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 broken down 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
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 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 or the cover. They should have a geologic theme and an informative 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 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:

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The Professional Geologist

Peer-Reviewed Papers
Some Pitfalls of Discounted Cash Flow Analysis
Ellen F. Hodos, CPG-6966

RBCA Who?
John G. Russell, CPG-8416

Technical Data Capture in Geological and Geophysical Data Management
Robert G. Font, CPG-3953 and Elaine M. Travers

Standards: A Tool for Professional Judgment
Robert J. Morgan, ASTM Director
James A. Thomas, ASTM President

ASFE: Professional Firms Practicing in the Geosciences
John P. Bachner, Executive Vice President

DEPARTMENTS
TODAY IN WASHINGTON
THE GOVERNMENT AFFAIRS REPORT
EXECUTIVE DIRECTOR’S COLUMN & ITINERARY
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AIPG BENEFITS AND INFORMATION
CALENDAR AND ADVERTISER’S INDEX
NEW MEMBERS, APPLICANTS, ETC.

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Potential Home Buyers

The American Institute of Professional Geologists has prepared the "Home Buyers' Guide to Geologic Hazards" to educate potential home buyers about damages that can occur to structures due to geologic hazards. It offers tips on finding information regarding geologic hazards; obtaining professional consultations; ensuring proper siting, construction, and drainage; and understanding risks posed by expansive soils and heaving bedrock, flooding, subsidence, landslides, rockfalls, avalanches, earthquakes, coastal erosion, and radon.

It is hoped that this booklet will provide the public with insight into those geologic processes that most affect the home buyer and home builder in the United States. To the old adage "buyer beware" we wish to add another. **Buyer, be informed.**

By being informed of potential problems prior to construction of a new home or purchase of an existing one, perhaps much damage and property loss can be avoided. **The possible presence of a geological hazard does not necessarily condemn a property. It is frequently possible to adjust to or overcome these limitations.** Information on how to contact qualified geological consultants is presented at the end of this publication.

**Buyer, be informed.**

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Some Pitfalls of Discounted Cash Flow Analysis

Ethen F. Hodos, CPG-6966

Valuation of assets that might include an income stream (or the prospect of one) is commonly approached with an analytic financial tool known as the Discounted Cash Flow (DCF) - Net Present Value (NPV) technique. Discounted Cash Flow techniques mix historical costs and risk experience with projections of future income in an attempt to account for the impact of time on the investment. The technique has been in common use for so long and abused so much by so many that the technique, is rarely called to account for its basic shortcomings.

Typically, a discussion of a DCF-NPV valuation tends to focus on the components of the analysis, that is, the basic assumptions rather than the relevance of the analysis itself. For example, real estate appraisers are required to approach market value by three compulsory methods including “income” or DCF-NPV analysis.

The principal shortcoming of a DCF-NPV analysis is that the underlying assumptions constitute a forecast of operating and market conditions. Some scenarios are inherently lower in risk than others, but no forecast is ever 100% accurate and analyses are rarely risk qualified. The farther the forecast extends into the future, the more likely the forecast conditions will change. The second most important shortcoming of the technique is that, although it was developed for the purpose of comparing diverse investments where various risks and problems tend to balance out or at least reach a comparable level of uncertainty, it is often applied to a single investment where no assurances of risk minimization or balancing can occur and uncertainty inherent in the forecast is unmeasured.

Basic mathematical conventions, applied without thinking, can have an extraordinary impact on the DCF-NPV analysis. Typical conventions used in any forecast include simplification, rounding, and averaging.

Discounted Cash Flow techniques were developed prior to the modern computer age. Therefore, in order to complete the analysis in a timely manner manually, simplification was necessary. Simplification affects arise from common practices such as projecting uniform conditions into the future, holding discount rates constant, and lumping all investments into year zero and/or year zero, year 5, year 10, and so on. Discount factor tables assume that all operating cash inflows and outflows take place at either the beginning of the year or at the end of the year when, in fact, cash flows ordinarily occur irregularly throughout the year. Compound interest tables which more accurately reflect reality are available, but seldom used, because the irregular nature of cash flows tends not to be readily predictable.

Finance theoreticians disagree on definitions for the cost of capital over and above “interest expense” on borrowed money, particularly if the asset is held free and clear. Choosing an appropriate discount rate under these conditions is problematic.

Additional simplification errors arise out of the effects of rounding and averaging. These conventions might be necessary to minimize computational time and complexity, however, the examples provided in this paper illustrate that sensitivity to rounding and averaging should be evaluated whenever such conventions are necessary. Simplistic input demands of basic DCF-NPV computer programs in common use might also cause assumptions to be over-simplified.

Considerable controversy and lack of agreement among experts nearly always arises in relation to a selected discount factor. Part of the problem stems from lack of understanding of what a discount factor is supposed to provide. The concept of interest suggests that the use of money has a value (or cost). Furthermore, the continuous use of money over time, rather than as a series of instantaneous transactions, is implied in DCF analysis. Where experts confuse discount rates and interest rates, significant errors can occur. Components of the discount rate include: opportunity cost, inflation cost and estimates for risk, uncertainty, and inflation. As a practical matter when DCF techniques are applied, the expert typically goes to the level of detail that time and budget will allow in the field of the experts.
applied knowledge and then often throws caution to the winds in selecting a discount rate. The discount rate, then, becomes a sort of “Fibber McGee’s Closet” where all unknowns are kept. There are at least four ways to develop discount rates: 1) rates developed from the market (the appraisers capitalization rate, for example), 2) “built-up” rates created from estimating the components mentioned above, 3) “industry practice” rates which are generalizations that are probably not relevant to any individual project and; 4) the “cost of capital”, obtained by estimating the corporation’s overall cost of capital and equating it with the discount. Most experts will have a distinct preference, although they might not understand or be able to distinguish between internal project risk and external business risk in choosing a discount rate. The following examples of inadequate forecasting are drawn from the business we know best, gold mining. The mental image of the gold miner is one of accidental but extreme wealth, profligate living and a violent or sudden demise, probably in bankruptcy. These stereotypes are based on certain realities of the industry: extreme and rapid price fluctuations, cyclical nature, huge capital requirements and extremely high business risk. Gold mine DCF-NPV forecasts are notoriously poor predictors of project profitability. Aside from the use of inadequately supported assumptions (as in “garbage in equals garbage out”), extreme reliance on DCF-NPV analysis as a substitute for experience and good judgment can lead to financial disaster.

Example #1:

Impact of varying rounding practices:

The proposed mine has a projected average recoverable gold grade of 0.02375 ounces per ton, contained in 1 million tons of ore. Recovered ounces, therefore, amount to 23,750 ounces. The gold price used to evaluate the project was $403.57 per ounce. Three experts arrived at the following estimates of gross value for the gold:

- **Expert #1**: 0.03 ounces per ton X 1 million tons X $403.57 per ounce = $12,107,100
- **Expert #2**: 0.02 ounces per ton X 1 million tons X $403.57 per ounce = $8,071,400
- **Expert #3**: 0.023 ounces per ton X 1 million tons X $403.57 per ounce = $9,282,110

**Expert #1** used a rounding convention we might term “the Bonanza principle”, whereby he rounded upward to the nearest whole number.

**Expert #2** used a conservative “engineers-style” convention where he observed that 0.02375 was less than 0.02500 and thus rounded downward to the nearest whole number.

**Expert #3** “a nit picker”, used an additional significant decimal place on which to base his calculation but did not round at all. By doing so, he came the closest to the projected “actual” value of $9,584,788.

All of these rounding or simplifying conventions can be mathematically justified as they are in common use. Judgment is required to determine which projection is likely to be the most accurate over the life of the mine. What would **Expert #3** have done if his computer program would only accept two decimal places? The uncounted gold recovered during the mine life by **Expert #3** is only 0.00075 ounces per ton. However, due to the high unit value of gold, the uncounted ounces are worth over $300,000. Gold mine financial analysis should be performed to at least 4 significant decimal places. Reporting can be reduced to three places. The experts involved were all attempting to simplify the mathematical calculation and make it easier for the jury to understand, but in doing so, introduced large errors into the calculation of value. (The market value estimate for the property determined by comparable sales was about $280,000.)

Example #2

Impact of averaging practices.

In Example #1, the gross value of the gold can be seen to be very sensitive to the actual recoverable gold grade. Supporting information was obtained by **Expert #1** as to the average gold grade for the district which agreed with his estimate and appeared to confirm his (erroneous) grade assumption. However, district-wide grade averaging, though often seen in published reports, is not appropriate for valuation purposes. For example, in Nevada on the
famous Carlin Trend, Newmont Gold Company has published the gold grade of their proven and probable gold reserves (Annual Report, 1993):

<table>
<thead>
<tr>
<th>North Area</th>
<th>Grade</th>
<th>South Area</th>
<th>Grade</th>
<th>Rain Area</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capstone Bootstrap</td>
<td>0.037</td>
<td>Gold Quarry</td>
<td>0.041</td>
<td>Emigrant Springs</td>
<td>0.035</td>
</tr>
<tr>
<td>Carlin</td>
<td>0.034</td>
<td>MAC</td>
<td>0.016</td>
<td>Rain/SMZ</td>
<td>0.054</td>
</tr>
<tr>
<td>Deep Star</td>
<td>0.929</td>
<td>TUSC</td>
<td>0.062</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genesis</td>
<td>0.032</td>
<td></td>
<td></td>
<td>Rain Area mean</td>
<td>0.045</td>
</tr>
<tr>
<td>Northstar</td>
<td>0.035</td>
<td><strong>South Area mean</strong></td>
<td>0.040</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pete</td>
<td>0.026</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>0.169</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tara</td>
<td>0.057</td>
<td><strong>Overall Trend mean</strong></td>
<td>0.083</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>North Area mean</strong></td>
<td>0.165</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is worthwhile considering that the Overall Trend mean and the local mean gold grades are especially poor predictors of gold grade for any individual deposit. Prediction success rates ranges from a high of 33%, if we equate the South Area mean with Gold Quarry, although it is not identical, to a low of 0% for the overall Trend mean. Expressed another way, predicted grades using the averaging technique proposed by Expert #1 would be in error 67% to 100% of the time. Clearly, any DCF-NPV developed from averaging data in this manner would be greatly biased.

**Example #3**

**Simplification error.**

Averaging and rounding errors have been described in Examples #1 and #2 above with regard to basic assumptions. Compounding of errors can occur through the need for simplification in the financial forecast. This example deals with the effect of averaging over the life of the operation from a cost and revenue point of view for a small scale gold placer operation in Alaska.

