respect to a rain. To determine a generalized background concentration, it would appear that samples should be collected after a week or two of dry weather, but this suggestion should be based on an understanding of the reaction rate of the system. The reaction rate can be determined only by continuous monitoring of the water-table, which is best accomplished by pressure transducers/recorders, and by the closely spaced collection of water samples.

Assumption
Ground-water quality is nearly constant, both in space and time.

The quality of ground-water in unstressed, confined aquifers should remain nearly constant, but in shallow or surficial aquifers, the quality can change significantly within a matter of days, hours, or even minutes, as well as throughout the year.

Figure 9 shows the variability of specific conductance throughout a period of several months in a well 14 feet
Figure 9. Variability of electrical conductivity in a well 14 feet deep, and relation between weekly and quarterly samples.

In this case extreme values ranged from about 800 to almost 1175 umhos, a difference of nearly 50 percent. Superimposed on the graph of weekly measurements are quarterly samples, which ranged from about 920 to 1075 umhos. This figure clearly illustrates that quarterly measurements do not adequately express the degree or magnitude of variability.

Assumption

Electrical conductivity can be used to estimate the concentration of selected chemical constituents.

Electrical conductivity provides an acceptable measure of the dissolved solids content of a water sample, but it does not allow one to estimate the concentration of minor constituents. Electrical conductivity is strongly influenced by the major chemical constituents, such as calcium, sodium, chloride, sulfate, and bicarbonate. Generally, minor constituents, which normally occur in concentrations less than 10 mg/L, have little impact on the measurement.

Figure 10 shows the relation between nitrate and electrical conductivity. In this case nitrate, driven by a rainfall event, decreased with time as the electrical conductivity increased, then tended to follow the same pattern but at a reduced concentration, and finally nitrate began to increase as the electrical conductivity decreased. Apparently a small volume of nitrate-enriched water moved rapidly through macropores, and this was followed a day or so later by a much greater mass of water that contained an abundance of calcium bicarbonate but a small amount of nitrate.

Assumption

Nitrate can be used as an indicator of the presence of other agricultural chemicals.

There is a high probability that a small percentage of fertilizer and other agricultural chemicals in some situations can travel rapidly to the water-table by means of preferred pathways, as previous examples have illustrated. On the other hand, nitrate can have several other sources, none of which are related to agricultural activities.

As one example, over a period of several months in the 1960's several water samples were collected from a shallow private well in North Dakota that tapped a mass of surficial sand and gravel. Livestock were excluded from several acres surrounding the well, the adjacent grasslands were but lightly grazed, and there were no other apparent sources of contamination in the near vicinity. Nonetheless, from one time to the next the nitrate concentration ranged from less than 2 to more than 100 mg/L. The owner noticed a relation between rain and high concentration. In this case the source of the nitrate was the rain induced leaching of decaying organic matter that had accumulated in the many shallow depressions (prairie potholes) that dot the land surface.

Assumption

Cuttings of earth materials penetrated during well drilling provide an accurate representation of subsurface conditions.

Cuttings from holes drilled by auger, hydraulic rotary, or air provide a good indication of the lithology of the material being penetrated, but they do not furnish adequate information on the rock structure, which may control hydraulic conductivity. Cores impart far more detail than cuttings, but they too can be misleading, partly because a core represents an infinitely small sample of an infinitely large area.

Lithologic logs, based on cores acquired from a hazardous waste disposal site, are shown in Figure 11. The alternating layers of very fine-grained sandstone, silt-
stone, and mudstone suggest individual water-bearing zones that are separated by confining units. The cores display a few fractures, but presumably not enough to have much influence on hydraulic conductivity.

When the vertical head distribution is examined, however, it becomes clear that the entire upper 50 to 70 feet is so fractured that the entire thickness serves as a single hydrologic unit, regardless of rock type (fig. 12).

**Figure 11.** Cores from a hazardous waste site appear to indicate an alternating sequence of aquifers and confining units that would reduce the potential for vertical migration.

**Assumption**

Published maps accurately depict the conditions that exist in the subsurface.

For some strange reason many people assume that any type of map, particularly if published, accurately represents a subsurface condition, and, in many cases, a map generated by a computer graphics package is considered even more authoritative. Anyone who has ever constructed a contour map is well aware of the fact that if 10 individuals using the same data set each draw a map that the end product will consist of 10 unique maps. If the same individuals use the same data base a second time, there will be 10 more unique maps. At least a computer mapping package is consistent, and, presumably, it will produce the exact same map each time the program is run, but this does not mean that the map is correct. Perhaps a partial solution to this dilemma is for every investigator to use their knowledge of geology and hydrogeology, couple it with a strong measure of common sense and fundamental hydrogeologic principles, and draw their own maps.

**Assumption**

Large concentrations of a contaminant in the unsaturated zone indicate a major pollution source.

It seems logical to assume that large concentrations of a contaminant in the unsaturated zone will serve as a source of ground-water contamination because infiltration will leach the constituents to the water-table, and this is implied from several previous examples. On the other hand, large concentrations in the unsaturated zone may indicate that leaching is not very effective.

**Figure 12.** A vertical flownet based on water levels in wells of different depths indicate that the upper 50 to 70 feet functions as a single hydrologic unit regardless of rock type.

**Figure 13.** Vertical distribution of chloride in cores from a site contaminated by oil-field brine.
Shown in Figure 13 are records of the distribution of chloride in three cores consisting largely of very fine-to-fine-grained sandstone. Several cores were collected in the same general area, but these are typical of the entire suite. Core D-1, representing background conditions, was collected several hundred feet from any known or suspected location of oil-field brine contamination at a site in south-central Oklahoma where precipitation averages about 28 inches per year. Core W-6 was obtained by drilling through the middle of an old saltwater disposal pit. The pit had not been used for some 40 or so years. Chloride concentrations in D-400, also collected from the middle of an old disposal pit with the same general history, are 12 to nearly 30 times greater than those W-6.

