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The Professional GEOLOGIST

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AZGS Begins New Decade

COVER - Geology at work in the Shawnee National Forest, Illinois: unique rock formations in the Pounds Member of the Pennsylvanian Caseyville Formation (Morrowan) in Garden of the Gods Recreation Area. Photo Credit: U.S. Bureau of Mines

DEPARTMENTS

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Geologists And
The Internal Revenue Service

Earl G. Hoover, CPG-2739

One of the most frequently asked questions is: What does a geologist do with the IRS? In general, the primary function of the geologist is to provide specialized services to the Examination, Appeals, Collection, and Litigation functions of the Service. The principal objective is to maximize voluntary compliance with tax laws by providing efficient and effective resolution of the more significant and complex natural resource and valuation issues examined by audit groups.

Geologists, foresters, and mining engineers are natural resource specialists employed in the Engineering and Valuation program, which was started as a result of the Revenue Acts of 1916 and 1918. These laws introduced the concepts of cost basis, fair market value, and specialists in the natural resources and utilities fields. By the end of the 1920's, about 45 Engineer Specialists were employed in Washington, D.C. by the Service. As a demand for the services grew, more Engineers and Valuation Specialists were added to work in other major cities.

The Engineering and Valuation Program as it exists today is the result of the 1952 reorganization of the Internal Revenue Service. That reorganization placed the Engineers under the officers of the respective District Directors. By the mid-1960's, engineering and valuation ranks had increased to 158 nationally, by the 1970's, the number had reached 260; and today there are 400 employees in the Engineering and Valuation program. Nationwide there are less than 40 mining engineers and geologists in the program and of this number just 13 are geologists.

The focus of this article is on the role of the geologists employed by the Service. A good beginning point is to discuss how services of geologists are requested. The Engineering Program is covered by the Internal Revenue Manual (IRM) section 42(16)0, which includes details on how income tax returns are referred for engineering services. If a return is selected for examination and meets the requirement, it is mandatory that it be referred such as for instance (1) all corporate returns with assets of $10,000,000 and over, (2) all partnerships and joint venture returns with annual gross receipts or total deductions of $1,000,000 and over and (3) all returns, including estates and gift, with a fair market value issue of $500,000 and over.

The referral procedure is as follows: A classifier at the Service Center or District marks the return as "Mandatory Engineering", or the examiner, Revenue Agent, for example, may determine engineering assistance is needed. The appropriate form is prepared with attachments, such as schedules, copy of return, appraisals, and other pertinent information and is forwarded to the group manager, who approves the referral and forwards the file to the engineer group manager. The engineer group manager reviews the referral and either accepts or rejects the request for engineering services. If it is accepted for examination, the group manager assigns the case to the geologist. The geologist investigates the case and forwards his case report to the engineer group manager who reviews the case for quality and sends it to the requesting function. Normally, this completes the loop for the geologist; however, if the taxpayer disagrees with the conclusions and has a strong supporting data base he may appeal. If it is a complex technical issue, the Appeals Officer may request additional engineering assistance. Should Appeals sustain the position of the Service geologist, the taxpayer may elect to go to tax court. District Counsel may request the services of the geologist to assist in trial preparation and to perform as an expert witness for the government.
or the geologist may assist a consulting geologist if District Counsel elects this option. In order to accomplish the foregoing, an IRS geologist has well-defined duties and responsibilities.

A geologist independently conducts investigations of valuation issues of tax returns filed by very large and complex organizations. The examinations require special ability and advanced knowledge of engineering valuation principles, tax law and industry practices. Referred cases contain a wide variety of unusually complex and difficult valuation, legal and tax issues of major significance which are likely to set important precedents in the field. These cases require familiarity with many sections of the Internal Revenue Code and Income Tax Regulations, and the geologist is responsible for applying specific tax laws to the specific issues.

Service geologists review and investigate engineering features such as valuation issues associated with the mining industry, including: representative market or field price of minerals for computing percentage depletion, fair market value of minerals and mineral properties for allocations of purchase price, for determining contribution value, for computing cost and amortization, determining value of abandoned properties and surrendered mineral leases and determining exploration and development expenses. This then leads to the question of knowledge required.

The geologist is required to have a thorough knowledge of basic tax laws relating to: mineral depletion, depreciable and non-depreciable assets, exploration expenses, determination of transition point between exploration and development stages and between development stages and production stages and related activities.

Also required is full knowledge of pertinent industry practices, procedures, and methods and how economic conditions affect these as well as the engineering, accounting and legal aspects of valuation problems. In addition a Service geologist should have a working knowledge of the laws relationship of real and personal property transfers such as leases, deeds, contracts, sales agreements, plats, and easements, and an ability to interpret and discuss valuation issues and apply tax laws, regulations, rulings, and court decisions, for the purpose of identifying potentially precedent-setting issues during examinations and to reach conclusions concerning tax liability where guidelines are unclear, conflicting and often non-existent.

Geologists are expected to keep abreast of current engineering developments, theories, techniques, technological advances, economic conditions, and other information that would aid them in rendering sound decisions. Many issues involved are not covered by existing guidelines and thus require extensive research and evaluation of the intent of the law, engineering principles, as well as the basic facts to arrive at accurate solutions. Guidelines on tax law and procedures include the Internal Revenue Code, IRS Regulations, Revenue Rulings, technical advice which applies, precedent-setting court decisions, revenue agents’ manuals and IRS administrative policies. Technical guidelines include standard appraisal handbooks, texts on business and finance, government and industry reports on manufacturing costs and prices, and trade and professional journals.

In conclusion, a geologist with the Internal Revenue Service performs the same professional duties as geologists elsewhere but with the added responsibility of applying tax law to specific situations. Professional knowledge is constantly challenged in cases where geological materials such as coal, lignite, peat, uranium, gypsum, phosphate, kaolin, sulfur, mica, novaculite, limestone, sand and gravel, gold, copper, zinc, and soil are involved. Such cases require travel to field sites in the United States dealing sometimes with, at best, reluctant taxpayers. The work is professionally rewarding and never dull. On a broader scale, a geologist’s contribution to a case sometimes determines the success or failure of the government in the U.S. Tax Court. When successful, a geologist has the sense of both personal and professional accomplishment and has also fulfilled the mission of the Internal Revenue Service, which is to collect tax revenues in a fair and equitable manner for the U.S. Treasury.

Earl G. Hoover works for the Internal Revenue Service in Jacksonville, Florida.

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Government and the Geologist

Historically public perception of “Geologist” (which includes most elected and appointed government officials) has been that they look at rocks, they dig holes in the ground working for mining companies, they work on oil rigs, and as prospectors they carry hammers and shovels. All of these activities are commonly associated with degradation of the environment and most likely pollution. Geologists have been associated with land exploitation and extraction of nonrenewable resources, all general activities that are not now considered environmentally sound or politically correct. But geologists do so much more ..., we need to communicate more, and target those areas in which we can be most effective; and geologists within government agencies are in a position to impact public policies and thinking the most.

Resource exploration; yes we as geologists do this. We need to contribute to the information outreach to educate the public how dependant our society and culture is on raw materials, minerals, and all our economic mineral commodities.

Resource development and production; yes we as geologists also do this, in efficient ways with resource conservation in mind. Only with sufficient geologic input can we maximize the use of a commodity and do it in the most environmentally safe and compatible way.

Environmental protection and land-use planning; geologists now are involved in a whole cross-section of activities to help us develop our lands the best way we can. Here is where geologists, both in government when regulations or zoning decisions are in question, and in the consulting industry supplying the data and interpretations as needed, are the most valuable and visible and can have the most impact.