In the real world, cash flows are not neatly so uniform and well-behaved as forecasts imply. Gold grades, mining conditions, and costs fluctuate from place to place within a district and also within each deposit. In addition, the gold price fluctuates abruptly and very meaningfully at times. To Illustrate, consider the hypothetical erratic schedule listed below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Gold Grade Troy Ounces Cubic Yard</th>
<th>Gold Price Per Ounce</th>
<th>Gross Revenue Per Cubic Yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.011</td>
<td>400</td>
<td>$4.40</td>
</tr>
<tr>
<td>2</td>
<td>.014</td>
<td>320</td>
<td>$4.48</td>
</tr>
<tr>
<td>3</td>
<td>.007</td>
<td>379</td>
<td>$2.65</td>
</tr>
<tr>
<td>4</td>
<td>.032</td>
<td>350</td>
<td>$11.20</td>
</tr>
<tr>
<td>Mean</td>
<td>.016</td>
<td>362</td>
<td>$5.68</td>
</tr>
</tbody>
</table>

Note here that the mean values do not accurately capture any individual year's performance.
Then, to further understand the impact of several components of variability on profits:

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue per cubic yd.</th>
<th>Cost per cubic yd.</th>
<th>Cubic yds. mined</th>
<th>Gross operating profit (loss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$4.40</td>
<td>$3.00</td>
<td>10,000</td>
<td>$14,000</td>
</tr>
<tr>
<td>2</td>
<td>$4.48</td>
<td>$3.00</td>
<td>8,000</td>
<td>$11,840</td>
</tr>
<tr>
<td>3</td>
<td>$2.65</td>
<td>$2.90</td>
<td>8,500</td>
<td>($2,125)</td>
</tr>
<tr>
<td>4</td>
<td>$11.20</td>
<td>$3.75</td>
<td>12,000</td>
<td>$89,400</td>
</tr>
<tr>
<td>Mean</td>
<td>$5.68</td>
<td>$3.16</td>
<td>9,625</td>
<td>$24,255</td>
</tr>
</tbody>
</table>

It is evident that the mean data do not give a picture of the risks involved in a small placer mining operation, nor does the mean correctly predict cash flow for any single year. Furthermore, using the mean data as a predictor of gross operating profit will result in an error compared to the actual amounts recovered:

(Forecast using the mean)  
$5.68 \times 3.16 \times 9625 \times 4 = $24,255 per year

(Actual)  
$14,000 + $11,840 + $2,125 + $89,400 = $113,115.

Thus the mean predictor was in error, in this particular scenario an underestimate:

$113,115 - $97,020 = $16,095

$16,095 / $113,115 = 0.1423 = 14.2%.

Remember that this 14.2% arose solely from typical fluctuations in basic assumptions that are actually experienced in the mining industry. Had the low gold price of $320 per ounce coincided with the highest mining cost of $3.75 per cubic yard, the hypothetical operator would be immersed in red ink. Uniform annual forecasts of gross operating profits are inherently inaccurate.

Example #4

**Games involving the discount factor.** (Adapted from Gentry and O'Neil, 1984.)

Consider two projects A and B which generate cash flows as follows:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PROJECT A</th>
<th>PROJECT B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$ - 10</td>
<td>$ - 10</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Given a discount factor of 15%, the NPV of Project A is 2.60 and the NPV of Project B is 2.41. Therefore, at 15%, Project A is preferred. However, at a discount rate of approximately 16.5% there is no difference between the two projects. Extreme sensitivity to the discount rate indicates that additional scrutiny of the two projects will be required and the decision to invest ultimately will rely on professional judgment.

Is there a better way? Probably.

Anytime a DCF-NPV is used, the expert should consider alternative valuation methods as a verification check. In our opinion NPV-DCF should never be used except for going concerns where a significant amount of cost and revenue experience exist and where data are sufficient to make predictions fall with a narrow range. Most large mining houses like to see projected estimation errors for proven reserves of no more than +/- 10-15%. This number...
represents internal risk and some external risk. Additional business risk connected with project management must be added if the mine, rather than the reserves, are valued.

The temptation to simplify assumptions should be resisted. If insufficient information is available to actually construct a closely constrained estimate of income, then the technique should not be used at all.

In the mining business (as in many other businesses) there are active markets for raw materials; in our case, mining properties. Many are either undeveloped or partially developed making both internal and external project risk difficult to evaluate and quantify. As a result, properties are sold on the basis of some standard units of comparison or on a “percent of retail” basis. For example, a property might contain 50,000,000 tons of coal with a current retail selling price of $7 per ton. If the mine sold to a second party for $3,500,000 the “percent of retail” can be calculated (Widdoss, 1994).

$$3,500,000 \div (50,000,000 \text{ tons} \times 7.00 \text{ per ton}) =$$
$$3,500,000 \div 350,000,000 = .01 = 1\%$$

or, as a unit cost:

$$3,500,000 \div 50,000,000 \text{ tons} = 0.07 \text{ per ton}$$

Properties should only be compared with properties that have sold that are similar in development status to the subject, for example, proven, operating, developing, or exploration.

**Example #5**

Comparison between actual sales information and DCF-NPV Analyses.

A Canadian mining stock analyst’s report gives the following information (emphasis added):

“Royal Oak has done well because it doesn’t overpay for its assets. This is clear from the companies last two transactions, the Hope Brook Mine and the Colomac Mine. These mines were brought into production (unprofitably) for an aggregate cost of close to $400 million in the late 1980’s by former operators. Royal Oak paid approximately $20 million for the same assets...”

Another Canadian mining stock analyst provides the following (emphasis added):

“A net present value (“NPV”) analysis of the future expected cash flow of Kinross indicates a value of $406.9 million. This is a status quo analysis in that the existing operations were continued to the end of the mine life without the benefits of major improvements. The NPV would be boosted by at least 40% if all mine improvements, expansions and potential ore reserve increases are taken into account, without considering probability of occurrence... The calculated NPV represents a value of $3.78 per fully diluted share. Gold companies tend to trade in a range from 1.5 to 3.0 times their NPV. Currently, Kinross’ peer group are trading about 2 times based on this type of analysis. This should result in a minimum share price of $C7.50 for the base assets.”

Kinross, incidentally, purchased the assets referred to above in 1993 for a combined investment of $422.2 million. Obviously the NPV does not reflect the actual market value of the base assets. What the stock market is buying is improved management; the basic assets have not changed.

A more costly, but potentially more valuable method of income valuation, is Risk-Qualified Analysis. Two projects of equal discounted cash flow, rate of return might be compared - one in the U.S. and another in an African country with high political risk. In another case, one very promising prospect might be compared with a marginally profitable operating mine. In both situations, although the projects might appear equally financially rewarding, the risk in the context of DCF-NPV will be greatly different. A higher discount factor might be used as a “catch-all”, but risk-qualified methods have the advantage of exposing that the most sensitive areas of each project requiring further analysis and are preferred.

Computational sophistication available today enables the expert to vary assumptions according to a probabilistic model, providing sufficient data are available. By testing the project assumptions, various uncertainties are evaluated for impact on the ultimate DCF-NPV. This enables the risk of a particular NPV outcome to be evaluated. In a legal context, the best application of this complex methodology is to demonstrate the weaknesses of an analysis that might propose an exceptionally high valuation. Detailed descriptions of this complex method are available in the literature (Gentry and O’Neil, 1984).

Aesop said, “We can easily represent things as we wish them to be...” In 1992, Tumazos, a highly respected Wall Street gold analyst said, “Many gold mine transactions were priced based on hopes and wishes which have not materialized.” DCF-NPV analysis are prone to manipulation. Great care should be taken in their use.

**References**


McDermid St. Lawrence Chisholm, Ltd., Investments Securities, 1994, Research, Royal Oak Mines, Inc.

Smith, Kerry D., 8/29/94, Kinross Gold Corporation, Research Comments.


Tumazos, John, 1992, Personal communication.

Widdoss, John, ARA, 1994, Personal communication.

Ellen F. Hodos, CPG-6966, Vice President, Constterm Resource Manager, Inc., 90 Lewers Creek Road, Carson City, NV 89704-9589.
RBCA Who?

Risk-Based Corrective Action—Applying Common Sense and Established Risk Analysis Protocol to Address Properties Impacted by Environmental Contamination

John G. Russell, III, CPG-8416

RBCA-THE Tool that Risk Managers and Corporate America Have Been Waiting For to Help Address the Old Dilemma:

*How clean must this particular site be?*

It is anticipated that the American Society for Testing and Materials (ASTM) “Standard Guide for Risk-Based Corrective Action (RBCA) Applied at Petroleum Release Sites” guidance document will revolutionize the decision-making process associated with future cleanup of sites contaminated by petroleum hydrocarbons and not regulated under the authority of Superfund; i.e., the highest percentage of contaminated sites across the U.S. Within the next three years, we expect that the acronym RBCA will be referenced as frequently and colloquially as UST (Underground Storage Tank) is used today.

RBCA provides regulators and the regulated community a tool by which they can determine, in a much more cost-effective manner than ever before, the degree to which a site contaminated by petroleum hydrocarbons should be remediated. Established Risk Assessment protocol, which has been used for years at Superfund sites to help determine “how clean is clean,” may be applied to sites involving petroleum hydrocarbon constituents.

The most prevalent environmental contaminants across the U.S. today have been petroleum hydrocarbon constituents. Leaking USTs produce a large percentage of these contamination problems. In 1984, Congress enacted legislation that initiated one of the largest environmental investigation programs ever adopted by the Environmental Protection Agency (EPA), namely the regulation of USTs. EPA’s UST regulations established technical requirements for owners and operators of new and used USTs to enact specific UST leak detection (investigation and remediation), corrosion protection, and spill/overfill prevention measures. The deadline for initial compliance is December 1998.

Typically, if a site is determined to have been polluted by petroleum hydrocarbons associated with an UST, the UST owner and/or operator has to investigate and remediate the site to a point which satisfies the appropriate state regulatory authority. Generally, each state in the U.S. has enforced similar, but slightly different, UST regulations and soil and ground water cleanup standards. Many states mandate investigation and remediation to background conditions or Drinking Water Standards, while other states enforce somewhat less stringent cleanup requisites.

To date, most investigative efforts at such sites have consumed considerable sums of money and taken years to implement before any remedial action is ever undertaken. Moreover, most remedial efforts have not achieved cleanup of sites to background or Drinking Water Standard conditions. A question that continues to haunt Corporate America is: “Must a site, which is being used presently for industrial purposes and is not anticipated to be used as residential property in the future, be remediated to a point that is protective of human health and the environment based on pristine background or Drinking Water Standards?”

Throughout the late 1980s and early 1990s, after years of research and study, the EPA prepared a suite of Risk Assessment guidelines for addressing contaminated air, soil, ground water, and surface water at Superfund sites. The intent of the Risk Assessment process is to quantify the risks to human health and the environment associated with contaminant constituents at a particular site, on the basis of current and projected future land use. For example, if the site has been used as an industrial property for years, and it is anticipated that this use will continue in the future, a risk analysis might be used to examine potential risks associated with site-specific contamination issues relevant to the future use of the property as
an industrial site; i.e., no anticipated residential usage.

The risk analysis examines potential exposure pathways (leaching of contaminants in subsurface soils to underlying ground water, for example) and potential sensitive receptors (human health or the environment) in light of site-specific hydrogeologic conditions and contaminant-specific toxicity characteristics. In turn, a risk characterization identifies the hazards of the cumulative effects of site contamination to all potential receptors for which there are completed exposure pathways. In many instances, the Risk Assessment process results in Superfund sites not having to be remediated to levels protective of residential usage, but rather to somewhat less stringent cleanup levels, which are protective of human health and the environment based on the site being used solely for industrial purposes. The practice of applying risk analysis protocol, such as has been conducted at Superfund sites for years, has rarely been used to address cleanup of sites impacted by petroleum hydrocarbons—at least, not until the construct of RBCA.