The only difference between the pits at W-6 and D-400 is the presence of a zone of oily waste, a few inches thick, at D-400. The hydrocarbon layer, which formerly floated on the saltwater surface, was covered by dike material when the pit was abandoned in the early 1950's. Apparently the hydrocarbon serves as a very low permeability membrane that greatly reduces infiltration and leaching. In turn, this suggests that the unsaturated zone beneath the old pit, even though it contains a substantial mass of contaminant, is not a major source of ground-water contamination. Similar conditions have been encountered throughout Oklahoma.

Assumption
A chemical analysis of a single constituent is satisfactory and chemical analyses are always correct.

Not uncommonly an attempt is made to reduce the cost of an investigation by analyzing a water sample for a single constituent, such as chloride where oil-field brine contamination is suspected.

Figure 14. Map showing original chloride values in surface and ground-water samples.

This approach is both unscientific and thoughtless because it does not allow one to determine the accuracy of an analysis.

Figure 14 is a map that shows the concentration of chloride in samples of surface and ground water in an area where both have been contaminated by oil-field operations. Notice, for example, the 743 mg/L concentration in the stock pond near the southeast corner of section 1. The pond is impounded behind an earthen dam in a small but long ephemeral stream channel that originates in Section 6 about a half mile to the northeast at a large, former saltwater disposal pit. The reported concentration, about two orders of magnitude greater than expected, strongly implied that the disposal pit, which had not been used for more than 40 years, was the source of the chloride.

If the water samples had been analyzed only for the chloride ion it is likely that the concentrations and interpretation would not have been questioned. Fortunately, complete inorganic analyses were run on all of the samples. A brief comparison of chloride and specific conductance indicated major inconsistencies, and an examination of the cation-anion balance showed that the analyses were not to be trusted. Checking in this manner would not have been possible had the analyses been for the chloride ion only.

The samples were submitted to another laboratory and reanalyzed. Resulting chloride data are shown on the map in Figure 15, which differs considerably from the original. There was no consistency in the errors in concentration reported in the original analyses, and the

Figure 15. Map showing corrected chloride values in surface and ground-water samples.
stock pond contained only 4 mg/L of chloride rather than the 743 reported originally. The old pit was not a major source of contamination.

Conclusions

The conclusions to be reached from the above-described hydrogeologic assumptions should be quite obvious. The solution, however, boils down to at least two clear facts. First, adequate and long-term monitoring of field sites, representing different geologic conditions, are essential to justifiable interpretations of hydrogeologic data, and to the formulation of regulations and guidance documents. Secondly, results of the field studies must be made available to, and used by, the scientific/regulatory community in order to avoid the entanglements brought about by invalid assumptions.

Many of the examples described in this report are based on data obtained through the arduous, time consuming, frustrating, and seemingly thankless work accomplished by several former graduate students in the School of Geology at Oklahoma State University. Neither rain nor snow, heat or freezing cold kept them from their assigned duties. They joyfully conducted their work in a professional manner with never a discouraging word or complaint...at least not too many.

Reference


Wayne A. Pettyjohn, 1502 Wildwood Drive, Stillwater, OK 74075. Retired from the School of Geology, Oklahoma State University. Reprinted from the Journal of Applied Ground-Water Protection, Volume 1, Number 2.

The Bernard L. Majewski Research Fellowship

The American Heritage Center announces the second annual offering of the Bernard L. Majewski Fellowship and invites applications from interested scholars. The Fellowship is named in honor of the late petroleum industry pioneer, Bernard L. Majewski, and provides a stipend of $2,500 in support of research conducted in the archival collections at the American Heritage Center on the campus of the University of Wyoming. Acceptable areas of research include history, oral history and historical archaeology pertaining to economic and petroleum geology, or, environment and natural resources, business or economic history pertaining to economic and petroleum geology. The deadline for applications for the 1998 Fellowship is December 15, 1997 and research should be conducted by the Fellow within one year of appointment. For application information or a comprehensive listing of available research collections, contact: Manager, International Archive of Economic Geology, American Heritage Center, P.O. Box 3924, University of Wyoming, Laramie, WY 82074, (307) 766-6506, fax (307) 766-5511 or e-mail: mgrafel@uwyo.edu. For updated information on this subject, check web page: http://www.uwyo.edu/ahec/iaeg/majewski.htm

Special Update: USGS Library may be Spared Draconian Cuts

At the recent meeting of the AGI Member Society Council in Dallas, member society representatives expressed unanimous opposition to an internal USGS plan to drastically cut the budget for its library system. The proposed funding decrease would cut in half the already reduced number of subscriptions that the libraries receive, crippling the holdings of current literature and downgrading one of the Survey's best-known and well-used outreach functions. Acting on these concerns, AGI President Ed Roy wrote a letter to USGS Director Gordon Eaton opposing the proposed cuts. Many other geoscientists both in and outside of the Survey also wrote to Eaton and Chief Geologist Pat Leahy to express their concern as well.

Subsequently, the USGS Policy Council met and decided to back away from the proposed cuts. Although the library's overall financial picture is still unclear, impacts on periodic subscriptions will be minimized and future decisions will be made in the context of a long-range plan. The Council, which comprises the Survey's top leadership and division chiefs, also recognized bureau-wide responsibility for the library system. Long-term budgetary pressures remain, and it is important to realize that library funding will continue to erode unless efforts continue to emphasize the value of the library system both for research and as an outreach tool.