Agency staff are now involved in a wide range of interpretative geologic decisions including:

- Waste Disposal; such as landfills, and deep well injection,

- Water Resources, including: locating and design of municipal well fields, mapping aquifer recharge areas, remedial action and aquifer clean-up plans,

- Land-Use Plans and Zoning, including: economic mineral deposits, geologic hazards (such as sinkhole or pipeclay areas), coastal zone erosion decisions, wetlands delineations, etc.

- Environmental Protection and Resource Conservation, such as: mining permits, mine reclamation requirements, oil and gas well regulations, and others.

We are all familiar with the various federal or state requirements involved when assessing land for different reasons. They include Developments of Regional Impact (DRI), Environmental Impact Statements (EIS), Environmental Compliance Assessments, Environmental Audits, Environmental Risk Assessments, Remedial Action Plans (RAP), Contaminant Assessment Plans (CAP), etc. All of these require competent geologic input at some point. After all, who better to help protect the earth and its environments than people trained in the Earth Sciences? Sound knowledge and understanding of these complex systems must be employed to help design ways to protect them!

This is the message we as geologists must get across to the public. Geologists are a major part of the solution to environmental problems caused by our society’s appetite for natural resources, not part of the cause!

In Florida, state government geologists have been visible and involved. In addition to the Legislature establishing Professional Geologist licensing responding to the need to protect our environment and natural resources, geologists have been appointed to: a “Bluebelt Commission” to assess aquifer recharge areas related to ad valorem tax rates, to assist the State Conservation and Recreation Lands Acquisition Committee, to the Preservation 2000 Committee staff (a long-range environmentally sensitive land acquisition program), and several others.

Agency staff geologists and those geologists from outside government must take an active role when they see a need or opportunity for input. It will benefit our profession, industry and the economy, governmental agencies, and universally, the public.

Mr. Schmidt works for the Florida Geological Survey in Tallahassee, Florida.
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The Role of Mineral Professionals In The Bureau Of Land Management

Roger A. Haskins, CPG-6598

The Bureau of Land Management is an agency within the U.S. Department of the Interior. It is charged with administering 272 million acres of public land, both surface and subsurface, located essentially in the West and Alaska. The Bureau, as the sole manager of the Federally owned onshore mineral estate, administers an additional 460 million acres of Federal mineral rights, located mainly in the Eastern and Midwestern United States.

Acquisition of Federal mineral rights within the National Parks, National Forests, and other Federal agency administered lands are also managed by the Bureau. However, exploration and development rights (surface management) is vested within the other agencies, and requires that agencies permission to explore or operate. The U.S. Forest Service and National Park Service also have the authority to sell mineral materials (sand, gravel, and the like) from the lands they administer.

The Bureau currently employs approximately 700 mineral professionals Nationwide. The term mineral professional includes geologists, mining engineers, and petroleum engineers. They are stationed mainly in the West, in the Bureau’s 165 offices Nationwide.

The Federal mineral estate is divided into three legal categories, each with its own legislation, regulations, and case law to administer. These are described as “locatable minerals” (those subject to acquisition under the General Mining Law of 1872, as amended), “leasable minerals” (those acquired under the Mineral Lands Leasing Act, as amended; the Geothermal Steam Act of 1970, as amended; and the Acquired Lands Leasing Act of 1947, as amended); and “salable minerals” (those mineral materials that are sold under the Mineral Materials Act of 1947, as amended).

Locatable Minerals Program

Under the General Mining Law of 1872 and the Federal Land Policy and Management Act of 1976 (FLPMA), the Bureau mineral professionals have several duties; the first is to process and oversee mining plans and reclamation plans for hard rock exploration and mining operations. The second is to examine mining claims to determine if they meet the use, occupancy, and discovery requirements of the Mining Law. The mineral examination is required for mineral patent applications or if the Bureau suspects the activity is not reasonably incident to mining, or the mineral claimed is a leasable or salable mineral.

Leasable Minerals Program

Under the Leasing Acts, the Bureau is charged with administering mineral leases, approving and supervising exploration and drilling operations, mining operations, and production verification to ensure that the Federal government is being paid the proper amounts of royalty from leasehold production. Supervision also includes proper downhole plugging and abandonment procedures by the operator, and proper reclamation of the land when the operation has been completed. For competitive sale within known mineral leasing areas, the mineral professional(s) also appraise the lease area for its minimum acceptable value to the government in terms of a bonus bid.

Salable Minerals Program

Under the Mineral Material Act (which covers sand, gravel, cinders, and other construction type aggregate materials), the Bureau mineral professional processes mine plans and reclamation plans, appraises the material for its fair market sales value, and verifies production to ensure proper royalty payments.

Land Use Planning

Under the Federal Land Policy and Management Act (FLPMA), the Bureau is charged with several additional duties that require the input of mineral professionals. The first is land use planning. FLPMA requires that the Bureau inventory all of its administered lands on a periodic basis, and with public participation, create and implement land use plans (called Resource Management Plans [RMPs]) for each planning area. Mineral resources are a required inventory product.

The mineral professionals create, from all available data, overlays which classify lands in the RMPs for mineral potential, using a high-medium-low potential grouping for the different commodity groups that are known or inferred to exist within the RMP area. The mineral potential overlays then identify areas requiring management attention for the prospective development of minerals. The overlays also delineate areas of
resource conflict which the manager must try to resolve (such as an area of high mineral potential that is also habitat for an endangered species).

These conflicts may be with critical wildlife habitat areas, wilderness areas, cultural resource districts, high use recreation areas, and others. The mineral professional works as part of an interdisciplinary team of resource specialists to identify options for the development of the most appropriate mitigation measures in the areas of conflict that will eventually be applied to mineral operations as either lease stipulations or conditions of permit approval. Mineral professional input is essential so that reasonable (as opposed to unworkable) mitigation measures are created and placed into the RMP. The mineral professional also prepares an analysis of the proposed RMPs impacts upon the mineral development of the area being studied.

Lands and Realty Program

The FLPMA requires that land being purchased, sold, or exchanged be done only at fair market value; and the value of the land being purchased, sold, or exchanged include the value of the mineral estate. Bureau mineral professionals evaluate these tracts of land as to their mineral potential for all minerals. If the evaluation turns up "known mineral values", then a separate mineral appraisal process is carried out by the mineral professional(s) involved in the evaluation.

The FLPMA requires that land proposed for withdrawal from mineral entry have a mineral report prepared as part of the official record. The report will document all that is known concerning the mineral potential of the area, so that the public, the administration, and sometimes Congress (if the proposed withdrawal will exceed 100,000 acres), will know what mineral resources will be rendered inaccessible if the land is withdrawn.

Headquarters Role

Mineral professionals play a major policy and regulatory role in the Bureau’s headquarters in Washington, DC. The Divisions of Solid Minerals, Fluid Minerals, and Policy Analysis are mainly staffed with geologists and engineers (mining and petroleum) to develop the

Bureau's national policies, legal and technical, on mineral rights, mineral development, and mineral production. They also author regulations, review proposed and final legislation and advise the Directorate on the legislation's impacts on the Bureau, the public, and the industry. Most Headquarters staff become subject

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**Summary**

The Bureau, as a comprehensive land management agency, has many interesting roles and opportunities for mineral professionals who seek a diversity of work assignments and work environments. The Bureau is not a research agency like the U.S. Geological Survey. Our mineral professionals are practitioners of their science; and applied science and applied skills are essential for the operation of the Bureau. For as a regulatory agency, applied science (in all fields, not just earth science) is what sustains the Bureau in carrying out its legislative mandates to administer the public lands in a total multiple use environment.