During 1994 and 1995, the ASTM prepared the RBCA standard guide, in an effort to help address environmental contamination associated with thousands of leaking USTs across the U.S., as well as many sites impacted by petroleum hydrocarbons not associated with USTs. The RBCA guide, which is based on EPA’s established Superfund Risk Assessment guidelines, provides a step-by-step decision-making process by which a site that has been impacted by petroleum contaminants (such as gasoline, diesel fuel, and fuel oil) and respective hydrocarbon constituents (such as benzene, toluene, xylene, and benzo(a)pyrene), along with additive compounds (such as methyl ethyl ketone/MEK, methyl isobutyl ketone/MIBK, lead, and ethylene dibromide), may be examined in light of the potential risks to human health and the environment on the basis of current and anticipated future use of the property. Ultimately, the RBCA process might save UST owners, and owners of properties contaminated by petroleum hydrocarbons, considerable money by streamlining investigative efforts and focusing remedial measures to address anticipated future land use (non-residential, for example).

The RBCA process is implemented in a tiered approach, involving increasingly sophisticated levels of data collection and analysis. Preliminary information is used to formulate a Tier I Lookup Table denoting Risk-Based Screening Levels (RBSLs), which are generic contaminant concentration levels in soil and ground water which will not pose unacceptable risks to human health or the environment. Calculation of a RBSL is determined using a combination of exposure and physical parameters that are based on current EPA-accepted toxicological data and either ASTM-accepted generic/default data or site-specific hydrogeological information.

If a contaminant concentration level at a site exceeds a respective RBSL value, then a more comprehensive Tier II or Tier III RBCA evaluation might be conducted. In other words, if the results of the Tier I evaluation process indicate that there might be an unacceptable risk to a potential receptor, then additional risk characterization calculations, based on more site-specific data, rather than generic/default data, might be pursued. Through a Tier II or Tier III evaluation, Site-Specific Target Levels (SSTLs) are developed for each contaminant constituent that exceeds a respective RBSL value. The SSTL value is the contaminant concentration in soil or ground water that will be protective of human health and the environment based on the Tier II or Tier III risk calculations.

In light of the fact that investigations of sites contaminated with petroleum hydrocarbon constituents have been progressing for years, due in part to the EPA UST regulations and relatively strict investigative and cleanup requirements, it is anticipated that a considerable amount of site-specific hydrogeological data have been generated at many sites. Thus, it is anticipated that many of these sites will have had a sufficient amount of information generated for the appropriate completion of a Tier I or Tier II RBCA evaluation. Once evaluated via the RBCA process, many of these sites might not need to be investigated or remediated to the extent required previously.

For example, in 1989 a metals manufacturing and recycling facility closed an UST area which contained three 30,000-gallon USTs, in accordance with all appropriate state regulations. The USTs contained various petroleum distillate and additive products, including toluene, xylene, MEK, and MIBK. Residual concentrations of some of these constituents were detected in subsurface soils during the UST closure proceedings. The state UST Division mandated that any soil or ground water contamination be investigated to background conditions or Drinking Water Standards. Thus, through a series of subsequent investigations, which were implemented in accordance with site directives and consent during the early 1990s, a considerable amount of site-specific hydrogeologic and physical information was generated.

Residual petroleum hydrocarbon constituents were detected in subsurface soils located within the former UST tank pit and in places along the surrounding tank pit sidewalks. Soil test boring and ground water monitoring investigations indicated that the residual hydrocarbon constituents were confined primarily to the former UST tank pit. The results indicated that shallow residuum ground water had been impacted by the contents of the former USTs, although not to any significant degree. Through the summer of
1996, the metals company spent several hundred thousand dollars on investigative efforts at the site, and yet they still had not delineated soil and ground water conditions to background and Drinking Water Standards. Moreover, projected remediation costs associated with such cleanup levels were estimated to be at least $500,000 to $1,500,000, depending on whether soils were remediated in-situ or ex-situ.

Although the metals company wanted to resolve the closure of the former UST area in a timely manner, and in turn use the former UST area as part of its daily operations, it seemed as if the company would never be able to, as a result of the state’s pursuit of supplemental investigations. In an effort to identify any potential risks to human health or the environment and attempt to resolve the closure of the former UST area, the company contracted an environmental consulting firm to prepare a Tier I RBCA risk analysis. At the time, the state UST Division did not have a formal policy regarding RBCA; however, many other states were either in the process of preparing formal policies or they had already adopted such policies. The metals company decided that it was in its best interest to pursue the RBCA risk analysis, for at least the results would help identify if there were any short-term liability concerns.

The consulting firm used a computerized spreadsheet program to help conduct the Tier I risk analysis. ASTM-suggested and site-specific parameters were evaluated in the RBCA risk calculations, using an Individual Excess Lifetime Cancer Risk (IELCR) value of 1x10^-5 for the carcinogenic constituents (industrial setting; i.e., not a residential area) and a Hazard Index (HI) value of 1 for the non-carcinogenic constituents. RBSSL values protective of human health and the environment were developed for each contaminant constituent detected in subsurface soils and ground water. In turn, actual contaminant concentration values detected in soil and ground water during subsurface field investigations were compared to the RBSSL values. Only one of the field contaminant concentration values exceeded a respective RBSSL value, indicating that all but one of the concentrations of residual hydrocarbon constituents remaining in subsurface soils and ground water should not pose a threat to human health or the environment.

The one soil sample concentration that was of potential concern exceeded the RBSSL value only slightly. That particular soil sample was representative of unsaturated soils located above the water table. All of the RBSSL values had been calculated based on the Tier I ASTM-suggested assumption that the ground water might be used as a drinking water supply source. However, the metals company anticipated that the ground water in the general area would never be used as a drinking water supply source as a result of a number of items including the fact that the metals company facility and most surrounding areas are provided with city water; the metals company’s nearest property boundary in relation to the former UST area is located at least 0.4-mile away; and the yield of the residual ground water aquifer was estimated to be less than 0.5-gallon per minute and therefore would probably not produce enough water to be a viable drinking water supply source.

The consulting firm re-evaluated the risk characterization associated with the one soil contaminant of potential concern, in accordance with the RBCA Tier II risk analysis process. A SSTL contaminant concentration, protective of human health and the environment, was calculated, on the basis of the assumption that ground water would not be used as a drinking water supply source. The actual contaminant concentration value detected in the soil sample of potential concern was found to be less than the SSTL value, indicating that, as long as the ground water was not used as a drinking water supply source, the concentration of potential concern in soil should not cause any unacceptable risk to human health or the environment.

The results of the RBSC Tier II risk analysis indicated that the residual petroleum hydrocarbon and additive constituent concentrations detected in soils and ground water beneath the site should not pose any significant threat to human health or the environment, as long as the property is used solely for industrial purposes and the ground water is never used as a drinking water source. Moreover, the RBCA process helped apprise the company’s Risk Management and Engineering Divisions of potential risks associated with existing facility operations as well as possible future site usage in the immediate vicinity of the former UST area.

During October 1996, the company submitted the RBCA results to the state with proposed supplemental investigative and remedial actions. Rather than investigating and remediating soils and ground water to background and Drinking Water Standard conditions, the company proposed less stringent actions including monitoring a few ground water monitoring wells rather than dozens of monitoring wells and remediation of only those soils located within the confines of the former UST area rather than all soils in the general area that contained residual hydrocarbon constituents. To date, the state has not responded to the RBCA report, but the metals company anticipates that the risk analysis results should aid them in future negotiations with the State and probably reduce future site closure expenditures.

Technical Data Capture in Geological and Geophysical Data Management

Robert G. Font, CPG-3953 and Elaine M. Travers

Abstract
When most of us think of geological data management, we often envision the end product: images of all documents related to a specific geographic region or geological area magically appearing on our computer screens. In real life, any system that provides this service is only as good as the information that has been put into it. Often it takes an enormous effort to capture the data and enter it into a system that is efficient and easy to use. Identification and classification of scientific data are best performed by experienced technical personnel who understand the data fully. Choosing a format that will provide maximum benefit to the user is an important consideration. Adherence to uniform data entry standards is vital in establishing a coherent data base. Finally, an ongoing quality control program is needed to ensure consistency of internal standards throughout the system. Specific procedures and recommendations are presented.

Introduction
Geoscience professionals in the oil and gas industry use vast quantities of technical information. Many of us dream of the day when we can see all of our data on the computer screen and retrieve it at a moment’s notice in a format that will be of optimum benefit to us in our daily tasks. Thus, when we think of “data management” we tend to contemplate the end product: the world map on the computer screen, the point-and-shoot technique, and all of the files and documents we need “magically” appearing along with all of the detailed information we seek.

What may not be apparent to us as end-users is the enormous effort it takes to capture this material. Data capture involves the proper identification and classification of the documents, the indexing, coding and cataloging process, data entry into a searchable database, preparing the physical files and storing them so that they may be easily retrieved. A well-planned data management strategy is vital to deriving the maximum benefit from the data and preserving its value.

Experience has shown us that optimum data capture depends on four basic ingredients. Thus, the “formula for success” consists of the following components:
(a) the “right personnel” to manage the data
(b) the “proper format” for data capture
(c) the “internal standards” to ensure uniformity
(d) the “quality control program” to ensure accuracy

The Right Personnel
Quality people perform quality work. Geological data management personnel is no exception. Individuals who manage technical data must understand the different

Figure 1- Technical Data Capture Cataloging Rates - Detailed Inventories Well and Seismic Data, Technical Studies

![Graph showing catalogued documents per person per hour]

Typical Distribution - Various Workers
- Well Logs
- Well Files
- Seismic Records
- Geoscience Studies
Table 1 - "THE RIGHT PERSONNEL" For Detailed Technical Data Capture

<table>
<thead>
<tr>
<th>Best Suited Personnel</th>
<th>Data Type Examples</th>
<th>Cataloging Rate/Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professionals (scientists and engineers)</td>
<td>Complex data often needing &quot;judgement calls&quot;.</td>
<td>Highly variable, but average (in our experience) 1.5 files/hr</td>
</tr>
<tr>
<td>Technicians (Trained/Experienced)</td>
<td>Complex data, not involving &quot;judgement calls&quot;. Also, searches for data &quot;hidden&quot; in the files.</td>
<td>Variable, but average 2.0 files/hr</td>
</tr>
<tr>
<td>Clerks (Trained/Experienced)</td>
<td>Intermediate to simple files.</td>
<td>Variable, but average 7.5 files/hr</td>
</tr>
</tbody>
</table>

Data types, their value to the interpreter and how they are used. Furthermore, they must know how to record this valuable information so that it is most beneficial to the end-user. The ideal data management staff is a blend of well-trained industry professionals, technicians and clerks, each performing tasks according to their level of expertise. Table 1 and Figure 1 summarize the personnel best suited for cataloguing various data types and illustrates typical productivity rates. All members of the staff must be made aware of their contribution to the overall success of the company and encouraged to take pride in their accomplishments.

The Proper Format

The proper format for capturing technical data is a key component of successful data management. A major element of this phase involves the selection of the appropriate database. A variety of excellent data bases are available for commercial purchase, or are the product of in-house development in some companies. Regardless of the origin, the data base must be simple, user-friendly, flexible and have sufficient storage capacity. It should also be easy to learn for both the end user and the data entry personnel. It must also be expandable, to allow for increased volumes of data to be added as the company’s needs change. Finally, it should be flexible enough to permit sophisticated searches on multiple attributes in a variety of combinations.