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Report on AIPG’s Washington, D.C. Fly-In

Jonathan G. Price, President, and Jim Shotwell, Chair of our National and International Affairs Committee

The Institute’s recent fly-in to Washington, D.C. was a resounding success, and the participants are urging us to do it again, preferably annually.

We invited Presidents and Presidents-Elect, or their representatives, of each AIPG Section, members of the National and International Affairs Committee, members of the State Affairs Committee, state geologists who are members of AIPG and who had experience with such meetings in Washington, D.C., members of the Executive Committee, and our Executive Director to attend. Considering that everyone volunteered their time and paid their own ways to attend, we were delighted with the turnout of 21. Participants included Bob Braunstein (Alaska), Dawn Garcia (Arizona), Stephen Testa (California), Tom Fails and Bill Knight (Colorado), Bob Jordan (Delaware), Ron Alexander (Kentucky), Janine Mauersberg (Maryland), Gary van Guild (Minnesota), Kathy Benedetto (Montana), Jon Price (Nevada), Allison Kozak (New York), Charlie Mankin (Oklahoma), Dennis Pennington (Pennsylvania), Jim Shotwell (Texas), Gene Aleshin, John Dragonetti, Mike Lawless, John Marr, and Russ Wayland (Virginia), and Larry Woodfork (West Virginia). Feel free to contact any of us for further insight on the fly-in.

In addition to perhaps our most important meetings with Senators, Representatives, and their staff, we met with geoscientists working for key committees in Congress and with leaders in various federal agencies: the Water Resources and Geological Divisions of the U.S. Geological Survey, the Office of Fossil Energy in the Department of Energy, the Environmental Protection Agency, the Office of Water & Science in the Department of Interior, the National Atmospheric and Oceanographic Administration, and the National Science Foundation. We also met with leaders in several Washington-based lobbying, trade, and professional organizations: the U.S. Chamber of Commerce, the National Mining Association, the American Society of Civil Engineers, the National Society of

Professional Engineers, the Committee for the National Institute for the Environment, the Sierra Club, and the Ecological Society of America.

Prior to the fly-in we prepared a flier for distributing to everyone with whom we met. The flier, which the Executive Committee approved at its meeting on April 26, highlighted the purposes of AIPG and key official policies and positions of the Institute, including support for specific federal programs (Please note that this flier is available through AIPG National for section members to use for their local meetings). The fly-in group met Sunday afternoon, May 18, at the office of the American Geological Institute, to review the flier, update our schedule of meetings for the next three days, discuss which issues were most important for the specific groups we would meet, decide who would go where, and discuss logistical matters. Most of the agency meetings took place on Monday and Tuesday, and we used Wednesday primarily for meetings with our Congressional delegations. To make further adjustments and discuss issues in depth we also met for dinner Sunday, Monday, and Tuesday evenings.

Did we have any impact? Indeed we did, both in the short term and in the long term. In the immediate short term, our presence during this particular week helped to move the bill in the Senate to reauthorize the National Geologic Mapping Program. In the longer term, we developed rapport with Senators, Representatives, and their staffs, and we commanded the respect of bureaucrats in several federal agencies, who are now asking for AIPG members to advise them on their strategic planning and overall programs and to participate in reviewing proposals for federal funding. We also began to find common ground between geologists and others who have active lobbying organizations in Washington, D.C. and who will likely help us with support of selected issues.

Why should AIPG put emphasis on national government affairs? A number of AIPG members have voiced concern about perhaps an overemphasis by AIPG’s National Headquarters on international relationships with our colleagues in Europe, when the real action for our members is more at the state and local levels. The feeling that National Headquarters needs to do more to support the Sections has been a common theme at our annual Advisory Board meetings. At last year’s meeting we polled the Section delegates to the Advisory Board, and most felt that a Washington, D.C. fly-in would be a good idea. Some obvious reasons for AIPG to be more active in advocacy for the profession at the national level are (1) many national regulatory programs, through the Environmental Protection Agency, the Army Corps of Engineers, the Bureau of Land Management, the Forest Service, the Minerals Management Service, and others have dramatic impacts on what goes on within the states and often mandate what states and local governments must do in their regulatory programs; and (2) much of the funding, from basic geological data collection (such as 1:24,000- to 1:100,000-scale geologic mapping and collecting data on streams and ground water) to mitigating geological hazards and to funding of fundamental research, flows from the federal government.

We gained some useful insight on why some agencies are more successful in their efforts (to show their relevance to society and, as a corollary, to justify expenditure of taxpayer funds for their programs) than others. As D. James Baker, Undersecretary of Commerce and head of NOAA told us, “an aggressive outside community can have a tremendous impact on an agency.” His agency actively solicits input and support from its constituents.

Many thanks are in order to all AIPG Sections that sent representatives or contributed ideas for the meeting, to the American Geological Institute’s Government Affairs Program for their help with logistics, to the AIPG staff for their assistance, and to the individuals with whom we met. Steve Testa, AIPG President-Elect, is already beginning to plan next year’s fly-in. If you are interested in participating, please let us know or discuss it within your Section officers.
Ethics Complaints:
How Not to Make One

I recently received an anonymous letter containing assertions that one of the "guest columnists" who contributed to this column is practicing unethically by simultaneously (1) holding a job with a company, (2) running a private consulting service, and (3) consulting for the agency regulating the part of the profession he practices in (part of the environmental field). Beyond a slightly longer description of the foregoing and various judgmental comments, the letter ends, "The rest find for the plaintiff."