The Bureau's mineral professional is also a "bridge" between the public and the Bureau. We help the user public (mining, drilling, and exploration companies) understand the Bureau's multiple use role and mission for the public lands. Internally, we perform the same function for our resources staff. The resources staff commonly do not understand the technical requirements of the industry for operating on the public lands. The mineral professional must educate them, as to the operational requirements of the industry and resource mitigation requirements of the staff, to ensure that only prudent and practical conditions are imposed on an operator.

The reverse is also true. We work with the industry to educate them as to the need for proper mitigation and reclamation measures on the public lands, and to ensure that everyone operates in a reasonable and prudent manner.

**Footnotes**

1. Roger Haskins is a mining law specialist and mineral examiner for the Mining Law Administration program of the Bureau of Land Management, Division of Solid Minerals, Washington, D.C. He has technical oversight of mining claim recordation, mineral patent adjudication, mining claim validity examinations, and surface management (reclamation) bonding. He is duty stationed in the Nevada State Office, Division of Mineral Resources, in Reno, Nevada.

2. Locatable minerals are the traditional "hard rock" metallic minerals (gold, silver, copper, lead, zinc, etc.), those industrial minerals of a unique character (fluorite, gypsum, diatomaceous earth), and non-metallics of intrinsic value (tantalum, rare earths, borates, etc.).

3. Leasable minerals are oil, gas, coal, sodium, phosphate, potash, geothermal resources, off shore, and all minerals on acquired lands.

4. Salable minerals are essentially construction materials such as sand, gravel, pumice, pumicite, cinders, common clays, stone, common limestone, and mineral materials of a common and widespread character.

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**Mr. Haskins works for the Bureau of Land Management in Reno, Nevada.**

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**UPDATE - Kentucky Geology Registration Law**

**David C. Scott, CPG-6383 Chairman, KY Board of Registration for Professional Geologists**

Application forms for registration may be obtained only by writing: Kentucky Board of Registration For Professional Geologists, 228 Mining and Mineral Resources Building, University of Kentucky, Lexington, KY 40506-0107. Requests will not be taken by phone.

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**Ohio Section Reports On Geology Disregarded**

**Tom Jenkins, CPG-7892**

AIPG Ohio Section Newsletter Editor

The following example of Geology Disregarded was found in the *National Environmental Journal* in the November/December 1991 issue. I have reprinted the abstract from the article here. I think it points out the importance of employing the proper professionals for site audit work.

"Incorrect conclusions during environmental site assessments can be avoided through careful geologic observation and interpretation. A prospective buyer commissioned an environmental audit at a manufacturing plant. From boring samples, a buried layer of "dark materials" was identified and speculated to be ash from a former plant trash incinerator. Elevated arsenic levels also were suggested and negotiations were halted. The owner retained a consultant to investigate the nature and extent of the "dark layer" and assess any hazards. Test pits were used to locate and expose the "dark layer" for direct examination, which suggested it to be a silty clay similar to other site soils except for color. Observed organic plant matter further suggested a natural origin, a microscopic examination revealed only natural soil particles with no industrial material or ash. Nor did metals analysis indicate any anomalies compared to area soils. It was concluded that the "dark layer" was a natural soil horizon which had been buried by clay fill, perhaps during plant construction. Had the correct interpretation been reached in the initial assessment, the property transfer could have taken place and significant time and expense saved."

I will be publishing these in upcoming Newsletters. If any other readers know of good examples of Geology Disregarded, please send them in.

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AIPG Ohio Section Newsletter
August 1992
Some Idle Thoughts About Our 1990’s Futures

William E. Cutcliffe, CPG-1348
President/Chief Executive Officer, DUNN Corporation

I just returned from Environment Business ’92, a national executive forum about environmental business development which is held every March. Parkas and Berkowitz, management consultants to the environmental protection industry, estimated that environmental consulting and engineering services grew 15 percent last year to $8.2 billion. Their best guesstimate divides the market as 45 percent industrial, 30 percent Federal, and 25 percent municipal. For 1992, they stated that the outlook is for good growth - 20 percent or better - but competition will be tough. Nearly all other environmental consulting executives attending the conference agreed.

The market is changing extremely rapidly. Changes in the market and the competition are resulting in new requirements to be successful in consulting in this decade. New professional disciplines, new services, new client perspectives, new management structures, new types of competition, new strategic alliances, new project sizes - the list goes on and on - will all be factors.

Having been in the geologic consulting business for some thirty-plus years with Dunn Corporation, I cannot help but stop and ask a number of questions. Where and how do geologists, hydrogeologists and geoscientists fit into the environmental market of the 1990’s? What are the markets likely to be? What types of consulting organizations will thrive? Are there geologic leaders that are ready now to grasp opportunities? Is the "heyday" of hydrogeo past? Did geologists seize upon legislative opportunities (registration et al.) to best position the profession after the hydrogeo hazardous-waste "high", or did we fritter away our day in the sun?

As I think through the answers to many of the questions, I become uncomfortable with some of my thoughts. Those that have observed the evolution of civil engineering consulting firms say that the "life" of any given specific professional service cycle is between 5 and 10 years, with 7 a common figure. Somehow, the "system" has worked so that by the time one emerging service line begins to decay from its mature phase, a new demand for a civil engineering service line, nearly always driven by legislation, springs upon the scene - the service line only to be done by those who are licensed. This past year, we merged a NYS-chartered civil engineering company, The Standard Engineering Corporation, into DUNN. The group of approximately 30 engineers and technical staff have extensive depth. Years back, they designed waste water treatment plants, then water supply plants, then subdivisions, then highway, road, and bridge design, and they are now into design of environmental and various waste systems. The message: the engineers positioned themselves with legislation, regulation and registration to handle each new opportunity.

What’s now in line for geologists and hydrogeos? For some ten years, I have referred to the six business sectors or "waves" of a typical site investigation and remediation. I call them "waves" to emphasize that each service sector - be it the Phase I, the RI (remedial investigation), the FS (feasibility study), or design - would have a market business cycle. The cycle is half a sine curve - emerging, maturing, declining. I was extremely concerned about building a large organization around disciplines that might peak early. An example of such, which was rather predictable, were the organizations that two years ago built single-discipline asbestos consulting firms. Some expanded in one year to 300 plus employees. But now, the organizations have drastically shrunk as the narrow niche market greatly closed down.

How do geologists fare in the six waste-business sectors? In the three front end sectors, Phase I’s, RI’s, FS’s, geologists do quite well as project managers and technical staff. However, NYSDEC considers a feasibility study (FS) to be engineering and will accept a FS only from an engineer, or engineering firm. When the DEC contracts the RI combined with the FS, the project again must be done by an engineer, leaving the geologically-owned company out of the big RI marketplace.
Geologic purists stop with the RI. Geologic opportunists become project managers and technical data managers of FS's, as well as the "back end" of the site business sectors, e.g., design, construction management, and operations and maintenance. Admittedly, the back end is made for engineers. However, some geologists can handle the complex client relationships and complex scheduling as well or better than some engineers.

The "wave" of the front-end RI that made hydrogeos king of the hill for one of those market cycles (seven plus years), as defined narrowly, is only the decline. It is now a commodity business. The clients are now to the point that they demand significantly reduced fees of environmental consultants. Another sector of the geologic community - the petroleum geologists - is suffering from an extreme market segment collapse. The number of operating drill rigs is only something, I believe, in the range of 5-10 percent of their peak.