Exactly how user-friendly does the data base need to be? Often the more powerful systems require a significant learning time in order to be used effectively. The key to answering this question correctly depends on the answer to another question: “Who is really going to use it?” Given the staff availability, some companies may find it more practical to delegate data base searches to the data management staff. Other end users will prefer to search the data base themselves, leaving the physical data retrieval for their data management or support personnel. Some factors in these decisions are the amount of time the end user has available for learning the system and the time he/she has available for actually performing the search. Frequency of use is also an important consideration, since it may be necessary to “re-learn” the system every time if searches are not performed daily. The advantage to end user searching is the reduction of support staff. Alternatively, the advantage to relying on data management personnel for complete service is that the mechanics of the search and retrieval

TABLE 2a - MAP TYPES AND TECHNICAL CONTENTS
Typically Catalogued From Studies And Well Files

<table>
<thead>
<tr>
<th>MAP TYPES</th>
<th>TECHNICAL STUDY CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Structure</td>
<td>• Cross Sections</td>
</tr>
<tr>
<td>• Time-Structure</td>
<td>• Interpreted Maps</td>
</tr>
<tr>
<td>• Isopach</td>
<td>• Montages</td>
</tr>
<tr>
<td>• Isochron</td>
<td>• Production Data/Tests/Plots</td>
</tr>
<tr>
<td>• Velocity Gradient</td>
<td>• Formation Tests</td>
</tr>
<tr>
<td>• Porosity</td>
<td>• Pressure Buildup Data</td>
</tr>
<tr>
<td>• Production/Shows</td>
<td>• Interpreted Seismic</td>
</tr>
<tr>
<td>• Facies/Plugout</td>
<td>• Paleontology</td>
</tr>
<tr>
<td>• Isolith</td>
<td>• Geochemistry</td>
</tr>
<tr>
<td>• Net Effective Pay</td>
<td>• Core Analysis</td>
</tr>
<tr>
<td>• Subcrop</td>
<td>• Rock Mechanics</td>
</tr>
<tr>
<td>• Fault/Seafloor Plane</td>
<td>• Log Data</td>
</tr>
<tr>
<td>• Tectonic/Linesments</td>
<td>• Log Analysis Data</td>
</tr>
<tr>
<td>• Gravity/Magnetics</td>
<td>• Petrography</td>
</tr>
<tr>
<td>• Surface Geology</td>
<td>• Gravity/Mag Data</td>
</tr>
<tr>
<td>• Source Rock Data</td>
<td>• Daily Drilling Reports</td>
</tr>
<tr>
<td>• Surface Geochemistry</td>
<td>• Fluid/Gas Analysis</td>
</tr>
<tr>
<td>• Reservoir Properties</td>
<td>• Mineralogical Data</td>
</tr>
<tr>
<td>• Hydrodynamics</td>
<td>• Well Completion Reports</td>
</tr>
<tr>
<td>• Permeability</td>
<td>• Well Treatment Reports</td>
</tr>
<tr>
<td>• Arealage</td>
<td>• Environmental Impact Statements</td>
</tr>
<tr>
<td>• Index</td>
<td>• Geohazards Reports</td>
</tr>
<tr>
<td>• Others</td>
<td>• Driller's Logs</td>
</tr>
<tr>
<td></td>
<td>• Surveyor Data</td>
</tr>
<tr>
<td></td>
<td>• Engineering Tests</td>
</tr>
<tr>
<td></td>
<td>• Others</td>
</tr>
</tbody>
</table>
process are transparent to the end user. In the latter case, the “user-friendliness” of the data base becomes less critical. If used on a daily basis, workers can master “less-than-friendly” systems and operate them very effectively. Therefore, the question of “who is really going to use it?” becomes a critical factor in the selection.

“The Internal Standards”

To ensure that key attributes of the data will be captured consistently, uniform internal standards are required. Without adherence to these standards, the integrity of the data base is compromised, and the information becomes less meaningful to the end user and less valuable to the company. Training is vital. Well-documented procedures manuals can also be a good source for ensuring uniformity. It is useful to develop a set of “coding forms” on which key information is handwritten before data entry. These forms allow the cataloguing personnel to have a ready guide listing all of the key parameters to be captured and other procedures that must be followed. The advantage of the coding forms is that they act as a quick reference and are apt to be used more often than a lengthy manual. They are also essential if cataloguing and data entry are done separately by more than one person. A partial listing of the most significant categories (maps and technical contents) to be captured from well files and geoscience studies, as well as selected log types and seismic attributes typically coded from log files and seismic records are presented in Table 2 (a and b).

As an example, a map is submitted to the data management staff for data capture. It lies within an area of high priority to the company, but has no title block or author’s name. The map is a contour map joining points of equal thickness. It illustrates a sand with porosity of 15% or greater and true resistivity values of at least 10 ohm-meter/2/meter (i.e. the values defining the productive intervals). The map may be classified by the cataloguer as an isopach, a porosity map, an isolith or a net effective pay map. Which is correct? Although it may fit all these categories, the last (net effective pay map) defines it best. These rules should be established at the onset and should be well documented. The end result is consistency in coding and classification and a uniform and reliable data base. Table 3 shows an example illustrating the criteria for proper classification of selected map types typically found in technical studies.

The “Quality Control Program”

No matter how well-trained or experienced the personnel, errors will occur. Implementation of a strong quality control program (1) ensures compliance with the rules and internal standards, and (2) reduces the frequency of errors. The QC program should be performed systematically throughout the life of the data management project, that is, during initial data capture and also during subsequent updates or additions to the file. In some cases, a data base modification to track handling of files by specific staff members may be needed. Quality control should be performed by the data management staff at the supervisory or professional level.
Cost Effectiveness

The value of a well-organized, well-maintained and easily accessible technical information system cannot be overstated. The resulting benefits are technical efficiency and cost savings.

Technical efficiency is gained through time savings. Search and retrieval time is significantly reduced. Because critical data are quickly identifiable and retrievable when needed, company professionals are able to use their time more effectively. Once the database is in place, ongoing maintenance and quality control will require less labor. At this point data management staff can be reduced or reassigned to other tasks.

Cost savings are achieved through tangible and intangible savings. Properly catalogued technical data eliminates the wasteful repurchase of data already available, as well as duplication of previous works. In addition, the inventory helps a company identify data to be used in joint ventures, trades, divestment efforts and strategic planning, and helps establish a concrete monetary value of the data owned.

Summary and Conclusions

The formula for success regarding geological data management translates to four basic ingredients: the “right personnel”, the “proper format”, the “internal standards” and the “quality control program”. These four fundamental factors constitute the essence of successful geological data management; all other elements are subordinate to them. The proper capture of technical data results in palpable advantages that improve internal efficiency and generate income. Any firm that achieves these results will possess a competitive edge.

Acknowledgments

We express sincere gratitude to our company colleagues and staff members for their support and for furnishing, through their work and efforts, the practical evidence which sustains the ideology and conclusions arrived at in this paper. A very special thanks is directed to our clients, ORYX ENERGY COMPANY, UNION PACIFIC RESOURCES, EXXON COMPANY USA, MAXUS ENERGY CORPORATION and NEARBURG PRODUCING COMPANY; without an opportunity to serve them, we would not have acquired the practical knowledge pertinent to this discussion.

References


Robert G. Font, CGP-3953, Ph.D., PG, REM, P.O. Box 795151, Dallas, TX 75379 and Elaine M. Travers, Geoscience Data Management, Dallas, TX.

<p>| TABLE 3 - CRITERIA FOR CLASSIFICATION SELECTED MAP TYPES ILLUSTRATING INTERVAL THICKNESS |</p>
<table>
<thead>
<tr>
<th>MAP TYPE</th>
<th>DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopach</td>
<td>Map on thickness values between two separate horizons. Contour lines join points of equal thickness. Determined from well data or from depth-converted seismic.</td>
</tr>
<tr>
<td>Isolith</td>
<td>Lithology isopachs. Examples include maps of net sand greater than a set percentage of porosity; map of percentage of lithology within a total isopach interval; ratio maps of % dolomite over % limestone depicting the desirable reservoir rock.</td>
</tr>
<tr>
<td>Isochron</td>
<td>Mapped on values between two separate seismic reflectors and contoured in time (seconds or milliseconds).</td>
</tr>
<tr>
<td>Net Effective Pay</td>
<td>Generally isopach maps designated as net pay or net effective pay. Typically defined by specific attributes, such as resistivity/porosity cutoffs, illustrating reservoir thicknesses possessing such attributes.</td>
</tr>
</tbody>
</table>
TODAY IN WASHINGTON

Comments by F. B. "Ted" Mullin, CPG-1716

Well, here it is — Income Tax time again. It seems as though we just did it a short time ago. I guess that the years are getting shorter — or they just seem that way when you are busy.

There are some interesting happenings in Washington, outside of the White House, no less. The new Chief of the Forest Service, Mike Dombeck announced that he wanted to move the Forest Service in a new direction. He immediately received retirement notices from two Deputy Chiefs, Gray Reynolds and Mark Reimers. My guess on the future of the Forest Service is a bleak one. It seems that there is a movement to put the Forest Service in Interior, and consolidate with the BLM. After all, the budget for both is controlled by the Interior and Insular Affairs Committee. It makes sense. Unfortunately, it also fits right in with Vice-President Gore's reinvention program. If that should happen, you can kiss multiple use goodbye. Interior, under the present secretary, seems to be in a lock-it-up mode or regulate it off the Federal lands. It certainly isn't interested in mineral resource development.

A few friends of mine who are hanging on with the Geological Survey are not very up-beat over the future of the GS. Apparently, the BS Division of the USGS has taken over completely. It is obvious if you've tried to find any new geologic publications or GG's lately and certainly is if you spend any time reading the Federal Registers. Normally, if you find the Geological Survey listed in the Contents, you could turn to the page cited and find some action, notice, or announcement, that would be of interest to a member of the geological profession. Not so any more. Note the Federal Register Section this month for the latest from the U.S.G.S.

Now here we come with the 105th Congress. There are many issues left over from the 104th that are not going to go away. Mining Law changes are inevitable. Senator Bumpers and Congressman Miller have each introduced bills that would add a 5% royalty on all hardrock minerals produced from public lands, eliminate patents and the sale of the surface to the mineral operator. A few days later, the Administration announced that the FY 1998 Budget would contain a 5% net smelter return royalty on hardrock minerals on public lands.

So now to the Federal Registers this month


"The USGS solicits specific comments as to: 1. Whether the collection of information is necessary for the proper performance of the functions on the bureaus, including whether the information will have practical utility—"

Title: North American Fisherman Nationwide Angler Survey—"

The purpose of this survey is to obtain information about anglers preferences, behaviors, motivations, and satisfactions with fishing opportunities that can be used by fish management agencies—

Comment within 30 days to: Desk Officer for DOI, Office of Information and Regulatory Affairs, OMB, Washington, D.C. 20503

I think that everyone should comment upon this proposal. It certainly is out of place with the USGS. Just more BS in the GS, I guess. I thought we had a Fish and Wildlife Service in Interior—Maybe they are too busy with Endangered Species...

Volume 62, No. 26, 2-6-97, page 5841. OSMRE, Water Protection, Notice of Availability. This document describes OSM's role in water protection and overview of 2 permitting requirements from SMCRA: Application for the determination of Probable Hydrological Consequences (PHC), and regulatory authority for Cumulative Hydrological Impact Assessment (CHIA)—not to be confused with the CHIA PETS.