Apparently the author of this letter feels this constitutes a viable ethics complaint. It does not. Section 1.3 of the AIPG Disciplinary Procedures states:

"Complaints shall be based on personal knowledge and be signed by the Complainant, shall identify the member or applicant against whom the complaint is made (the Respondent), shall identify the specific Rules under the Code of Ethics which are alleged to have been violated, and shall describe the conduct giving rise to the alleged violation. Complaints shall be accompanied by copies of any letters, reports, documents, or statements upon which the complaint is based, and a list of persons (potential witnesses) who have personal knowledge of the matter, including a brief statement of what the knowledge of each such witness is alleged to be."

The letter I received fails to be a valid complaint because (1) it was not signed, (2) it contained no references to the specific portion(s) of the Code of Ethics alleged to have been violated, (3) the descriptions of the alleged unethical practices are quite generalized, (4) there was no supporting documentation, and (5) no potential witnesses were identified.

The information specified in Section 1.3 is needed in order to properly assess the complaint and provide a basis for further action. In particular, the person making the complaint must identify himself or herself. If I, as the Ethics Chair carrying out specific functions assigned in the Disciplinary Procedures, know who to contact, I can request further information to make up for other deficiencies in complaint.

The alleged activities do not on their face constitute a violation. There are many AIPG members who work for more than one organization, myself included. This is not unethical in general. It is a matter of the employ-
Registration and Multistate Geologic Practice

Many of us have multistate and even multinational geologic practices. The proliferation of registration requirements prompts the following observations, comments, and suggestions. A member, who is licensed in four states, initiated this discussion but requested anonymity, which I believe is appropriate in this case. The following is a combination of his contributed comments and some of my own.

As consulting geologists, we provide a service. Although our profession is technical and requires intense (and expensive) training, we are in the service business. Our clients come to us because they like the way we do the work—this has to do with accuracy, integrity, the eye appeal of our reports, previous association with the client, and with our individual pricing structure for services. That is why clients come to one person or one firm instead of a competitor. The client is comfortable with that consultant. If the client wants to send one of us to a location where registration is in force, we should not have undue constraints in our path. Hence the question, when should registration or similar qualifications be obtained for those jurisdictions in which we are not registered?

This question brings up the related question, where is one practicing? For example, several years ago I worked on a case involving Wyoming coal. Most of my work was done in Denver using various public and private reports. Eventually I testified in California state court in a related trial. Overlooking for the point of the argument that I was exempt from California’s registration law as a government employee, does the fact that I was testifying in California mean that I was practicing in California? I was testifying about Wyoming geology. Does the fact that my client was a legal resident of the District of Columbia make any difference? Does a brief field trip to Wyoming during the investigation of this case mean that I was practicing in Wyoming even though most of the time spent was in Colorado?

Consider a couple more examples. Consider a consultant working for a medium-sized industrial minerals firm that is domiciled in Texas. The client has active mining operations in Pennsylvania, Arkansas, and Texas and several exploration-level projects in Colorado. Recently, the client has discussed the possibility with the consultant of looking at the operations in Pennsylvania and Arkansas as they are having some quality-related problems that may be related to mine geology. Now, if registration passes in Texas, does the consultant have to get registered in Texas to work for this client? If the consultant goes to visit the operations in Pennsylvania and Arkansas, reciprocity is available, since the consultant is registered in California.

However, did you ever try to get reciprocity? A consultant reports receiving reciprocity in Idaho and Arizona, based on his California registration, but described getting reciprocity as “a pain in the rear.” It took a lot of time and effort—a major project for which there was no immediate compensation (not chargeable time in other words). What is needed is an easy way to get temporary registration (a green card if you will), to work in these states. Does a short trip to a processing plant really constitute geologic practice in Pennsylvania?

Final situation: the client is a Canadian junior exploration company for which the consultant has been engaged for the better part of a year in a due diligence project at a property in California—the consultant is registered in California. The consultant has also carried out some low-key exploration in Arizona, New Mexico, and Mexico for this client. The client also has a property in the Northwest Territories on which they may obtain some funding. If so, the consultant may be asked to work there as well. With Canadian registration in the works, that is another place to get registered! More paperwork, more fees! Anyone for a blanket registration for North America as part of NAFTA? Those of us in the mining and petroleum businesses would really appreciate it.

What constitutes geological practice in a state? Is domicile required? Does it require holding oneself out to the public in that state as being available to do work in that state? Does a business card in a professional journal which is mailed to that state (like The Professional Geologist) or posting a web page which can be accessed by a resident of that state constitute the requisite holding oneself out to the public? Some states permit practice for a limited time without requiring registration. It would be nice to know which states and what the time limits are.

Possible Solutions or Mitigations: the consultant who initiated this discussion suggests, and I agree, that AIPG could be of service to the profession by acting as a clearinghouse of data for all professional geologists. It could post all state, provincial, etc. registration laws on its web site. This would provide a one-stop answer to at least some of the questions raised. AIPG could also act as a spokesman for all professional geologists and promote the idea that there should be mobility between the states for single projects. In other words, if a consultant needs to go to Arkansas, the consultant should be able to call up the AIPG and get his data packet sent to Arkansas (for a $50 to $100 fee of course). Arkansas should just accept the data in a packet without making one fill out a bunch of other forms which have their letterhead. After all, if a consultant is good enough for one state, he or she should be good enough for another, that is if states are really interested in professional competence. The problem of lack of reciprocity is really a pain.
when one performs one job once in every few years in a particular state.

The foregoing should be sufficient to generate a lot of comments and suggestions.

