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PROFESSIONAL UNITY

PUPO
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The American Geological Institute’s Committee on Planning a Unified Professional Organization on April 10, 1975, presented a unanimous report to AGI’s Board of Governors, and on its own motion has been discharged. AGI’s Board in turn has unanimously adopted a resolution accepting the report and endorsing the principles set forth in the proposed Constitution, Code of Ethics, and Bylaws of the new organization, to be known as the Association of Professional Geological Scientists.

AIGP and AAPG, represented by their respective presidents and executive directors, had already ratified an agreement stipulating the actions to be taken by each organization to carry out the unification of the two existing professional certification systems. Subject to the ratification of these agreements by the societies involved, particularly those requiring constitutional revision, the way is now clear for a profession-wide merger of geological scientists, with geophysicists very much included within this latter term.

The PUPO Committee of AGI consisted of representatives of AIGP, the Division of Professional Affairs of AAPG, the Association of Engineering Geologists, and the Society of Exploration Geophysicists, with observational participation by the Association of American State Geologists. After 15 months of discussion, debate, argument, hassle, compromise, legal adjustment, rehash and final tuning, the group came up with a joint solution that was not ideal for any but acceptable to all. Nobody dominated anybody; no one rolled over and played dead; nobody stayed mad very long -- it was a good committee and the mutual interaction was educational to all of us. It is well understood that the product is not perfect, but is workable now, and capable of adjustment and fine tuning, as necessary, during the years to come.

The new organization is based on AIGP, deliberately and unashamedly. The principal modifications are structural and semantic and do not impair the attainment of AIGP’s purposes, which are also the purposes of the new APGS.

The chief differences are:

1. The name;

2. The use of the terms “geological science” and “geological scientists” in lieu of “geology” and “geologists,” as a semantic concession to the geophysicists, who have strong feelings on this point;

3. The expansion of the Executive Committee to include the President and Vice-President of AGI, and the Chairman of the newly-created Policy Board (see below);

4. The creation of a Policy Board to handle (1) long-range planning and (2) coordination of specialty certification practices among these specialized societies wanting additional certification superimposed upon the APGS’s basic certification of professional geological scientists.

There are additional minor language changes, some of them adopted for legal reasons, but the AIGP Constitution and Bylaws, as well as the Code of Ethics, remain readily recognizable. Among the problem areas will undoubtedly be grandfather provisions (largely solved) and rare cases of individuals already in one organization but obnoxious to another.

The reorganization will require constitutional and by-legal revision on the part of AIGP, and much inner turmoil. But when the dust clears away, we should have achieved a previously unattained goal -- unity among the “geological scientists” of our profession; unity in voice and presentation; unity in professional purpose; and unity in the use of available resources to these ends. We should have more bodies, more brains, more breadth, and more boodle. People such as mining and engineering geologists as well as geophysicists should feel they have a home, and that APGS will provide a vehicle to provide it, and that the time is ripe for a construc-
The PUPO Committee has done what it can, and the various executive groups have indicated their approval. Now it is up to the individual members to decide, on the basis of merit, whether they wish to adopt this procedure. Documents will be circulated for individual study in due course by the various member societies concerned.

One thing is certain — if the present plan is not accepted, many years will elapse before another is put forward. The PUPO Committee is, in a word, pooped. If a better solution were available, we would have gladly adopted it. We are by no means ashamed of this one, and urge its acceptance.

AIPG - AAPG AGREEMENT

On March 20, 1975 AIPG President Arthur O. Spaulding and AAPG Merrill W. Haas executed following agreement. The agreement was ratified by both Executive Committees in Dallas in early April.

THIS AGREEMENT, made by and between the American Institute of Professional Geologists (AIPG) and the American Association of Petroleum Geologists (AAPG).