This information can be viewed at http://www.osmre.gov. The document contains prompts for further responses. For further information contact: Douglas Growitz, OSMRE, 1951 Constitution Ave., N.W., Washington D.C. 20240, phone 202-208-2634


Comments must be submitted by 4-14-97 to the Department of Interior, Minerals Management Service, MS 4700, 381 Eldon St., Herndon, Va. 20770-4817, Attn: John Mirabella, Chief of Engineering Standards Branch. For more information call David Zinzer, Geologic Assessment Branch at 703-787-1575, or KumKum Ray at 703-787-1600


Upon turning to page 6553, I found—Department of Interior-Geological Survey, Technical Transfer Act of 1986. I'm happy that the USGS has the time and money to evaluate vaccines for the plague. I guess they are teaching all sorts of new technology in geochem classes now.


The comment period for Determination of Royalties found in 62FR 3742, 1-24-97, has been extended until April 28, 1997.

Support your Executive Committee's position paper to keep GEOLOGICAL in the name of the U.S.G.S.

So much for this month. Maybe next month will be more informative.

F. B. "Ted" Mullin, is currently a consultant after retiring from the United States Forest Service after 18 years. The Today in Washington column is a monthly feature and has been written by Ted since September, 1991.

APRIL 1997 • The Professional Geologist 17
Congress Expands Control over the Executive Branch

The Act requires an extensive array of reporting requirements encompassed within four themes: strategic plans, annual performance plans, government-wide performance plans, and annual performance reports. Every federal agency is to submit strategic plans to Congress and to the executive branch's budgetary watchdog agency, the Office of Management and Budget (OMB), by September 1997. The strategic plan is to include a mission statement and specific goals for all major programs and operations for a five year period. What constitutes a major program is most likely going to be the subject of considerable negotiation. Also due in September 1997, is the initial annual performance plan outlining definitive accomplishments to be achieved during fiscal year (FY) 1999.

OMB itself does not escape the reporting criteria, for it is commanded to submit an annual government-wide performance plan beginning early in 1988. This plan is to be presented as part of the President's FY 1999 budget request and will presumably represent a composite of the federal agencies' plans received by OMB. Finally, each federal agency is to prepare an annual performance report to be tendered beginning on March 31, 2000 and every year thereafter to Congress and the White House measuring agency performance against the goals established for the prior year.

In November 1996, to prepare federal organizations for compliance with the Act, OMB issued a memorandum advising all agencies to meet with their congressional oversight committees and to institute effective consultations. Although the Act mandates agency discussions with Congress, it does not define the scope of the legislated consultations. While OMB recommended consultative meetings with Congress, it also dictated that all substantive documents concerning strategic planning must be furnished to OMB beforehand. This last factor created some nervousness among the congressional leadership.

The Act certainly represents the greatest intrusion by Congress into federal agency program implementation in history. And the present Congress has made it clear that it intends to exercise its new power, and play a pivotal role in the strategic planning effort to improve federal government effectiveness and efficiency. In early March, Republican congressional leaders responded to the OMB memorandum. They sent a letter to OMB Director Franklin Raines describing what they believed agency strategic plans should contain and instructed federal agencies to confer with the appropriate congressional committees prior to the August congressional recess and the September compliance date. The letter also warned OMB not to install a rigorous clearance process that might interfere with strategic planning dialogue between the agencies and Congress. Among the signatories were a veritable "who's who" of the present Congress. Included were Senate Majority Leader Trent Lott of Mississippi, House Speaker Newt Gingrich of

It seems apparent that the principles of the Paperwork Reduction Act enacted by Congress some years ago does not apply to the executive branch in the case of this Act. But despite the seemingly onerous reporting burden on federal agencies and the lack of definitions concerning consultation and major programs, this cloud may have an unanticipated silver lining beyond the obvious possibility that it might actually improve government performance. Congressional leadership has agreed to coordinate the complex jurisdictional morass of overlapping congressional committees, and to reduce the duplication the present system produces. In addition, there is the opportunity to bring together appropriation and oversight committees to match spending plans with strategic goals. And if we are to fantasize, the Act may set in motion a congressional initiative to pass no authorization bill without an associated appropriation. And to think the unthinkable; in requiring accountability of the executive branch, Congress might parenthetically bring the same fate down upon itself.

The Government Affairs Column is a bimonthly feature written by John Dragonetti who is Senior Advisor to the American Geological Institute’s Government Affairs Program.

NOTE: The end of the following sentence was not included in the February article: The author is indebted to the many former Bureau employees who provided the bulk of the information contained in this article, principally George Coakley, John Murphy, and Bob Doyle.

Our apologies for this error.

Status of Geologists’ Regulation Bills

The following status reports were obtained March 20, 1997, from the Bill Status reporters of the respective legislatures.

KANSAS: House Bill 2099 has been held over for 1998. The current session adjournment is May 2. The Bill Status telephone number is (800) 432-3924 for In-state during sessions. For Out-of-state or between sessions phone (913) 296-3296 and ask for Legislative Reference.

NEBRASKA: Legislative Bill 700 has been passed out of committee to the full Legislature (one house in Nebraska) for its consideration. A vote has not yet been scheduled. The Nebraska Legislature adjourns June 6. The Bill Status telephone numbers are (800) 742-7456 for In-state, and (402) 471-2709 for Out-of-state. Between sessions it is (402) 471-2271.

NEW MEXICO: House Bill 474 is in the House Energy and Natural Resources Committee, where it has been tabled. Its sponsor likely will reintroduce it in the next session. The current session adjournment is March 22. The Bill Status telephone number is (505) 986-4600 for both houses both during and between sessions.

TEXAS: Senate Bill 486 and House Bill 3447 are parallel bills. Senate Bill 486 has been referred to the Senate State Affairs Committee for consideration. House Bill 3447 has been referred to the House Committee on Licensing and Administrative Procedures. The current session adjournment is June 2. Bills must be out of committee at least 72 hours before adjournment in order to be considered. The Bill Status telephone number for both houses is (800) 253-9693 for In-state, and (512) 463-1251 for Out-of-state. Between sessions it is (512) 463-1252.

UTAH: Senate Bill 169 was tabled in committee. The current session adjourned March 5. The Bill Status telephone numbers for both In-state and Out-of-state are (801) 538-1029 for the House and (801) 538-1035 for the Senate.

IN SUMMARY: The Kansas, New Mexico and Utah bills appear to be dead for this session, but the Kansas and New Mexico (and, perhaps, Utah) bills are likely to be reintroduced in the next session. The Nebraska and Texas bills are still alive, with plenty of time for action.
"STANDARDS"

William V. Knight, CPG-0154

Formal "standards" of practice are new to most geologists. We know about codes of ethics. Those of us who spent our lives in the petroleum industry are aware of "API" (American Petroleum Institute) "standards," or "specifications." The relatively few of us in the construction industry are familiar with various building codes. These are only three of the more prominent of the many systems of "standards" increasingly encountered by geologists and others in their professional work. Most of us have seen occasional references to ASTM (American Society for Testing and Materials) "standards" for testing of materials, etc., and we have a vague idea of what they are and represent. But, these have usually been peripheral to our professional practice and were generally regarded as "something engineers worry about."

ASTM "standards" have been around for about 100 years. They often are included in contracts for products or services and in regulations of government agencies. Expert witnesses frequently encounter "ASTM standards" when testifying in trials and hearings. By and large, they are very highly regarded and have been the "standard" of quality in many industries for many years. There are thousands of ASTM "standards" on a multitude of subjects.

One thing that should be clarified here is the ASTM parlance. Unqualified use of the word "standard" has led to considerable confusion. For example, the heading of a "standard" document may read "Standard Z.000, Standard Guide For . . ." Thus, it may appear as either a noun (Standard Z.000) or an adjective (Standard Guide), or both, in the same title. Unfortunately, the distinction is often lost. As frequently used in ASTM documents, " . . . a 'Standard' is a document that has been developed and established within the consensus principles of the Society and that meets the approval requirements of ASTM procedures and regulations. A 'Guide' is a compendium of information or a series of options that does not require a specific course of action. A Guide increases the awareness of information and approaches in a given subject area. A 'Practice', in contrast, is a definitive set of instructions for performing one or more specific operations that do not produce a test result." (See Form and Style for ASTM Standards, 10th ed. (1996).)

Frequently, the terms "Standard Guide" and "Standard Practice" are arbitrarily shortened to "Standard" in conversations or in non-ASTM documents. Unfortunately, in legal parlance, "standard" can have one of several meanings and it is sometimes difficult to determine which one applies in a particular context. (See Black's Law Dictionary, 5th ed. (1979).)

Geology, like other sciences, has traditionally been thought of by most of its practitioners as an investigative, interpretive science, unconfined by arbitrary limits, by definitive sets of instructions or by "recipes" dictating how things are to be done. The end result or interpretation has been the important thing, and the design and justification of how it was reached has been left largely to the ingenuity and professional judgement of the individual practitioner. Discipline has been primarily by the peer review process rather than by adherence to published "standards." Specific tests conducted in the course of an investigation may have utilized widely recognized and accepted methods or published "standards," but the overall conduct of the investigation has usually been within the professional discretion of the investigator. Of course, some companies and agencies have had their own ways of doing things that employees have been expected to follow, but new
ideas and innovation commonly have been prized. In this context, public health and safety have seldom been direct issues and the users of the resulting reports have usually understood the terms used and the conclusions drawn (whether they agreed with them or not). Thus, geologists are often shocked and a bit irritated when they are required to adhere to "all applicable ASTM standards."

Enter the environmental movement and geologists’ growing involvement in it, along with their increasing interface with the legal and engineering, or "design," professions. Environmental Impact Assessments and Statements (EIAs and EISs) appeared a quarter century ago. These followed rather broadly defined procedures spelled out in the statutes and regulations governing them. Water quality became a serious concern, and "standards" for this began to appear. Then, along came Environmental Site Assessments (ESAs). Many organizations and individuals have attempted to write "guidelines," "policies," "standards," or whatever, for conducting them. While there has been a fair degree of similarity between these attempts, none has been totally accepted by all of either those who produce them or all of those who use them.

For the benefit of the scientifically unsophisticated users of these documents, there was a need to bring some level of order into this perceived chaos. So, ASTM committees began writing "standard guides" for conducting both Phase I and Phase II ESAs and for planning, writing and reviewing hydrologic and geologic reports. The "standards" for Phase I ESAs have been published. Those for Phase II ESAs are in process. Those for the reports were "shelved," but there is a movement to revive them. In addition, for the past several years, ASTM committees have been writing "standards" for ground water investigations. Committee members for this effort are primarily geologists, hydrogeologists and hydrologists. AIPG Members are involved in many of these committees, but most of our Members are unfamiliar with them, what they are trying to do, and how they go about it. It behooves us to learn.

Recently, objections to these "standards" have been raised.

Leading the attack on these particular "standards," while endorsing and praising the general concept of "ASTM standards," has been ASFE (the Association of Engineering Firms Practicing in the Geosciences). AIPG has been watching this controversy develop, but has rarely taken an active role in it, though a few Members have expressed support on both sides of the issue.

To try to reach some agreement, a parley was convened recently by the American Council of Independent Laboratories. Several organizations, including AIPG, were invited to send representatives. The principal spokesman for the two points of view were James Thomas, President of ASTM, and John Bachner, Executive Vice President of ASFE. Each of these gentlemen kindly consented to prepare for TPG a summation of the statements which they presented at the parley. These follow. We hope that their efforts will shed some light on what has become a confusing and difficult problem for an increasing number of our Members.