Registration as a Vehicle to Restrict Practice: a Response

Ronald J. Wallace, CPG-8153, responded to Bruce Darling’s comments on the Georgia geologists in column 17 (April ’97). Wallace wrote, “The Georgia State Board of Registration for Professional Geologists now administers the Association of State Boards of Geology (ASBOG) national exam. As to Mr. Darling’s statement that the previously administered tests were biased, I have to disagree. I received my Masters in 1980 from the University of Kansas and took the Georgia exams in 1994. I studied in the evenings after work and went to some study sessions sponsored by the Atlanta Geological Society. I passed both parts of the exam the first time I took them. Part I was difficult and there were a few questions concerning Georgia geology, but I do not consider this bias. Part II was designed to measure the practical experience. My background was mainly in petroleum geology with four additional years in environmental investigations. I considered Part II as being easy because of my experience.

“Georgia has now administered the ASBOG exam three times. It will be interesting to see what the pass rate percentage is under this exam.”

I appreciate Wallace’s comments for two reasons. First, for informing us that Georgia has changed to the ASBOG exam, and second, for providing his personal experience with the former Georgia exam. Because Wallace’s last sentence suggested that his four years of environmental experience assisted him in Part II of the old exam, I called him asking whether he would have had more difficulty with Part II had he not had the environmental experience. Wallace replied that while his environmental experience helped him, he believed that he would have passed Part II had he not had it. Wallace stated that Part II covered practical applications and working principles more than geology. Wallace also reiterated his point that although some Georgia geology was included in Part I, which covered geologic principles, extensive, detailed knowledge of Georgia geology was not required.

If someone knows the pass rate for those taking the Georgia ASBOG exam, please pass it along.

Footnotes
1. I’m not sure what the author of this letter wished to imply by the words “guest columnist.” Contributions to this column are accepted from all interested parties, although contributions are most common from AIPG members. Most contributions are not specifically solicited, although contributions are generally encouraged and welcomed. From time to time, someone brings a matter to my attention and I request that a contribution be submitted, but that was not the case in this instance. The views expressed are those of the individual making a particular comment; they are not necessarily mine or those of AIPG. In compiling this column, I attempt to clearly distinguish whose views are being presented and try to keep my personal views to a minimum. Regular readers of this column know that alternative views of several issues have been presented. The point of this column is to stimulate further consideration of the issues presented. Presentation of alternative views is a significant part of this column’s value.
2. The bill to register geologists failed to pass in the 1997 Legislative session. But for the purposes of this discussion, assume that Texas geologists must be registered. The effort to register geologists in Texas has not died.

Student Career Day Publication on AIPG’s Web Page

Reflections on a Geological Career, the expanded version of the handbook the Colorado Section provided for undergraduate and graduate students attending a Career Day in September 1996, is available on AIPG’s web page in the Colorado Section’s section. The file is in PDF format (version 3), which can be read on any major operating system with a reader available for free from Adobe. A link is provided on the AIPG web page for those of you who do not have a copy of Adobe’s Acrobat Reader. If you don’t have a copy of Acrobat Reader, I suggest you get one as a lot of documents are published this way (for example, all IRS publications and forms are available in PDF format). The AIPG address is:

http://www.nbm.gov/aipg/co/co.html
or for those already having Acrobat Reader, v. 3:

http://www.nbm.gov/aipg/co/career.pdf

A number of Sections have asked about the handbook for use in their own career days. Now everyone can get a copy, including students. Making the handbook available for free on the web recognizes the realities of student’s budgets, their access to the web, and avoids having AIPG incur a large printing bill with little hope of recovery. As editor of this handbook, I welcome suggestions and further contributions.

SME Announces 1997 Officers

At its Annual Meeting in February, the Society for Mining, Metallurgy, and Exploration installed the following officers:

- 1997 SME President, Richard R. Klimpel
- 1997 SME President, Thor A. Kunasz
- Past President, John F. Burst
- Vice President, Finance, Ta M. Li

The Society for Mining, Metallurgy, and Exploration advances the worldwide mining and minerals community through information exchange and professional development.

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During recent years, the level of ethical behavior among professionals and others in prominent positions in society has fostered increased interest and scrutiny. Nonetheless, society in general tends to hold the design professions to a higher standard, and expects practicing engineers, architects and allied design professionals to perform on an ethical plane commensurate with their responsibility to the community. This expectation creates a dilemma for the practicing design professional since standards for ethical decision making are seldom addressed in professional training.

As a consequence, the focus of this program is to present real situations taken from professional practice in order to stimulate greater attention to ethical issues, and to hopefully allow Internet web site visitors an opportunity to avoid similar pitfalls in their own careers. In addition to providing an opportunity for individuals to read and respond to the case histories, it may also provide a convenient focus for informal brown bag discussions in firms and agencies.

AIPG is encouraging those interested in reviewing or participating in this program to visit the new web site at the following Internet address:

http://www.engr.washington.edu/epp/Pepl/Ethics/

Program inception

This program originated early in 1997 and is provided by the Professional Engineering Practice Liaison Program at the University of Washington, under the direction of Dr. Ronald E. Bucknam. It is an outgrowth of Bucknam's work over the past several years in increasing the level of awareness of university students, faculty and young practicing engineers on the non-technical issues which most often spell the difference between success and failure in designed projects. Most of the situations described are derived from his more than 30 years of practice as a consulting engineer and the experiences of a variety of practicing engineers across the country.

The language used is straight-forward and understandable, and the solutions provided for consideration are realistic and, for the most part, practical. The expressed intent of this program is to foster discussion of many day-to-day, sometimes gut-wrenching ethical issues in professional practice and to derive practical solutions for practicing design professionals.