Of unusual interest, is the observation that when the profession was having its "day in the sun" (hydrogeology and hazardous waste) and greatly expanding, the "older guard" controlled the national scene to the extent that national AIPG stood on the sidelines. For a decade we only debated registration and other important progressive issues. Very significant opportunities, most likely not to return again, were lost. Unlike the engineers, the next line of work to come down the pike will not come to be for geologists. We failed to convince our professional leaders of the importance of the new vs. the old.

As an example, on March 3, 1992, a group attempting to capitalize on the times introduced a NYS Assembly Bill A-10047 to register and license professional environmental consultants by amending the state education and environmental conservation law. If successful, environmental consultants would enjoy an equal status with engineers, architects, landscape architects and land surveyors. Geologists do not enjoy such equal status. The definition of environmental consultation appears to be broad licensed in a narrow niche profession. And by the way, geology is not mentioned under "acceptable education" in A-10047. Geologists would have to petition - beg to be included under the educational clause...or other program, in accordance with the commissioner's regulations. If geologists are not included, so goes the Phase I and RI work. Here is an opportunity to speak out. Let your legislators and the Committee on Higher Education know your thoughts.

Meanwhile, where are the geologic baby boomers to help (birth dates 1946-1960), now 32 to 46 years old? I did not spot one in Boston out of a group of approximately 500 environmental leaders, and there were only 3 DBA geologists (depression baby achievers, born 1929-46) at the meeting.

There are a few boomers out there in leadership positions - but too few. If only the boomers had boomed in the 80's! One of my major concerns is the general lack of interest and attention of an adequate number of the new boomer group in getting out and controlling their worlds. As I push and cajole those who work with me, I am often informed "you are from a different era, the new young professionals aren't interested in professional or trade associations, you can't expect it of them", but I haven't given up the faith. The recession has opened some eyes and I am hearing a fresher tune. As the role of the geologist becomes less defined in the back end, "the decade of the hydrogeo" fades as it was sure to do, I hope we will see a new "life", a new drive from the group.

Five years ago it should have been much easier to get geologists positioned for the next save of business. Now the task is more difficult. Nonetheless, we do not have a choice. The battle is larger, and we are slightly stronger in some geographic regions. There is no longer any time to lose. Our organization, on the national and local scene, should "either lead, follow, or get out of the way."

AIPG Northeast Section Newsletter, Spring 1992 - II
Through most of recorded history, human beings have had a negative impact on their environment. Starting about 4,000 B.C., for example, the Sumerians and their contemporaries adjacent to Mesopotamia stripped the forests of the Zagros Mountains of Iran and the Taurus Mountains of Turkey, enormously accelerating the development of the delta of the Tigris and Euphrates Rivers. On the Tigris, Baghdad, once on the Persian Gulf, is now 320 miles away; Ur on the Euphrates was also a port city, and its ruins are now 150 miles from the Gulf. These ancient environmental problems still exist in the poor nations of the world, where the rate of environmental deterioration is the greatest in history.

Only the world's wealthy industrial democracies, of all civilizations in history, have ever improved their environments in any significant way. Development has changed the face of North America - by making it green. Before the European immigrants settled the region from the Appalachians to the Rockies, the area was a vast grazing land for buffalo herds. The Indians maintained this grassland by burning - a practice of primitive people everywhere throughout history. Thus much of the prairies and the vast buffalo herds were artifacts of the Indian culture. When the Europeans settled the area in the mid 1800s, they were surprised to see woods appear in many areas where they did not till the land. Large sections of America's Midwest reverted to natural forest cover. One of the largest areas of new woods in the world is some 75 million acres of mesquite in Texas and contiguous states. Along with natural revegetation, trees were introduced by settlers. At nearly every farmhouse, in every town, and along many field boundaries trees were planted.

However, in the East, starting with the arrival of Europeans and then in the West in the late 1800's other trees were being cut for firewood and for lumber, and much land was cleared of forest for agricultural purposes. By the first decade of this century, tree harvesting in the eastern and western thirds of the country had reached a point where a series of articles in the New York Times predicted total deforestation of the United States. One article even suggested outlawing Christmas trees. But even as the deforestation alarm was raised, changes had begun to occur. First, alternatives to wood as an energy source became available. And we moved energy more efficiently, so that the costs of energy sources besides wood burning became reasonable. Of equal importance, the productive efficiency of our new industries created wealth for the general public so the population could buy those new forms of energy. This was the first phase of taking pressure off our woods.

Meanwhile, progress in other areas contributed to recovery of our forests. Modern agricultural technology, thanks largely to industrial chemists, became so much more efficient, enormously increasing productivity per acre. Since we needed less land to produce food, inefficient farms, often on excessively steep and erodible slopes, were abandoned, and their land reverted to forest. And the wood we used for lumber lasted longer, thanks to the greater use of wood preservatives.

In the United States today we grow more wood than we cut, and have been doing so for decades. According to the U.S. Department of Agriculture (USDA), each year we grow from 20 to 150 percent more than is cut, depending on the species. In the Eastern states more than 50 million acres of new forest have sprung up since about 1920, with over 12 million acres of that growth in the most populous Eastern state, New York. Though this is largely the result of natural reforestation of abandoned farmland, many trees are planted by land owners: since the state nursery at Saratoga opened about 1900, New
Yorkers have purchased nearly two billion new trees from that nursery alone.

Soil conservation is another American success story. Drive through the farmlands of the Midwest and you will see contour plowing, fields cut by grassed waterways, and steep slopes left untilled - all effective anti-erosion methods. And trees surrounding the fields minimize wind erosion (a surveying party observed a major dust storm in northern Kansas in 1830, before whites settled there). According to the USDA, we have reduced erosion of farmland by one-fifth just since 1985.

Another major American success is water conservation. There is good reason to worry - we are still "mining" the water of some major aquifers, removing water that may never be replaced - but we have taken many impressive strides. From 25 to 30 percent of the stored water in the U.S. is in manmade ponds and reservoirs, taking up less than 50,000 acre feet; in addition to conserving water, the ponds are used by water-fowl and other wildlife, and most are stocked with fish. Our forests retard water runoff, increasing our ground water resource and reducing erosion. In 1960 the sewage waste of only 20 percent of the U.S. population was treated; by 2000, it will be 95 percent. The cost of water clean-up, largely sewage treatment, has been over $300 billion, but it is mostly money well spent. Drinking water is a major problem for most of the world's people; the high quality of our drinking water has almost eliminated problems like cholera, dysentery, and typhoid.

Wildlife are also prospering. In my home state, New York, which many imagine to be covered with asphalt, white-tailed deer were once restricted to two small herds, one in the Adirondacks and one in the Catskills; now they are abundant throughout the state. The official deer harvest of about 200,000 per year in recent years is many times larger than New York's total deer population in the 1920s. (The populations of coyotes and opossums in New York are also increasing. Even moose are returning - New York's first moose - car accident was recorded in 1990.)

According to a recent survey by the USDA, turkeys are up over 250 percent in the past 15 years in 18 Eastern states. A 1991 survey of wintering waterfowl by the New York State Department of Environmental Conservation found an increase of 9 percent from the average of the past decade. Canadian geese are up a striking 2,600 percent since they were first surveyed in the 1940s. In the Western U.S., the population of prong-horned antelope and elk has also increased dramatically in the past 15 years. In the Midwest birds and animals that require trees for their habitats are far more abundant than before the arrival of whites.

These environmental changes occurred even though the human population of the U.S. has more than tripled since 1900: our population's expansion did not come at the expense of our natural environment.

This is obscured by talk, so common in the context of the Rio summit, about the "world environment." The fact is, there are two world environments, that of the wealthy industrial democracies, and that of the poor, non-industrial nations. In the wealthy nations, environmental threats are largely thought of in terms of the effects of industrial chemicals. Often the problems are measured in parts per million (or per billion), or based on the scientifically controversial concept that one particle or molecule could kill you. The time frame for health problems from such substances is usually some indefinite future date. Meanwhile, we continue to live longer.