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### Executive Director’s Itinerary

(subject to change)

The Executive Director is visiting various Sections, agencies, campuses, and other organizations. He is talking, listening, and exchanging information and ideas. Members are encouraged to attend these meetings wherever and whenever possible. His itinerary for the next several months, as presently scheduled, is:

- **Apr. 6:** Geoenvironmental Forum, Dallas, TX
- **Apr. 6-8:** American Geological Institute, Envir. Geoscience Advisory Committee, Member Society Council, Government Affairs Program Committee, Dallas, TX
- **Apr. 6-9:** American Association of Petroleum Geologists, Annual Convention, Dallas, TX
- **Apr. 26:** Executive Committee, Arvada, CO
- **May 18-21:** AIPG National Affairs Fly-In, Washington, D.C.
- **Jun. 12-15:** European Federation of Geologists Council, Stockholm, Sweden
- **Jul. 16-21:** AIPG-GSA-AAPG/DPA-USGS Ethics Conference, Welches, OR
- **Jul. 29-Aug. 1:** Council of Engin. & Scientific Society Executives, Pittsburgh, PA
- **Aug. 6-9:** National Conference of State Legislators, Philadelphia, PA
Standards: A Tool for Professional Judgment

Robert J. Morgan - ASTM Director, Technical Committee Operations
James A. Thomas - ASTM President

Since 1898, ASTM has provided an opportunity for professionals to exchange ideas and express strong convictions within an organized system. Diversity of opinions has shaped the quality and performance of products and services that affect our lives. This latest opportunity is no exception.

The consensus process that brings together individuals with different opinions and experiences is the reason that ASTM standards enjoy world wide recognition. ASTM has provided a management system enabling affected stakeholders to have an equal say in the development of standards for nearly 100 years. ASTM has 35,000, members from 100 countries working in 132 technical committees developing standards that have marketplace acceptance because of its process. This process allows the leading experts in their respective professions to exchange experiences, ideas and reach a consensus on needed information for their industries. Many industries and professions have been able to improve performance, quality and safety by partnering with ASTM.

On February 12, 1997, representatives from a group of very well respected professional organizations met with ASTM to express their concerns over some of ASTM's environmental committee activities. Specific concerns focused on the activities of Committee D18 on Soil and Rock and Committee E50 on Environmental Assessment. The subject of contention was twofold. First, is a concern over the use of the word "Standard" in the title of Practices and Guides and second is the prescriptive nature of these documents and how that stifles innovation and infringes on "professional judgment."

With regard to the first concern, it was suggested that the word "Standard" in front of Guide or Practice in the title of ASTM documents is causing confusion, particularly in the courtroom because different people have different perceptions of the meaning of the word "standard." ASTM's response has been that the word "standard" in the title of a document is used as an adjective to describe that the consensus process has been followed to develop the document. While the definition may be different from Webster's, in ASTM, for nearly 100 years, the word standard in the title simply describes a consensus process. For those that stop reading an ASTM standard after the title, this can be confusing. However, ASTM Standard Practices and Guides are required to have scopes and significance and use sections, in these required sections, found within the body of the document, one can find a detailed description of its recommended use and limitations.

The word standard is not unique to ASTM. Documents being developed in the American Society for Civil Engineering (ASCE) for example covering engineering and design practice have the word "standard" in the title. If any one of the nearly 400 standards organizations in the United States seeking accreditation by the American National Standards institute (ANSI), passes a guide or practice through their process, the result is an American National Standard. Those organizations seeking international approval from the International Standards Organization (ISO), end up with an International Standard. Public Law 104-113, signed into law in March 1996, requires federal agencies to use the private sector to develop standards for their regulatory needs. So the word "standard" is not exclusively used by ASTM.

The concerns raised by these professional organizations have not fallen on deaf ears. The technical committees are exploring caveat language to be incorporated into the scope of ASTM Practices and Guides which will make it clear that the standards are not a replacement for professional judgment.

The second concern expressed was about the prescriptive nature of ASTM standards. The claim is that the standards infringe on professional judgment. This claim has stimulated the interest of the professionals who have dedicated much time and resources in developing the standards. David Nielsen, Certified Professional Geologist and Professional Hydrogeologist and former chairman of ASTM Subcommittee D18.21 on Ground Water and Vadose Zone Investigations, speaking for many members states, "I firmly believe, as do many of my colleagues involved in ASTM Technical Committees, that the purpose of ASTM standards is not to replace sound professional judgment. These standards serve to assist practitioners in exercising their professional judgment by providing useful information upon which they can make decisions." Nielsen and nearly 500 other professionals have spent the last decade volunteering their time to participate in the process and develop these standards. "What other options exist? We could all sit back and, as happened in the environmental sciences in the early 1980's, wait for bureaucrats with little or no experience in the field to prescribe outdated or unproven practices for us. I hope we can all agree that voluntary consensus standards, which represent input from experienced peers and colleagues with very diverse perspectives and represent true state-of-the-art-practice, are preferable to nonconsensus practices foisted on us in such a manner."

This discussion always goes back to the process. This process welcome opposing points of view. It is because of that the end result is a technically credible document with marketplace acceptance. Nielsen sums it up well, "If you choose not to participate in the process, if you lack the necessary concern to become actively involved in helping determine the direction in which your field is headed from a professional practice standpoint - you have only yourself to criticize."
ASFE: Professional Firms Practicing in the Geosciences

John P. Bachner, Executive Vice President

ASFE: Professional Firms Practicing in the Geosciences has sounded the alarm relative to prescriptive professional practice standards developed and being developed by the American Society for Testing and Materials (ASTM). ASFE leaders and others believe that, without safeguards, these standards will cause serious problems.

Why the uproar? Consider this scenario:

A client engages a consultant to evaluate the environmental conditions of a property the client plans to purchase. The consultant and client develop a project-specific scope of service. The consultant explains that even thorough audits are not fail-safe; risks remain. The consultant later submits a report of findings. Based on these conclusions, the client purchases the property.

A year later, while redeveloping the property, unexpected contamination is found. It will cost more than $1 million to eliminate it. In response, the client's attorney reviews the project documentation. He reports, "The consultant didn't follow ASTM standards." He notes the report's title was 20 words long. The ASTM standard says the title should be short.

"You mean too many words in a title makes a consultant negligent?" the client asks, incredulous. "Not really," the lawyer answers. "But when you add that violation to chapters in the wrong place, failure to perform certain tasks that probably didn't apply, and such, the jury will probably see things our way." The lawyer explains that environmental professionals usually base their defense on technicalities that juries don't understand well. "The jury will be terribly confused, and our arguments will be easier to understand."

After enduring months of the time-consuming, demoralizing, and costly "hoops" of our justice system, the weary consultant finally gets a day in court. He makes these points: ASTM standard practices and standard guides are suggestions professionals can consider. No ASTM standards are mandatory, (unless they are required by code, statute, regulation, or contract) nor can they ever be project-and client-specific. They do not define the applicable standard of care which professionals are required to uphold, and which the consultant followed.

Plaintiff's counsel responds, "Ladies and gentlemen of the jury, I imagine you're confused about all of this, so consider these facts."

"ASTM is the most respected standard-setting organization in the world. More than 1,000 experts developed each of the ten ASTM standards that applied to this project, none of which the defendant complied with in full. He says total compliance was not required. But our expert, the eminent Dr. Charlatan, noted that ignoring ASTM is 'arrogant and unprofessional.' And because of the defendant's arrogance and lack of professionalism, my client suffered a loss of $5 million. Please tell the defendant that professionals cannot thumb their nose at ASTM."

The jury obliges. As word of this spreads, others yield their professional independence and judgement to lower their risk. Even though an ASTM standard does not apply fully to a specific client and project; even though adherence prevents even modest innovation to lower costs and/or improve results; even though adherence requires hours of mind-numbing compliance verification and mountains of nonproductive documentary paperwork; even though adherence will raise costs while denying cost-effective choice to "consumers," the standard is followed.

This can happen because ASTM is developing more than 100 "standards" that specify the tasks professionals should perform to render a service; tasks that, heretofore, have been matters of professional judgement. Professionals especially worry that ASTM's prescriptive "standards" will deny them the ability to innovate. The standard of care professionals must observe is a moving target. It is the way a given activity is ordinarily performed at any given time by most area practitioners. Ordinary care, the law says, is all that professionals must provide. So long as they do, minor errors or omissions are not considered negligence. Only when they fail to abide by the standard of care, and consequently injure or damage someone, are they negligent. This gives professionals the leeway they need to develop new and better techniques. That ability will be lost if practitioners must follow an ASTM "recipe." Most geotechnical reports would probably have to adhere to the ASTM standard report format, even if it is inferior to what they used to follow. And what happens if you omit a chapter indicated in the standard table of contents even though it was irrelevant. A jury might be convinced that your omission was negligence.

Given this scenario, clients will start to receive (and be required to pay for) services they neither need nor want, because consultants would fear to do otherwise.

ASFE has some simple suggestions.
1. Do not label as "standards" documents intended for general guidance or which set forth specific suggested procedures ("standard practices") such as ASTM E 1527 on Phase I Environmental Site Assessments. Instead, call them "Consensus Guides" or something similar.
2. Include a clearly written, easily understood, prominently located user advisory in each of the two types of documents above, advising against misuse and also advising about proper application.

These suggestions are now being seriously considered by ASTM. ASFE hopes that work on a user advisory/caveat will move forward soon. Change is needed. ASFE believes, because professionals must have latitude to exercise judgement to advance professional practice. If professionals are reduced to implementers of others' procedures, they become little more than technicians.

While following a prescriptive professional practice may improve the output of those who practice in the "lower tier," as ASTM contends, the "improvement" will cost too much if it forces those who lead to become followers. In short, being forced to follow cookbook approaches creates a recipe for disaster. ASFE wants only to make the recipes optional, by modifying ASTM nomenclature and adding appropriate warnings.
Dear Editor:

I am writing to bring your attention to a January 1997 submittal in *The Professional Geologist*. On page 17, there is a column entitled “Volunteer” which seeks to recruit geologists and others to share their professional expertise with young men and women at the Philmont Scout Ranch this summer. My concern is with the second sentence of the fourth paragraph which reads “Better yet, your wife and offspring can stay over at no cost at the ranch base camp,” AIGP has many female geologists, and males too, who, like me, take offense at the implication that all geologists are men. While I realize that it was most likely submitted to AIGP in the form it was published, I do think it is important to edit out concepts that many members may find archaic. Certainly the word “spouse” would have been a better choice. As it turns, is out, I have a female geologist on my staff at the Colorado Oil and Gas Conservation Commission who has volunteered to spend a week at Philmont, and guess what, she’s taking her husband along with her!

Thanks for considering my comments and please know that I appreciate your commitment as editor of the TPG.