Program format

Each month a new applied ethics case taken from actual professional practice is presented in narrative format. The names of the participants and the locations are altered to obscure the real identities of those involved. Several suggested solutions to the situation are also presented. Not all of these solutions are necessarily ethical, but may represent a spectrum of reactions found in professional practice.

Web site visitors are invited to vote electronically for the solution(s) they believe to be the most applicable. Alternatively, visitors may submit their own solutions to the ethical dilemma presented. This can be accomplished via the Web, as well as by direct email, snail mail or fax.

Survey results

During the following month the tabulated results of the site visitors' responses and additional solutions are compiled and presented at the web site. The corresponding case history narrative is also available for reference. All reasonable additional solutions submitted are synopsized and presented as well. The identities of those submitting additional solutions are kept confidential, unless specifically requested otherwise. In addition, the recommendations of a panel consisting of members of the program's board of review are presented, and an epilogue is appended in cases where the actual outcome to the situation is known.

Core ethical values and solution guidelines

Based on research conducted by the program director, a list of six recommended core ethical values are presented on another program page to assist in evolving solutions to ethical dilemmas encountered in professional practice. Additionally, recommendations for basic steps to personal ethical decision making and guidelines for facilitating solutions to ethical dilemmas in professional practice are presented for reference on separate linked web pages.

Contributors and reviewers

Contributions of real life case histories from a variety of professional design disciplines are encouraged. Reviewers for each case history site are selected from a non-convening Board of Review. These reviewers are asked to comment on and submit alternative solutions to the cases. The identities of the reviewers for each case and their respective suggested solutions remain confidential.

Information regarding case history contributions and how to volunteer as a reviewer is available at the web site, or by contacting the program director, as follows:

Ronald E. Bucknam, Director
Professional Engineering Practice Liaison Program
168 Wilcox Hall
University of Washington
Box 352700
Seattle, WA 98195-2700
fax: 206/685-3836
email · direct: rebuck@whidbey.net
e-mail · office: rbucknatngu.washington.edu
Geraghty & Miller Experts Revise Guidance Manual for American Petroleum Institute

Geraghty & Miller, Inc. has updated API Publication 1628, "A Guide to the Assessment and Remediation of Underground Petroleum Releases, Third Edition," for the American Petroleum Institute. The guide is for those who deal with accidental releases arising from the production, transportation, refining and marketing of liquid petroleum products or unrefined crude oil. API 1628 is often recommended as a reference in UST regulations.

API also contracted Geraghty & Miller to develop five complementary technical bulletins entitled: Natural Attenuation Processes; Risk-Based Decision Making; Optimization of Hydrocarbon Recovery: In Situ Air Sparging; and Operation and Maintenance Considerations for Hydrocarbon Remediation Systems. The technical bulletins can be ordered as stand-alone documents, or as a set with A Guide to the Assessment and Remediation of Underground Petroleum Releases, Third Edition (A-1628S). Contact American Petroleum Institute Order Department, 1220 L St. NW, Washington, DC 20005; (202) 682-8375.

Employment Referral Requests

From time to time Headquarters receives requests from prospective clients for referrals to our Members. Most of these result in consultancy contracts. Some have been particularly interesting and lucrative. The practice that Headquarters follows is to determine as specifically as possible the needs of the prospective client, then search our Member database for persons who appear to fit those needs. We then ask the Members thus identified if they would like the referral. Some prospective clients ask us to arrange for resumes and references to be sent, and some ask only for the names and they follow through. We never make referrals without the permission of the Member being referred.

Increasingly, the requests we have been receiving have had short response times. For example, in mid-June we received a request that required a three-day turn-around. We identified a number of our Members who seemed to be qualified, but, in order to get the necessary information to these Members in time to respond, we needed to send them an e-mail or fax message. Regular mail would have been too slow. Telephone calls are too expensive and time consuming, given our limited budget and staff and the fact that we do not currently charge for this service to our Members. In this particular case, we found that less than half of those Members we had identified had either e-mail or fax numbers on record at Headquarters. For this reason, they were not contacted.

The result was that these persons did not have the chance to respond to this opportunity and the prospective client may have been deprived of the best person for the assignment.

All Members, especially those who are consultants, are encouraged to provide current e-mail and web page addresses, and fax and telephone numbers to Headquarters. This will expand their opportunities for employment.

Tucson Gem and Mineral Show Draws a Crowd

The activities of the Arizona section of AIPG in association with the Tucson Gem and Mineral Show were a great success. Thirty AIPG members and their guests attended the Valentine’s Day dinner at Dawn Garcia’s home, followed by a gem appraisal demonstration presented by Richard Allan. Over 50 people joined us for a talk by national AIPG president Jonathan Price and the "behind the scenes" tour lead by Erick Weiland on February 15, 1997. Many thanks to Richard, Jon and Erick for their time and efforts.

The next Tucson Gem and Mineral Show will be held February 12-15, 1998. The Arizona Section will be holding activities on Friday, February 13 and Saturday, February 14, 1998. Watch for details in The Professional Geologist next winter.

Eric Weiland speaking to group.

Darcy Gerhard, Lee Gerhard (Kansas State Geologist), Larry Fellows (Arizona State Geologist), Jonathan Price (Nevada State Geologist) and Argenta Price.
1997


Sep. 3-4. Alexandria University Third Conference on Geochemistry, Alexandria, Egypt. Contact: A. M. El Bousely, Alexandria University, Faculty of Science, Geology Dept., Alexandria, Egypt, Ph.: 20-3-392-1595.

Sep. 9-13. 4th Annual Conference & Trade Exhibition, Soil and Water Mgmt. for Urban Development, "Beyond the Drain - Future Direction for Stormwater Mgmt.", Sydney, New South Wales, Australia. Contact: Alison Frost, Hawkesbury Technologies Ltd., UWS-Hawkesbury, P.O. Box 415, Richmond, NSW 2753, Australia, Ph.: 61 45 701 690, Fax 61 45 701 520.