Environmental problems in the poor nations are measured in terms of worn-out or lost soil, decreased agricultural productivity, depleted forests, threatened habitats for virtually every species of wildlife, decreasing water resources, rampant disease, and starvation. Their environmental problems are immediate and likely to be related to the next meal. And they are likely to persist unless economic development lifts their people out of poverty.

Indeed, by seeing technology, industry, and free enterprise as the causes of environmental problems, we make these problems worse. Maurice Strong, secretary general of the Earth Summit, actually claims "we may get to the point where the only way of saving the world will be for industrial civilization to collapse." This is not environmentalism, it is Luddism. Is it any wonder that Dr. Mostafa K. Tolba, executive director of the UN's Environmental Program, hears "loud complaints from a number of developing countries that the rich are more interested in making the Third World into a natural-history museum than they are in filling the bellies of its people"?

National Review, July 6, 1992
150 East 35th Street,
New York, NY 10016

Retired Dues

During 1992, the Executive Committee considered at length various options for altering the structure of the dues for retired Members. It was recognized that the present structure has several problems, owing to a short-term misinterpretation of the Bylaws several years ago. These continue; but, they are phasing out. The Committee concluded that to alter the structure at this time would exacerbate the problem. Therefore, the present structure will be continued and reviewed annually.
AIPG 1992 Honors and Awards

The American Institute of Professional Geologists (AIPG) has a history of effective and outstanding service to the profession of geology. From its beginning in 1963, the Institute has emphasized the role that professional geologists play in this fascinating, changing, and highly complex world in which we live.

In an institute such as this, there are so many highly motivated geologists contributing to the profession, the Institute, the public, and the nations in which we live and work that the identification of a select few for particular awards is a monumental task. The continued success of the Honors and Awards Program is dependent on an accessible nominating process and a diligent screening of those nominated. This is done by the Honors and Awards Committee.

Members Of The
Honors And Awards Committee

Philip E. Lamoreaux, Chr.
James A. Barlow, Jr.
Frank E. Kottlowski

Robert H. Dott, Jr.
1992 Recipient Of The
BEN H. PARKER MEMORIAL AWARD

Kenneth N. Weaver
1992 Recipient Of The
MARTIN VAN COUVERING MEMORIAL AWARD

Robert R. Jordan
1992 Recipient Of The
JOHN T. GALEY, SR., MEMORIAL
PUBLIC SERVICE AWARD

Sam R. Evans
1992 Recipient Of The Award Of
HONORARY MEMBERSHIP

Richard J. Proctor
1992 Recipient Of The Award Of
HONORARY MEMBERSHIP

1992 Recipients Of The
PRESIDENTIAL CERTIFICATE OF MERIT
Presented By Daniel N. Miller, Jr.

Logan T. MacMillan
Russell G. Slayback
Lawrence C. Weber
Don E. Williams
U.S. 21370
AGENCY: Dept. of the In./Bur. of Indian Affairs
TOPIC: POLITICS AND GOVERNMENT
SUMMARY: Reproposes regulations implementing the Indian Mineral Development Act of 1982. A new section would be added to govern oil, gas, geothermal, and solid mineral development agreements entered into pursuant to the 1982 Act. Would revise existing regulations which govern mineral leasing on tribal and allotted Indian lands respectively.

AGENCY CONTACT: Director, Office of Trust and Economic Development, Bureau of Indian Affairs, Department of the Interior, 1849 C St. NW, Washington, DC 20240, (303) 232-5701

CITATION: 26 CFR 211, 212 AND 225
PROPOSAL DATE: 11/21/91
COMMENT DEADLINE: 11/20/92

U.S. 24500
AGENCY: Dept. of the Int./Bur. of Land Mgmt.
TOPIC: POLITICS AND GOVERNMENT
SUMMARY: Sets forth the restrictions on use of occupancy of unpatented mining claims and mill sites on Federal lands. Limits the use of such lands by the claimant to those activities related to prospecting, mining, or processing operations, and uses reasonably incident to them.

AGENCY CONTACT: Richard Deery, Bureau of Land Mgmt., Room 5555, Main Interior Building, 1849 C St. NW, Washington, DC 20240, (202) 208-4147

CITATION: 43 CFR 3710
PROPOSAL DATE: 09/11/92
COMMENT DEADLINE: 11/10/92

U.S. 24540
AGENCY: Dept. of the Trea./Internal Rev. Serv.
TOPIC: BUSINESS AND CORPORATIONS
SUMMARY: Establishes certain requirements that must be met by procedures of natural gas subject to a gas balancing agreement in order to effect a compromise from the application of subchapter K of chapter 1 of the Internal Revenue Code.

AGENCY CONTACT: Grace Kim, Internal Revenue Service, Room 5286, 111 Constitution Avenue NW, Washington, DC 20224, (202) 622-3060

CITATION: 26 CFR 1
PROPOSAL DATE: 08/18/92
COMMENT DEADLINE: 11/16/92
HEARING DATE: 11/17/92, 10am

U.S. 24583
AGENCY: Dept. of the Interior/Bureau of Mines
TOPIC: RESOURCE MGMT. AND PRES.
SUMMARY: Sets forth the Federal Government’s stipulation that a “reasonable percentage” of the value of coal produced by a private owner be paid to the Federal Government as compensation for the exploration and development efforts of the Bureau of Mines.


CITATION: 30 CFR 809
PROPOSAL DATE: 09/21/92
COMMENT DEADLINE: 10/21/92

U.S. 24839
AGENCY: Environmental Protection Agency
TOPIC: ENVIRON. PROTECTION AND POLLUTION CONTROL
SUMMARY: Adds new sites to the National Priorities List (NPL), which is a list of national priorities among known releases of hazardous substances, pollutants or contaminants throughout the U.S. Includes eight sites in the General Superfund Section and one in the Federal Facilities Section.


CITATION: 40 CFR 300
PROPOSAL DATE: 10/14/92
COMMENT DEADLINE: 11/15/92

U.S. 24898
TOPIC: ENERGY
SUMMARY: Updates the criteria used in decisions regarding power reactor siting, including geographic, seismic, and earthquake engineering considerations for future nuclear power plants.

AGENCY CONTACT: Dr. Andrew Murphy, Office of Nuclear Regulatory Research, U.S. Nuclear Reg. Comm., Washington, DC 20555, (202) 492-3880

CITATION: 10 CFR 50, 52, and 100
PROPOSAL DATE: 10/20/92
COMMENT DEADLINE: 02/17/93

US H 6033
AUTHOR: Wyden
TOPIC: ENVIR. PROT. AND POLL. CNTRL
SUBTOPIC: SOLID WASTE
SUMMARY: Amends the Solid Waste Disposal Act to authorize States to restrict out-of-state municipal waste.

STATUS: 09/25/92 INTRODUCED.

AK 1022
AGENCY: Dept. of Comm. and Econ. Develop.
TOPIC: BUSINESS AND CORPORATIONS
SUMMARY: Relates to occupational licensing fees for boards, commissions and regulated professions; establishes fee levels so that total amount of fees collected for an occupation approximately equals actual regulatory costs for occupation; fees taken into account level of administrative, investigative, and reflects, to extent possible, actual costs of activities under each licensing area.