Patricia C. Beaver, CPQ-7664
President, Colorado Section

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**1997 Short Course Program**

**International Ground Water Modeling Center**

**Colorado School of Mines**

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For more information contact:
International Ground Water Modeling Center
Phone: 303/273-3104
E-Mail: lgwmcm@mines.edu
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**Geologist Describes Opportunities for the Discovery of Diamonds and Gold in Wyoming**

W. Dan Hauser, senior economic geologist for the Wyoming State Geological Survey, recently spoke to the Wyoming Geological Association in Casper about the numerous opportunities for diamond discoveries in Wyoming. In his talk, entitled "Diamonds - Where and How to Find Them", Hauser explained that the Wyoming craton, which includes Montana and Wyoming and extends into Colorado, has some of the highest potential for commercial diamond deposits in the United States. In the Colorado-Wyoming State Line diamond district, more than 120,000 diamonds up to 28.3 carats in weight, have already been recovered. Reportedly, more than 50 diamonds have also been recovered from the Green River Basin of southwestern Wyoming in the past year. Evidence also suggests the possibility for diamonds in the Medicine Bow, Seminole, Bighorn and the Owl Creek Mountains, and in the Powder River Basin of Wyoming.

Later this month, Hauser will speak on diamonds to the Longmont, Colorado Gem Club, and on South Pass gold occurrences to the Gold Prospectors of the Rockies in Golden, Colorado. According to the Wyoming State Geological Survey, there has been a significant increase in interest in South Pass ever since the State Survey published an article on gold in the December, 1996, issue of the International California Mining Journal. The article described areas in Wyoming where specimen grade gold and nuggets had been found.
How much are professional geologists making NOW by:

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Continuing Education and Professional Development
(Column 14 - Jan '97)

Bruce Darling, CPG-9636, wrote, "I enjoyed your comments on the issue of continuing education and professional development for registered/certified geologists. I am a senior hydrogeologist with a well-established consulting firm in Austin, Texas. In addition, I am registered in six states, certified by AIPG, and am within a few months of completing my Ph.D. in geology at The University of Texas at Austin. Let me be blunt—I don't buy the argument that we should have a rigid set of continuing education requirements, as specified by the State of South Carolina, for example. As a consultant who has managed to continue his education through two master's degrees and a Ph.D. program, I am too busy to worry about proving to a group of power-hungry bureaucrats that I know enough about the field of ground-water hydrology to keep my registrations, etc. For example, I don't work 8 a.m. to 5 p.m. 5 days a week. There are many weeks running when I work 12 hours a day every day—before I have the time to work on my dissertation. Most consultants I know have schedules that are not much different. If we are to have continuing education/professional development, then we should look more closely at your well-reasoned suggestions before forcing many thousands of very capable geologists to sit through hour after hour of watered-down and expensive drivel. Secondly, we should make sure that those who PROFIT from teaching courses that might be required as part of a continuing education program also demonstrate by attendance in other courses, etc., that they have fulfilled their requirements. I suspect that those who cry the loudest for continuing education have ulterior motives."

While I don't know about everyone, I do know that my usual compensation for presenting a continuing education course certainly is not personally profitable in the immediate sense. I may get a lunch, sometimes free registration at an associated meeting, and occasional assistance with travel and rooms. While most of my career was spent as a federal employee and therefore subject to various restrictions, I don't believe that most of my private industry counterparts received any more. I recently gave my first short course presentation as a consultant and received registration and lodging. The rest of my expenses, meals, airfare, etc., are called marketing expenses.

Nevertheless, I do not intend to discount Darling's comments. Many organizations, including AIPG, have run short courses. The interest of the organization includes generating some revenue beyond dues although ensuring that expenses are covered is a primary consideration. Hotel meeting rooms are not all that cheap and even schools often charge for their facilities. Do you think speakers should be paid or not? What is reasonable compensation? Additional comments are welcomed.

AIPG Membership Application by an Ex-Con
(See Columns 13 - Dec '96 and 15 - Feb '97)

Peter H. Dohms, CPG-7141, commented, "Now to your hypothetical question in the [December 1996] TPG about felons applying for membership in AIPG. Here are my thoughts:

"1. Concealing a previous felony of any nature should be grounds for dismissing an application with prejudice (or for later dismissing a member). That should be explicitly stated in the application package.

"2. A previous felony of a nature that would bear on professional or ethical behavior should ordinarily be cause for denial of an application. 'Ordinarily' because the Institute should retain the ability to examine each situation on its merits.

"3. A previous felony of a nature that would not ordinarily bear on professional or ethical behavior should not necessarily be an impediment to membership. Here, the test might be, 'have the felon's civil rights been restored?' I would personally consider it unseemly if AIPG had members who could vote and hold office at the Section or National level, but who could not vote in general elections. Again, the Institute should retain the ability to judge each case on its merits.

"4. Notation of a previous felony conviction in the application should result in a follow-up questionnaire from the Institute in which the details of the offense, conviction, incarceration and rehabilitation could be supplied, together with additional justification as to why the applicant still believes himself/herself qualified for membership. This supplemental form would be returned directly to you or your successor for review."

The Screening Committee rather than the Ethics Committee is charged with reviewing applications and thus would be responsible for implementing Dohms' suggestions. (Both the National and Section Screening Committees may ask the Ethics Committee for assistance whenever desired, but screening applicants is their job).

Dohms' suggestions seem like good ideas given the current rules, which do not permanently preclude convicted felons from becoming members. Any other comments?
Speakers Who Decide Not to Show Up at Meetings

During the recent SEG-SME annual meeting, one of the scheduled speakers, a professor from a well-known university, canceled his presentation by sending a letter containing the following excuses. When he received the final schedule, he learned that he was scheduled during the last session of the 3½-day conference. He had heard, he wrote, that almost no one attended these final sessions and decided it was more important for him to return home despite having been at the meeting the previous day! He couldn’t stay the extra night. Over 100 people were at that session, which was as well attended as the other SEG sessions. The program organizers had planned a good meeting and scheduled an interesting session for last, one people stayed for.

We all know that speakers have to cancel for a variety of reasons. Sickness, family emergencies, unexpected business emergencies, corporate downsizing, refused visa applications, etc., do occur and most of us accept their legitimacy. The reasons for cancellation and how they are communicated can make a big difference. What do you consider to be acceptable excuses? Do you have examples of how to communicate last minute changes?

The professor’s actions were clearly impolite. A good many high-powered members of the mining community know about this lame excuse and, I believe, will remember it to the professor’s detriment. Were the professor’s actions also unethical? If so, which section of the Code of Ethics did he violate? As an exercise in making an ethical complaint, find the appropriate section(s) supporting your view and submit them.

Disagreements Between Co-authors

I ran into Ora H. Rostad, CGP-1869, at the SME meeting. Rostad and I discussed the ethical issues surrounding a major disagreement between joint authors of a draft paper. Assume one of the proposed co-authors substantially disagrees with conclusions reached by other co-authors. What is an ethical resolution? Does the disagreeing author withdraw his or her name? Should the other co-authors agree to include the minority view? Have you been in a similar situation? What happened?

Other “Ethics & Practice” Discussions

Professional ethics and practices has become a very popular subject. Several other societies, some with active AIPG members, are beginning to publish case histories and other ethics and practices discussions. Robert A. Larson, CGP-8113 and a member of AIPG’s Ethics Committee and contributor to this column, also chairs the Ethics and Professional Practices Committee of the Association of Engineering Geologists. Larson has begun a column in the AEG News which outlines a problematic situation, which is contributed by a member, followed by several suggested courses of action. Readers are encouraged to select a course of action and write a summary of why they chose as they did. The first situation was published in the Winter 1997 issue and the responses to this problem (June, issue of the AEG News) are thoughtful.

Peter H. Dohms, CGP-7:41, is working on the Applied Ethics Case of the Month with the Associated Soil & Foundation Engineers (ASFE, which Dohms describes as an AIPG for companies) and the Professional Engineering Practice Liaison Program of the University of Washington to an Applied Ethics “Case of the Month,” which will be available on a worldwide web site currently under construction and possibly up and running by the time you read this. I don’t have the web-site address but you can reach Dr. Ronald E. Bucknam, Director, Professional Engineering Practice Liaison Program at rebuck@whidbey.net or rbucknam@u.washington.edu.

While both these sources are focused on engineering geology situations, the cases they present are thought provoking. The situations discussed are more detailed than the situations usually described in this column and thus have a different flavor, complementing this column rather than competing with it. If you are not a member of AEG or ASFE, you might wish to check out these sources. An exchange of information between Larson, Dohms, and myself has begun so that we may share the best of what we have to offer to each other. Nevertheless, there is no substitute for going to the source.

Larson compiled the following list of ethics discussions on the web.

National Society of Professional Engineers (ethics page)
http://www.nspe.org/index.htm

Ethics Center for Engineering & Science
http://www.mit.edu:8001/asf/athena.mit.edu/org/e/ethics/www/

National Institute of Engineering Ethics
http://www.niee.org/

Murdoch Center for Engineering Professionalism
http://www.coe.ttu.edu/ethics/murdo.htm

If you know of other useful web sites on professional ethics, let me know and I’ll publish the web site address. I’m also working towards putting these columns on AIPG’s web site. David A. Stephenson, CGP-3237 and Past GSA President, is convening a week-long conference on “Ethics in the Geosciences,” co-sponsored by AIPG, GSA, and AAPG, July 16-21 at the Resort at the Mountain, Welches, Oregon. This conference is patterned on GSA’s Penrose Conferences. If you are interested in an intensive ethics session, contact Stephenson at (602) 948-7171 or sprigeo@aol.com. President Jon Price,
Executive Director Bill Knight, and I plan to be the official AIPG delegation, but many of those representing other organizations are AIPG members like Stephenson. In this column I'll summarize the information presented at the conference, but this will be no substitute for participation.

Registration as a Vehicle to Restrict Practice

Bruce Darling, CPG-9636, also wrote, "On another topic (one that really hits my hot button), I would like to see someone look more closely at the issue of registration, as I suspect that programs in states such as Georgia, North Carolina, South Carolina, Maine and California have been run as 'closed shops.' For example, the Georgia State Board of Registration for Professional Geologists used to administer a two-part exam written by old-timers in Georgia. The first part was designed (supposedly) to assess one's understanding of the basic principles of geology. The second was designed (allegedly) to be more practical, insofar as it focused on applications. I understand, however, that over a two-year period, fewer than 40 percent of examinees passed the first part of the exam! Similar results have been reported for North Carolina. Now, I am not an expert in testing theory, but I do have a very strong background in statistics. The results indicate, at least to me, that the old Georgia exam was biased as hell. I've heard very little discussion of this issue. I would be interested in your thoughts."

I can't personally speak about any of the states Darling mentions, an argument that "We expect those registered in our state to really know about ___'s geology." It sounds reasonable, but really covers protectionism quite nicely. General geological principles do not respect political boundaries and local details may be obtained fairly quickly in the library. Anyone care to present a more convincing justification?

In a related example, the first “Case of the Month” from the Professional Engineering Practice Liaison Program described previously involves the following scenario. An old factory was to be demolished and a new facility built on the same site. However, an historic clock tower, which was part of the old factory was to be saved. An engineer was retained to recommend procedures to ensure that the demolition of the old factory did no harm to the tower. The recommended procedures were followed but as demolition proceeded, the tower started tipping. The demolition firm brought in a consultant from another state with whom it had previously successfully worked, in a similar situation, to stabilize the tower. The second engineer's recommendations were successful in saving the tower and the project proceeded. Everyone appeared happy and no one sued over the engineering work by either engineer.

However, the second engineer was neither a resident of, nor licensed in, the state in which the project was located. He realized, after the fact (it was a weekend emergency when he was called in) that he should have been registered, or at least have obtained temporary permission to practice in that state, before he prepared an engineering design. He contacted the registration board, who informed him that they had no provision for temporary practice and that a full registration application was required. The engineer submitted the application, including evidence of registration in 17 other states, and was accepted by reciprocity.