Sep. 30-Oct. 4. AEG 40th Annual Meeting, Converging at Cascade, Portland, OR. Contact: AEG '97 c/o Julie Keaton, 130 Yucca Dr., Sedona, AZ 86336, Ph.: (520) 204-1553.


Oct. 6-7. Fundamentals of Petroleum Exploration, Drilling, and Production, Denver, CO. Contact: The University of Tulsa, Div. of Cont. Educ., 600 S. College Ave., Tulsa, OK 74104-3189, Ph.: (918) 631-3086, e-mail: conted_cae@utulsa.edu.

Oct. 6-8. Ecuador Mining '97 - Exploration, Geology, Mine Development, Business Opportunities Conference, Cuenca, Ecuador. Contact: George H. Roman, Conference Director, Engineering & Mining Journal, 29 N. Wacker Dr., Chicago, IL 60606, Ph.: (773) 342-1167, e-mail: ghroman@msn.com.

Oct. 16-17. Structuring and Selling Oil and Gas Programs for Profit, New Orleans, LA. Contact: The University of Tulsa, Div. of Cont. Educ., 600 S. College Ave., Tulsa, OK 74104, Ph.: (918) 631-2347.


Nov. 5-7. Problems and Pitfalls in Joint Operating Agreements, Houston, TX. Contact: The University of Tulsa, Div. of Continuing Education, 600 S. College Ave., Tulsa, OK 74104, Ph.: (918) 631-3086, e-mail: conted_cae@utulsa.edu.

Nov. 16-19. International Conference on Advances in Ground-Water Hydrology - A decade of Progress, Tampa, FL. Contact: American Institute of Hydrology, 2499 Rice St., #135, St. Paul, MN 55113-3724, Ph.: (612) 484-8169, Fax (612) 484-8357, e-mail: alhydro@aol.com.

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AIPG ANNUAL MEETINGS
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October 3-7, 1998
Baton Rouge, Louisiana
October 5-9, 1999
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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

KS-Bailey, Kevin James
5635 Gleason Road, Shawnee KS 66226. Sponsors: Richard Moberly, Brent Nickel, Phil Askey.

VT-Brown, Steven Ray
RR1 Box 140, Randolph Center VT 05061. Sponsors: Steven Lambert, Joanne Friedrich, Ron Bruhn.

AK-Crandall, Robert Paul

NV-Hendrickson, Robin E.
955 S. Virginia #222, Reno NV 89502. Sponsors: Radu Conalea, Bruce Bragintong, Ron Parrett.

AK-Kendall, Kenneth Scott
4032 Justin Circle, Anchorage AK 99507. Sponsors: Jeff Burton, Andrea Elconin, Steve Smynkowski.

MI-Lint, Robert J.
P.O. Box 612, Kingsley MI 49649. Sponsors: Robert Hilty, Erik Johnson, Chris Byle.

AZ-Megaw, Peter K.M.

MA-Perriello, Felix A.
9 Baker Place, Apt. 2, West Roxbury MA 02132. Sponsors: John Thompson, Raymond Johnson, Andrew Magee.

NJ-Spronz, William D.

OK-Summers, Kyle Gordon
5157 Harvard Drive, Bartlesville OK 74006. Sponsors: Randall Hicks, Steve Dubyk, Greg Contaldo.

NM-Swanton, Ada Suzanne
Route 4, Box 68D, Santa Fe NM 87501. Sponsors: G. Thomas Farmer, David Broxton, Richard Fuller.

MN-Uhlig, Kristina K.

LA-Weaver, Bradley J.

New Certified Professional Geologists

NE-Anderson, Dennis J., CPG-10105
13101 Emilie St., Omaha NE 68138, (402)566-2171

VA-Carter, Richard B., CPG-10108
2019 Headlands Circle, Reston VA 22091, (703) 948-2504

IN-Doss, Tod D., CPG-10106
8323 Southport Dr., Evansville IN 47711, (812)435-8285

MI-Finetti, James P., CPG-10099
29691 Warren, Garden City MI 48135, (313)454-1100

OK-Flanagan, Kevin C., CPG-10103
2804 Virginia, Norman OK 73072, (405)364-0600

SD-Hammond, Patricia D., CPG-10114
1219 Valley View, Vermillion SD 57069, (605)677-5227

OH-Hudson, Thomas W., CPG-10118
3883 Fulton Grove Road, Cincinnati OH 45245, (513) 651-3440

OH-Jones, A. Wayne , CPG-10119
1240 St. Rt. 521, Sunbury OH 43074, (614)265-1075

TX-Kennedy, Johnny W., CPG-10115
7003 Alderney, Houston TX 77055, (713)767-3552

NY-Napieralski, Robert R., CPG-10110
5 Ravenwood Drive, Lancaster NY 14086, (716)847-6310

IA-Nelson, Eric S., CPG-10107
312 NW Applewood St., Ankeny IA 50021, (515)254-0030

OH-Ozimek, Joseph A., CPG-10125
1904 Janette Avenue, Cleveland Heights OH 44118, (216)349-2708

MI-Peters, Thomas E., CPG-10111
28600 Brandes Road, Flat Rock MI 48134, (313)847-4444

CT-Post, Richard E., CPG-10112
193 Winding Ridge Road, Southington CT 06489, (203) 386-3763

NV-Rogers, Ralph D., CPG-10116
1428 Spice Sky Drive, Las Vegas NV 89128, (702) 794-1408