AGENCY CONTACT: JoAnne Cummings, Regulations Specialist, Department of Commerce and Economic Development, Division of Occupational Licensing, P.O. Box 110806, Juneau, AK 99811-0806, (907) 465-2537

CITATION: 12 ACC 02.030 thru 02.370
PROPOSAL DATE: 09/28/92
COMMENT DEADLINE: 11/02/92

CA 6091
AGENCY: Lands Commission
TOPIC: ENERGY
SUMMARY: Pertains to marine facilities used for the purposes of exploring for, drilling for, producing, storing, handling, transferring, processing, refining, or transporting oil, where a discharge could impact marine life. Defines terms, makes compliance with existing federal, state, and local regulations, requires leases to produce and operations manual and to demonstrate reasonable planning for emergency situations.


CITATION: 2 CCR 2170-2175 marine oil facilities
PROPOSAL DATE: 10/16/92
COMMENT DEADLINE: 12/24/92
HEARING DATE: 12/10/92

GA 1621
AGENCY: Department of Natural Res./Environ. Protection Div.
TOPIC: ENVIRON. PROTECTION AND POLLUTION CONTROL
SUMMARY: Confers regulatory authority for equivalency and qualifies Georgia for ongoing authorization under the Resource Conservation Recovery Act to operate its own hazardous waste program in lieu of the Federal program.

AGENCY CONTACT: Harold Rhees, Director, Environmental Protection Division, 205 Butler Street, Suite 1154, Floyd Towers East, Atlanta, GA 30304

CITATION: [UNCODIFIED] Sections 40 CFR parts 260, 261, 262, 264, 265, 266, 268, 270
PROPOSAL DATE: 09/02/92
COMMENT DEADLINE: 10/06/92
HEARING DATE: 10/28/92

ID 1046
AGENCY: Board of Water Resources
TOPIC: ENVIRON. PROTECTION AND POLLUTION CONTROL
SUMMARY: Plans work on waste injection well rules

AGENCY CONTACT: Lotwick Reese, Board of Water Resources, Boise, ID 83701, (208) 327-8900

CITATION: Waste injection well rules
PROPOSAL DATE: 02/24/92
COMMENT DEADLINE: 03/13/92
HEARING DATE: 11/16/92
<table>
<thead>
<tr>
<th>AGENCY</th>
<th>BUSINESS AND CORPORATIONS</th>
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<tbody>
<tr>
<td>KY 8470</td>
<td>General Government Cabinet/Board of Registration for Prof. Geologists</td>
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<tr>
<td>TOPIC</td>
<td>Sets forth in detail the fees charged by the Board of Registration for Professional Geologists.</td>
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<td>SUMMARY</td>
<td>AGENCY: BUSINESS AND CORPORATIONS</td>
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<td></td>
<td>Addresses the structure and organization of the Land Surveyors Board, clarifies licensing requirements, outlines complaint and hearing procedures, and includes a more detailed outline of ethical standards and professional conduct.</td>
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<tr>
<td>AGENCY CONTACT</td>
<td>Administrative Assistant, Land Surveyors Board, c/o Joint Board, 57 Regional Drive, Concord, NH 03301</td>
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<tr>
<td>CITATION</td>
<td>201 KAR 31:010</td>
</tr>
<tr>
<td>PROPOSAL DATE</td>
<td>10/01/92</td>
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<td>COMMENT DEADLINE</td>
<td>10/16/92</td>
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<td>HEARING DATE</td>
<td>10/21/92</td>
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<tr>
<td>MO 4822</td>
<td>Dept. of Economic Development, Missouri Board for Architects, Professional Eng., &amp; Land Surv.</td>
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<tr>
<td>TOPIC</td>
<td>BUSINESS AND CORPORATIONS</td>
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<tr>
<td>SUMMARY</td>
<td>Defines the word degree as it applies in the licensure requirements of architects, professional engineers, and land surveyors.</td>
</tr>
<tr>
<td>AGENCY CONTACT</td>
<td>Department of Economic Development, Shirley Nixon, Executive Director, 3605 Missouri Blvd., P.O. Box 184, Jefferson City, MO 65102</td>
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<tr>
<td>CITATION</td>
<td>4 CSR 30-14:010</td>
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<tr>
<td>PROPOSAL DATE</td>
<td>10/01/92</td>
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<td>COMMENT DEADLINE</td>
<td>11/01/92</td>
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<tr>
<td>MT 1915</td>
<td>Dept. of State Lands Bd of Land Comm.</td>
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<tr>
<td>TOPIC</td>
<td>RES. MGMT. AND PRESERVATION</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>Applies directly to 71 certified soil scientists in the state; proposes increases in all fees to assure the Board for Professional Soil Scientists compliance with the requirements of current statute; adds language regarding waiver from examination through experience to reflect the legislative amendments of the 1981 General Assembly Session.</td>
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<tr>
<td>AGENCY CONTACT</td>
<td>Bonnie Lovelace, Chief, Coal and Uran. Bur., Dept. of State Lands, Capital Station, Helena, MT 59602</td>
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<tr>
<td>CITATION</td>
<td>ARM 26.4.301 to 26.4.1212</td>
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<tr>
<td>PROPOSAL DATE</td>
<td>10/15/92</td>
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<td>COMMENT DEADLINE</td>
<td>11/17/92</td>
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<tr>
<td>NH 2476</td>
<td>Dept. of Environmental Services/Water Supply and Pollution Control Division</td>
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<tr>
<td>TOPIC</td>
<td>ENVIRON. PROTECTION AND POLLUTION CONTROL</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>Establishes standards, criteria, and procedures for groundwater permits and underground injection registrations to prevent pollution, protect groundwater, and remedy contamination; limits groundwater degradation associated with the designed discharge of wastewater.</td>
</tr>
<tr>
<td>AGENCY CONTACT</td>
<td>Patricia Reichard, Contact Person, Department of Environmental Services, Water Supply and Pollution Control Div., Groundwater Protection Bureau, 6 Hazen Dr., P.O. Box 95, Concord, NH 03301 (603) 271-3645</td>
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<tr>
<td>CITATION</td>
<td>En-Ws 410 Groundwater Prot. Rules</td>
</tr>
<tr>
<td>PROPOSAL DATE</td>
<td>10/16/92</td>
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<td>COMMENT DEADLINE</td>
<td>11/23/92</td>
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<td>HEARING DATE</td>
<td>11/20/92</td>
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<tr>
<td>NJ 2456</td>
<td>Land Surveyors Board</td>
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<tr>
<td>TOPIC</td>
<td>BUSINESS AND CORPORATIONS</td>
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<tr>
<td>SUMMARY</td>
<td>Requires land surveyors to complete 24 hours of continuing education during each biennial certification period.</td>
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<tr>
<td>AGENCY CONTACT</td>
<td>Administrative Assistant, Land Surveyors Board, c/o Joint Board, 57 Regional Drive, Concord, NH 03301</td>
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<tr>
<td>CITATION</td>
<td>LAN 100-500 Land Surveyors Administrative Rules</td>
</tr>
<tr>
<td>PROPOSAL DATE</td>
<td>10/09/92</td>
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<td>COMMENT DEADLINE</td>
<td>10/29/92</td>
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<td>HEARING DATE</td>
<td>10/29/92</td>
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<td>NJ 1178</td>
<td>Dorsey</td>
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<td>TOPIC</td>
<td>BUSINESS AND CORPORATIONS</td>
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<tr>
<td>SUBTOPIC</td>
<td>SPEC. INDUSTRIES, OCCUPATIONS</td>
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<tr>
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<td>AGENCY CONTACT</td>
<td>10/23/92</td>
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<td>CITATION</td>
<td>10/19/92 INTRODUCED.</td>
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<td>NM 183</td>
<td>Energy, Minerals and Natural Resources Dept./Oil Conservation Commission</td>
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<td>TOPIC</td>
<td>ENERGY</td>
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<tr>
<td>SUMMARY</td>
<td>Requires land surveyors to complete 24 hours of continuing education during each biennial certification period.</td>
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<tr>
<td>AGENCY CONTACT</td>
<td>William J. Lemay, Chairman and Secretary, Oil Conservation Commission, Santa Fe, NM</td>
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<tr>
<td>CITATION</td>
<td>(UNCODIFIED) Order R-9708</td>
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<tr>
<td>PROPOSAL DATE</td>
<td>08/27/92</td>
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<tr>
<td>OH 3754</td>
<td>Board of Engineers and Surveyors</td>
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<td>TOPIC</td>
<td>BUSINESS AND CORPORATIONS</td>
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<td>SUMMARY</td>
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<tr>
<td>AGENCY CONTACT</td>
<td>Mason Pizlish, Board of Engineers and Surveyors, 77 South High Street, Floor 16, Columbus, OH 43266-0314</td>
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<tr>
<td>CITATION</td>
<td>OAC 4733-19-01</td>
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<td>PROPOSAL DATE</td>
<td>07/13/92</td>
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<td>HEARING DATE</td>
<td>09/01/92</td>
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<td>SD 1737</td>
<td>Dept. of Commerce and Reg.: Comm. of Eng., Architectural and Land Surveying</td>
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<td>Administrative Assistant, Land Surveyors Board, c/o Joint Board, 57 Regional Drive, Concord, NH 03301</td>
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<td>CITATION</td>
<td>271-2219</td>
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<td>10/09/92</td>
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<td>HEARING DATE</td>
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<td>VA 1932</td>
<td>Board for Professional Soil Scientists</td>
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<td>TOPIC</td>
<td>BUSINESS AND CORPORATIONS</td>
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<tr>
<td>AGENCY CONTACT</td>
<td>Bonnie L. Hoehn, Assistant Director, Virginia Department of Commerce, 3600, West Broad Street, Richmond, VA 23230 (804) 667-8555</td>
</tr>
<tr>
<td>CITATION</td>
<td>VR 627-02-01; Board for Professional Soil Scientists Regulations</td>
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<td>PROPOSAL DATE</td>
<td>10/05/92</td>
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<td>COMMENT DEADLINE</td>
<td>12/04/92</td>
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<td>HEARING DATE</td>
<td>12/04/92</td>
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<td>WV 1354</td>
<td>Board of Registration for Prof. Eng.</td>
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<td>BUSINESS AND CORPORATIONS</td>
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<td>HEARING DATE</td>
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</table>
Well folks, the winners won and their opponents lost. Whoever you supported thanks you; and, whichever initiative or amendment you supported was the correct one. If you didn’t vote, you have nothing to complain about - you weren’t a part of the process.