Subsequently, the first engineer filed a complaint against the second for practicing without a license. Further, the first engineer threatened to sue for damages claiming that too many out-of-state engineers were practicing without being licensed, thus damaging the first engineer's professional practice.

This "Case of the Month" asks questions about how the second engineer should deal with this problem. Should he have (1) declined the assignment due to lack of registration, (2) contact the state engineering board for permission before accepting the assignment, or (3) take the position that protection of the public's health, safety, and welfare represents a higher ethical principle than strict compliance with the legal registration requirements and therefore his emergency work was justified; an argument further supported by his subsequent registration prior to any complaints being made. Those of you interested in the specifics are urged to consult the "Case of the Month" for full details.

I read this case after receiving Darling's comments above and recognized that this case also presents an excellent example of "protecting my practice" rather than "protecting the public." Remember, no allegations of incompetent engineering have been made and I assume none are warranted. What do you think of this situation? Comments are welcomed and will be published in this column and forwarded to the "Case of the Month."
AIPG MEMBERSHIP BENEFITS

Certification

AIPG certifies the qualifications of professional geologists prior to admitting them into membership. By means of a rigorous and thorough peer review process, the Institute investigates applicants who voluntarily apply for self-regulation through the Institute. This screening carefully evaluates their education, experience, technical competence, and ethical conduct. If they meet AIPG's high standards, applicants are granted Certification and the title of "Certified Professional Geologist" (CPG). When the letters CPG follow an individual's name, they proclaim to the public that this person has met the standards and subscribes to the Institute's Code of Ethics and Bylaws.

Representation

Members are represented by qualified geological professionals. Congress, Legislatures, and Federal and State agencies are lobbied on specific mining, petroleum, water, environmental and other issues of special interest to geologists.

A portion of AIPG's monthly magazine The Professional Geologist (TPG) is devoted to reporting developments at all government levels. Thirty-six sections of AIPG provide group representation on a state or regional level and offer opportunities to meet, work and exchange ideas and information with colleagues.

Education

At the national and section level, AIPG provides materials designed to enhance the professional knowledge and skills of its members. Educational opportunities range from seminars and short courses to sectional and national meetings. To encourage high standards of educational programs, the Institute recently established a program of Accreditation of Continuing Education opportunities offered by other organizations.

The Institute prepares and distributes comprehensive publications giving background and scientific explanations on geologically-related matters of public concern. Topics include: ground water, radioactive waste, and hazardous waste.


Insurance

Professional liability, health, and life insurance are available to members.

Information

AIPG disseminates information to its members and to the public in a number of ways on a wide variety of topics. The Institute publishes a monthly magazine The Professional Geologist (TPG). It is mailed to members and interested individuals, businesses, and political leaders. Subscriptions are available to non-members.

A comprehensive Membership Directory is published annually. Copies are sent to federal, state, regional and local governments, libraries, consulting firms, corporations, and other potential users of geologic services throughout the United States and abroad. The Directory may also be purchased by non-members.

REQUEST FOR APPLICATION AND ADDITIONAL INFORMATION

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STREET________________________________________

CITY_________________STATE____ZIP__________

DAYTIME PHONE______________________________

Mail, fax, e-mail, or call:
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7828 Vance Drive, Suite 103
Arvada, CO 80003-2124
(303) 431-0831 - FAX (303) 431-1332
E-mail address: aipg@aipg.com

Please send me information on:

☐ Certification - (degree and 36 semester hours in a geological science, plus five years of experience).

☐ Candidate for Certification - (degree and 36 semester hours, but less than five years of experience).

☐ Student (declared a major in a geological science).

☐ Continuing Education ☐ Advertising Rates

☐ Insurance ☐ TPG Subscription

☐ Publications ☐ Insignia Items
CALENDER

1997

Late Spring. 1997 International Ground Water Modeling Center courses at Colorado School of Mines, Golden, CO. Contact: Office of Special Programs & Continuing Education, (303) 273-3321, fax (303) 273-3314, e-mail: sace@mines.edu.

May 8-9. Concepts of Gas Imbalance and Gas Balancing Agreements. Houston, TX. Contact: The University of Tulsa, Div. of Continuing Education, 600 S. College Ave., Tulsa, OK 74104, Ph.: (918) 631-3088, e-mail: conted_cee@utulsa.edu.

May 8-10. 48th Highway Geology Symposium: symposium and field trip, Knoxville, TN. Call for papers - deadline January 15, 1997. Contact: Harry Moore, TN Dept. of Transp., Geotechnical Section, P.O. Box 58, Knoxville, TN 37901, Ph.: (423) 694-9366, Fax (423) 694-9310.


Jun. 1-6. CSPG-SEPM 1997 Joint Convention, Sedimentary Events and Hydrocarbon Systems, Calgary, Alberta, Canada. Call for papers - deadline February 1, 1997. Contact: 1997 Convention Office, CSPG #505, 206 - 7th Ave. S.W., Calgary, Alberta, Canada T2P 0W7, Ph.: (403) 264-5610, e-mail: cspg@cspg.org, or www.cspg.org/cspgsepm97.


Jul. 15. Ground Water Hydrology, Dayton, OH. Contact: Wright State University, Center for Ground Water Mgmt., 3640 Colonel Glenn Hwy, 056 Library, Dayton, OH 45435, Ph.: (513) 873-3648, Fax (513) 873-3649, IRIS@desire.wright.edu, http://biology.wright.edu/cgwmc/cgwm_home.html.


Sep. 3-4. Alesandria University Third Conference on Geochemistry, Alexandria, Egypt. Contact: A. M. El Bousslly, Alexandria University, Faculty of Science, Geology Dept., Alexandria, Egypt, Ph.: 20-3-492-1595.

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 4570 690, Fax 61 4570 520.

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) 631-3088, e-mail: conted_cee@utulsa.edu.

AIPG ANNUAL MEETINGS

October 8-11, 1997 Houston, Texas

October 3-7, 1998 Baton Rouge, Louisiana

October 5-8, 1999 Anchorage, Alaska

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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 applicant's rejection may be called as a witness in any resulting appeal action.

Applicants for Certified Professional Geologist

MI - Campbell, Larry G.
2012 Cuyuga Trail, West Branch MI 48661.
Sponsors: Mark Siegmam, Randy Westmoreland, Gary Guthrie.

WA - Cooper, John T.
824 NE 95th, Seattle WA 98115.
Sponsors: Carl Andersen, Dan Whitman, Dave Williams.

NJ - Filosa, Joseph G.
78 Mariners Cove, Freehold NJ 07728-3713.
Sponsors: Steven Okulewicz, Gerald Gilliland, Hans Behn.

NY - Jacobs, David T. Jr.
60 Hamlet Road, Levittown NY 11756.

OH - Majchzak, Frank
3179 Palomar Ave., Columbus OH 43231.
Sponsors: Herbert Eagon, Robert Van Horn, William Rike.

MN - Miller, Rolf
2421 33rd Ave. South, Minneapolis MN 55406.
Sponsors: Doug Cannell, Fletcher Driscoll, Richard Manser.

MN - Nagle, Davidson C.
8005 Jonself Lane, Golden Valley MN 55427.
Sponsors: Paul Wiese, Ken Meek, Chuck Williams.

MN - Nickson, Michael L.
2317 E. Maple Lane, Maplewood MN 55109.
Sponsors: Paul Wiese, Dave Witt, Charles Williams.

WI - Smith, George L.
743 East Franklin St., Appleton WI 54911-5511.

PA - Weible, Deborah A.
1106 Eagles Nest Lane, Monroeville PA 15146.
Sponsors: Nilda Gohaj, Joyce O'Connor, Frank Benquista.

New Certified Professional Geologists

AK-Barry, John F., CPG-10076
8800 Duran St., Juneau AK 99601,
(907)483-8576

MI-Davidson, William T., CPG-10048
1450 Van Auken SE, Grand Rapids MI 49508,
(616)459-3737

WY-Finley, Andrew K., CPG-10077
4011 Swanton, Casper WY 82609,
(307)237-3821

OK-Fisher, John B., CPG-10078
5205 S. Joplin, Tulsa OK 74135, (918)560-2932

AK-Gray, Michael D., CPG-10079
PO. Box 242231, Anchorage AK 99524,
(907)692-3366

TX-Hall, William B., CPG-10080
2014 Cortland, Houston TX 77008,
(713)586-5642

WI-Krumenacher, Mark J., CPG-10081
W332 N5531 Solveson Drive, Nashotah W
53058, (414)691-2662

OH-Lawton, David L., CPG-10051
3648 Paris Blvd., Westerville OH 43081

WI-Thompson, Troy R., CPG-10082
W374 N7507 Joanne Drive, Menomonee Falls
WI 53051-1430, (414)253-1440

CO-Tromp, Dirck E., CPG-10072
10701 Pecos St., Northglenn CO 80234-3202,
(303)860-6800

WA-Venchiarutti, Daniel A., CPG-10073
2808 170th Place NE, Redmond WA 98052,
(206)746-4600

AIPG Membership Totals

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IN MEMORY

Chilton “Chip” E. Prouty, CPG-1786, Professor Emeritus of MSU died February 22, 1997 of a heart attack at age 82. Chip contributed his time and talents to many organizations including the Michigan basin Geological Society. He was also one of the charter members of the Michigan Section of AIPG. Donations may be made to (NAGT) the National Association of Geology Teachers Summer Scholarship Fund (R.A. Christman, Exec.-Dir. NAGT Western Washington University, Geology, Bellingham, WA 98225 or to a charity of your choice.

Charles P. Purdy, CPG-1559, was a Harvard and M.I.T. educated professional mining geologist. From 1942 to 1945 he worked in Spokane as an Associate Mining Engineer for the Department of the Interior, Mining Division. He worked also for the State of Washington, in Olympia, for the Department of Conservation, Division of Mines and Geology. His career took him throughout the American west, Canada, Greenland, and parts of Central America in search of commercial mineral deposits. Mr. Purdy’s distinguished career, included working as a consultant, and with such corporations as Crown Resource, Tenneco Minerals, Houston Oil & Minerals, Copper Range Exploration, Anaconda, and American Metal Climax Inc. His ties to the mining and geology community of the Northwest were strong and he chose Spokane as his home after retirement in 1985. In retirement he worked to support the Mineral Information Institute to increase understanding of mineral development in a climate of growing environmental concern. An honest, engaging, and tolerant man, he was a mentor to many.

Mr. Purdy is survived by his wife, Eunice of Spokane, a brother Richard Walker Purdy, of South Dartmouth Mass, nephews Lincoln of Franklin, Mass, Richard of Arlington, Mass, step children Dr. Alan Campbell of Telkwa, British Columbia, John I. Campbell of Calgary, Alberta, and Laura Ruth Campbell-Black of Summerland, British Columbia; and 3 grand children and a grand niece and nephew.

Memorial contributions may be made to the Mineral Information Institute, 475 - 175th Street, Suite 510, Denver, CO 80202, (303) 297-3226.
AIPG National Meeting
1997

The TEXAS Section of the American Institute of Professional Geologists is pleased to announce that the 33rd ANNUAL MEETING will be held at the DOUBLETREE HOTEL POST OAK

in

HOUSTON, TEXAS

October 8-11, 1997

Theme of the meeting will be:
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