TX-Smith, Mark N., CPG-10117
2502 Sea Horse Court, Seabrook TX 77586, (281)335-4000

OR-Sprecher, Terry Ann, CPG-10123
Sprecher Geological Services, 551 NW Trenton Ave., Bend OR 97701, (541) 389-9290

PA-Walsh, H. Thomas , CPG-10113
820 Pine Grove Rd., Beaver PA 15009, (412) 921-3402

OH-Zakrzewski, Mark F., CPG-1021
3911 Redfern Road, Parma OH 44134, (216) 514-7100

New Candidate for Certification

GA-Barnes, Ralph A., CFC-0135
Law Engineering, 100 King St., Suite A, Dalton GA 30720, (706) 272-7937

New Student Affiliates

OH-Hon, Kevin Daniel , SA-0073
1342 Seneca Ct., Xenia OH 45385

OH-Hundley, Stacey A. , SA-0074
2363 #4 Duncan Drive, Fairborn OH 45324, (937) 775-3643

OH-Keup-Fett, Anne , SA-0075
1012 Hillcrest, New Carlisle OH 45344-1908, (937) 775-3636

OH-Pike, Stacia J. , SA-0076
5002 Broughton Pl., Dayton OH 45431, (937) 873-3455

AIPG Associate Editors

A special thank you to AIPG’s Associate Editors:
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G. T. Farmer
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Lynn L. Kelley
Inge R. O’Brien
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Neil H. Ridgley
Larry C. Simpson
Robert A. Stewart

AIPG Membership Totals

As of 6/30/96 As of 7/02/97

CPG - Active 4,449 4,437
CPG - Retired 499 492
CFC 46 51
AP 3 6
SA 60 41
Honorary 11 13

TOTALS 5,068 5,040
# Pre-Registration Form

**34th Annual AIG Meeting**  
**Houston, Texas - October 8 - 11, 1997**  
**"The 21st Century Professional Geologist: Training, Credentials, Political & Business Considerations"**

**Name:**  
**Spouse/Guest Name:**  
**Company/Institution:**  
**Address:**  
**Telephone:**  
**Fax:**

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<th>Registration</th>
<th>PRE-REGISTRATION PER PERSON BEFORE 9/12/97</th>
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<th>NUMBER OF PERSONS</th>
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<td><strong>AIG Members</strong></td>
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**Events:**  
1. **Trip #1:** Golf at "Tour 18"  
   Tuesday, 6:15 am to 2:00 pm (NEW TIME)  
   $100.00 | $150.00

1a. **Trip #1 Alternative:** Places of Worship and Orange Show  
   "Eye-Opener Tour"  
   Tuesday, 8:00 am to 5:00 pm  
   $35.00 | $70.00

2. **Trip #2:** Offshore Energy Center and Galveston Sampler (Lunch)  
   Wednesday, 9:00 am to 4:00 pm  
   $60.00 | $85.00

3. **Trip #3:** Major Art Museums (Lunch)  
   Thursday, 10:30 am to 3:30 pm  
   $45.00 | $70.00

4. **Trip #4:** Space Center Houston - N. A. S. A. (Lunch)  
   Friday, 10:30 am to 4:30 pm  
   $55.00 | $80.00

5. **Trip #5:** Theater Under the Stars Musical  
   Friday, 7:00 pm to 11:00 pm  
   $65.00 | $90.00

**Minimum Number of Participants Must Be Met by September 5th.**

**Short Courses:**  
1. **Management Development Program for Geologists and Related Professionals**  
   (CEU credit $50.00)  
   Monday and Tuesday, 8:00 am to 5:00 pm  
   Non-Member Cost: $300.00 | $375.00

2. **Environmental Chemistry**  
   Tuesday, 8:00 am to 5:00 pm  
   $300.00 | $475.00

3. **Environmental Geophysics for Oil & Gas Geologists and Geophysicists**  
   Tuesday, 8:00 am to 5:00 pm  
   $335.00 | $410.00

4. **Continuous Process Improvement in Professional Services**  
   Wednesday, 8:00 am to 12 noon  
   $25.00 | $50.00

5. **Practical Geostatistics**  
   Wednesday, 8:00 am to 5:00 pm  
   $295.00 | $370.00

6. **Multidisciplinary Teams: How and Why They Make You Money**  
   Wednesday, 8:00 am to 5:00 pm  
   $250.00 | $325.00

   Thursday, 8:00 am to 5:00 pm  
   $335.00 | $410.00

8. **Reservoir Seismic Methods**  
   Thursday, 8:00 am to 5:00 pm  
   $295.00 | $370.00

9. **Introduction to Reflection Seismic Interpretation**  
   Friday, 8:00 am to 5:00 pm  
   $360.00 | $435.00

**Mini-Symposium:**  
**Environmental Ethics, Professional Practices, and Related Issues**  
Wednesday, 1:00 pm to 5:00 pm  
$25.00 | $50.00

**Total Amount Paid:** $

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**Return form with payment to:** John L. DeValve, AIG Houston 1997, P. O. Box 218567, Houston, Texas 77218-8567  
**or FAX to (281) 558-5876**  
**Visa / MasterCard / American Express / Discover Cards Accepted**  
**Card Type:**  
**Card No.:**  
**Exp. Date:**  
**Signature:**  
**Please Charge My Credit Card:**  
**Make checks or money orders payable to AIG Houston 1997**  
**Refund Policy:**  
Refunds of 100% of registration fees will be given upon written request received by 5:00 pm on Friday, September 19, 1997. Notification and full refund for field trips or social activity fees will be given in cases of cancellations due to insufficient registration by this date also.  
50% refunds will be given up to October 3, 1997.