After all of the political diatribes and advertisements, it’s a welcome change to see a funny looking rabbit with a battery, or a light beer ad on the tube, and almost as believable...

Meanwhile, the government juggernaut rolls on.

IN THE FEDERAL REGISTER

Vol. 57, No. 201, 10-16-92, Part II

Department of Labor, MSHA - Safety Standards for explosives at Metal and Non-metal Mines; Proposed Rule - Among other things, this section starts providing metric specifications to “assist” industry in converting to metric measurements.

Vol. 57, No. 203, 10-20-92


Vol. 57, No. 208, Page 47802, Proposed Rules

Nuclear Regulatory Commission - Reactor Site Criteria; Including Seismic and Earthquake Engineering Criteria for Nuclear Power Plants.

This proposed rule primarily consists of two separate changes, namely, the source term and dose consideration, and the seismic and earthquake engineering considerations of reactor siting.

For further information contact: Dr. Andrew Murphy, Office of Nuclear Regulatory Research, U.S.N.R.C., Washington, DC (301) 492-3860 - concerning the seismic and earthquake engineering aspects.

It is the purpose of these criteria to set forth the principal seismic and geologic considerations that guide the Commission in its evaluation of the suitability of the plant design bases established in consideration of the seismic and geologic characteristics of the proposed sites.

Vol. 57, No. 209, 10-28-92

National Highway Traffic Safety Administration (NHTSA). New Car Assessment Program - In its continuing effort to improve the New Car Assessment Program (NCAP) NHTSA is interested in establishing the Part 572, Subpart E-Hybrid III Anthropomorphic Test Dummy (Hybrid III) as the surrogate testing device used in this program. Now then, once they get HY III established, he “will be the only dummy used in the NCAP program that would permit collection of more injury data, in addition to head, chest, and femur currently collected for all vehicles tested in the program. These data would not be published as consumer information because of issues related to human tolerance levels and dummy biofidelity, but would enable the agency and manufacturers to obtain research data on potential injury to other body parts.” If I get this straight - the dummies are using a dummy to test what body parts are going to be broken by non-dummies if they have an accident in a new car and we don’t have enough tolerance to understand the data and are not going to tell us about it.

Topography Data For Personal Computers

The National Geophysical Data Center has developed a complete 30-second resolution point digital topography data base for personal computers. The data set covers the conterminous United States and a small portion of the bordering areas. Elevations are given for every 30-second by 30-second coordinate cell.

A set of access software enables the user to select and extract the data from any area within the data base. Menu-driven screens allow the user to choose the coordinate boundaries of the area to extracted and select from columns, arrays, or undelimited file format. The program operates in DOS with no additional software needed.

For information write the National Geophysical Data Center, NOOA, Code E/GC1, 325 Broadway, Boulder, CO 80303.

Headquarters receives many requests from individual students and prospective students, as well as college departments and counselors, for advice on curriculum. As a result of the growing number of these requests, especially from the Geology Departments at some of our most prestigious universities, a committee was convened in 1991 to address the issue. The report of the Ad Hoc Committee on Curriculum was published as a booklet, "Education For Professional Practice", in July 1991. It is available from Headquarters for a small fee, which covers the cost of publication, handling and mailing. It is being reproduced on these pages in a three-part series as a service to young prospective geologists from whom we have received so many requests for guidance.

EDUCATION FOR PROFESSIONAL PRACTICE
Part 2 of 3

Report with Recommendations of the AIPG Ad Hoc Committee on Curriculum

The following report was accepted, approved and endorsed by the Executive Committee of the Institute on July 13, 1991.

Geology Courses

Thirty-six semester hours in Geology courses is the minimum considered necessary for professional training. In some cases, these may come from related departments such as soil science or civil engineering. AIPG also recommends additional requirements for the Geology major in mathematics and other sciences, and encourages provision for a liberal education. All students should understand that a Masters degree with thesis is the primary professional degree in geology. Ideally, geology students will attend two institutions (undergraduate and graduate) to obtain breadth and experience in adapting to new ideas and colleagues.

AIPG recognizes a core of required courses (descriptions appear in Appendix) common to most curricula, and essential to the training of geologists.

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Geology</td>
<td>4 sem. hrs. or equiv.</td>
</tr>
<tr>
<td>Historical Geology</td>
<td>4 sem. hrs.</td>
</tr>
<tr>
<td>Earth Materials (Rocks &amp; Minerals)</td>
<td>4 sem. hrs.</td>
</tr>
<tr>
<td>Structural Geology</td>
<td>3 sem. hrs.</td>
</tr>
<tr>
<td>Stratigraphy</td>
<td>3 sem. hrs.</td>
</tr>
<tr>
<td>Field Geology</td>
<td>6 sem. hrs.</td>
</tr>
<tr>
<td></td>
<td>24 sem. hrs. or equiv.</td>
</tr>
</tbody>
</table>

A minority of the committee strongly urged the inclusion of 3 hours of Geomorphology in this core (bring the total to 27 hours). However, the majority recommended that aspects of Geomorphology be included in the other courses and that Geomorphology be recommended as a highly desirable elective.

 Tradition changes slowly, some programs recommend or require courses that are less useful than others in the current workplace. However, there are legitimate regional differences and needs in a curriculum. Therefore, the remaining 12 semester hours may come from the following (or equivalent) and must include 3 hours in one of the "capstone" courses (*), or a senior thesis.

Geomorphology
Invertebrate Paleontology
Petrology, or
Petrography, or
Sedimentary Petrology, or
Igneous and Metamorphic Petrology, or
Optical Mineralogy
Sedimentology
Groundwater Hydrology, or
Hydrogeology, or
Hydrogeochemistry
* Environmental/Engineering Problems
* Applied Geophysics
* Economic Geology
* Petroleum Geology

Field study and/or laboratory exercises are crucial in the training of geologists, and each course elected for the minimum of 36 semester hours must include such activities. Furthermore, students should gain experience in writing and oral presentation and in application of mathematical skills to solve problems in many of the courses. Some campuses have formalized these activities in programs referred to as "writing across the curriculum" or "mathematics across the curriculum." A "capstone" experience involving problem definition, data acquisition, analysis and conceptual integration is expected in every program, and may take the form of a special problem, undergraduate thesis, or be a major part of a course, such as those indicated above by an asterisk.

The core of 6 courses and additional 12 semester hours from a specified list of geology elective courses represents guidelines slightly more flexible than earlier AIPG recommendations. AIPG Guidelines for Undergraduate Programs in Geology (revised 12/11/85) included Geomorphology, Invertebrate Paleontology and Petrology in the required core of courses. In comparison, the American Association of Petroleum Geologists lists all of these plus Geophysics as core courses "undergraduates preparing for careers in earth science should have ... ."

Mathematics and Statistics

Proficiency in quantification and numerical solutions of geologic problems may be achieved in several ways. A mere passing grade in one or two courses in calculus or statistics or computer applications does not assure such
proficiency. Students should be taught calculus through integration and practical problem-solving in at least one of the required geology courses that has the mathematics course(s) as prerequisite(s). Such training would give better assurance that the student will be properly trained in this area. Computer literacy is also essential.

**Physics**
Two courses (8 semester hours) of college level Physics with laboratory, preferably calculus-based, is recommended.

**Chemistry**
Two courses (8 semester hours) of college level Chemistry with laboratory, including an introduction to qualitative analysis, is recommended.

**Effective Communication**
A formal course in Technical Writing, a program of "writing across the curriculum" or inclusion of writing assignments graded for clarity, style, and grammar as well as technical content in one or more major courses is recommended. A course in oral communication (speech) or formal oral presentations in required geology courses is also expected. Team teaching involving geology and communications instructors is encouraged.

**Other Courses**
Elective courses outside of geology which have proven useful to practicing geologists include the following:
- Accounting
- Applied Economics (e.g., Engineering Economics)
- Descriptive Geometry
- Statistics
- Differential Equations
- Quantitative Chemical Analysis
- Physical Chemistry
- Organic Chemistry
- Soil Science & Soil Mechanics
- Rock Mechanics
- Fluid Mechanics, with emphasis on porous media
- Strength of Materials
- Surveying
- Geographic Information Systems
- Foreign Languages (at least one modern language)

**Graduate Curriculum**
The Masters degree is the primary working degree in geology. All students should be apprised of this before they are accepted as majors. In general, a Master's degree program should include Geophysics and advanced courses in Structural Geology, Stratigraphy, Petrology, and specialized courses in an identified field of practice. A thesis should be required in a Master's program.

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**AZGS Begins New Decade**

**Larry D. Fellows, CPG-4447**
Director and State Geologist,
Arizona Geological Survey

In April, 1992, Governor Fife Symington signed Senate bill 1055, which continues the Arizona Geological Survey (AZGS) for another 10 years. This bill marks the successful completion of the Arizona Legislature's Sunset Review of AZGS performance from July 1, 1977, to June 30, 1992. After completing the review, the legislature voted to continue the agency with minor modifications to its enabling legislation.

*Governor Fife Symington signs Senate bill 1055, which continues the AZGS for another 10 years. Those observing are (left to right) Larry D. Falls, CPG-4447, AZGS Director and State Geologist; James A. Briscoe, JABA, Inc., Tucson; William O. Wellendorf, CPG-8628, Water Resources Associates, Inc., Prescott; Frank S. Turke, CPG-4788, A-N West, Inc., Phoenix; and State Senator Doug Todd, Tempe. Briscoe, Wellendorf, and Turke are members of AZGS advisory committees.*
Alamo's multiple choice test.

Which Alamo offer is best for you?

Is it a free upgrade for an important business trip? Or, is it a free day for your next vacation? These are just some of the great choices you'll have with Alamo's Membership Program. In addition, you'll have the choice of driving any one of Alamo's fine General Motors cars, all with unlimited free mileage. You'll also get to choose from discounted daily, weekly and weekend rates available at every Alamo location in the United States and United Kingdom, and you can earn Frequent Flyer credits with Alaska, Delta and United airlines. Plus, as a member you can get faster reservation service with our new Member Reservations Line. Simply call 1-800-354-2322, supply your Membership I.D. number and request Rate Code BY to receive your benefits. See, you can afford to be choosy when you rent from Alamo.

Free Upgrade
- Valid for ONE FREE UPGRADE to the next car category, subject to availability at time of rental.
- (In the U.S.) Valid from a compact car or above, excluding luxury and specialty cars.
- (In the United Kingdom) Valid on self-drive rentals only from a group B car category or above, excluding group E cars and above.
- Offer is subject to availability at time of rental. Certificate must be presented at Alamo counter on arrival. Once redeemed, certificate is void. A 24-hour advance reservation is required.
- This certificate and the car rental pursuant to it are subject to Alamo's conditions at the time of rental.
- Offer valid through May 26, 1993 (except 12/19-12/22/92, 2/12/23/93 and 4/8-4/10/93).

Free Weekend Day
- (In the U.S.) Valid for ONE FREE WEEKEND DAY on a compact through fullsize car category.
- (In the United Kingdom) Valid on self-drive rentals only on a group B through group E car category.
- Offer valid on rentals of two days or more. Car must be picked up after 12 noon on Thursday and returned before 12 noon on Monday.
- Offer applicable toward Membership Rates only. A 24-hour advance reservation is required. Reservations are subject to availability at time of booking.
- One certificate per rental accepted; must be presented at the Alamo counter on arrival. Once redeemed, certificate is void.
- This certificate and the car rental pursuant to it are subject to Alamo's conditions at the time of rental.
- Offer valid through May 26, 1993 (except 12/19-12/22/92, 2/12/23/93 and 4/8-4/10/93).

$10 OFF Your next rental.
- (In the U.S.) Valid for $10 OFF weekly rentals (3 days or more) on compact through fullsize car categories only.
- (In the United Kingdom) Valid for £10 OFF weekly rentals on group B through group E car categories.
- A 24-hour advance reservation is required. Reservations are subject to availability at time of booking.
- One certificate per rental accepted; must be presented at the Alamo counter on arrival. Once redeemed, certificate is void.
- This certificate and the car rental pursuant to it are subject to Alamo's conditions at the time of rental. May be redeemed for the basic rate of the Alamo self-drive car rental which does not include taxes and other optional items.
- Offer valid through May 26, 1993 (except 12/19-12/22/92, 2/12/23/93 and 4/8-4/10/93).