WHEREAS, The American Institute of Professional Geologists, a Colorado corporation, is interested in contributing to the unification of the geological profession and is therefore contemplating the restructuring of its organization so that AIPG will be designated as the Association of Professional Geological Scientists (APGS); and

WHEREAS, AIPG and AAPG, a Colorado corporation, currently are both engaged in separate programs involving the certification and professional interests of geologists; and

WHEREAS, the accomplishment of the mentioned restructuring of AIPG involves the amendment of its Articles of Incorporation, the revision of its Constitution and By-Laws and the undertaking of related matters which will entail substantial effort; and

WHEREAS, AAPG wishes to contribute substantially to the unification of the entire profession of geology through consolidation of its specialty certification program with the general certification engaged in by AIPG, and to be undertaken by APGS; and

WHEREAS, AIPG and AAPG wish to assure each other in their undertakings and agreements in the event that such restructuring of AIPG is, in fact, undertaken and APGS, operating under that new name under Colorado law, undertakes its general certification activity as a continuing program;

NOW, THEREFORE, WITNESSETH: That in consideration of the foregoing premises and their respective promises set forth herein the parties to this Agreement mutually agree as follows:

1. AAPG agrees that if AIPG, within one (1) year after the signing of the Agreement is restructured in the manner described in the premises and the second paragraph of this Agreement, changes its name to Association of Professional Geological Scientists, and undertakes a program involving the general certification of geologists, AAPG will continue its program of specialty certification of petroleum geologists, with the added requirement that new applicants be certified as Professional Geological Scientists by APGS for so long as the restructured organization of AIPG, to be known as APGS, or its legal successor, by whatever name, continues to have a program involving the general certification of geological scientists, with the exception of applicants who are not citizens of the United States.

In that regard, AAPG further agrees that it will actively encourage and support membership in APGS.

2. AAPG agrees, upon the execution of this Agreement, to undertake the amendment of Articles of Incorporation as a Colorado corporation; the amendment of its Constitution and By-Laws; the execution of a Memorandum of Agreement to be signed by AAPG, AIPG and certain other interested member societies of the American Geological Institute; the change of its name to Association of Professional Geological Scientists (APGS); and will conduct its general certification program as Association of Professional Geological Scientists (APGS).

IN WITNESS WHEREOF, the undersigned have executed the foregoing Agreement, subject to ratification by their respective Executive Committees and the Executive Committee of the Division of Professional Affairs of the AAPG.

WHAT COMES NEXT?

The Executive Committee of the Division of Professional Affairs of the AAPG decided to poll their membership before approving the agreement signed by Spaulding and Haas. When and if the DPA approves the agreement, the AIPG will begin the process of restructuring. Since the Constitution of AIPG will have to undergo revision, the new constitution will have to be read and discussed at the 1975 Annual Meeting October 30 and November 1 in Tucson, Arizona, and then a vote of the membership will be conducted by mail. Prior to the Annual Meeting the proposed new Constitution and Bylaws will be published in JPG.

Frank Conselman has pointed out that the member societies of the American Geological Institute have unanimously adopted a resolution endorsing the principles set forth in the proposed organizational documents of the Association of Professional Geological Scientists. AIPG can become the professional association for geologists and geophysicists by changing its name.
EXECUTIVE COMMITTEE MEETING

The Executive Committee met in Dallas on April 1, 1975. The Committee approved the Spaulding-Hass agreement to work for the creation of a single unified professional society (see page 2).

The plans for the Annual Meeting in Tucson next October 30 and November 1 were discussed and the Executive Committee suggested to the Annual Meeting Committee that they include a discussion of the process of testifying before legislative committees.

Executive Committeeman Thomas L. Thompson (Okl.) presented a proposal to encourage the State Sections to develop an effort to inform their state and local officials and their local press of the economic effects of the oil and gas legislation proposed in Washington. A motion was made and passed that "the Executive Committee encourage all State Sections to participate at all levels in the education of governmental officials, legislators, press, and the public of the dire consequences of the depletion of the unrenewable natural resource base."

The Committee voted to support the Committee of Scientific Society Presidents this year. The CSSP monitors the Congress for legislation that affects scientific societies in particular.

In an effort to facilitate Institute administration the Executive Committee, acting on Advisory Board recommendations, directed State Sections to charge annual dues of $0, $5, or $10. For the same reasons the committee approved the following resolution for balloting to amend the Bylaws:

Article X, Section 3, Paragraph A, fourth sentence: "Upon approval of an application, dues held in suspense shall be credited to the respective members dues account for the year in which he is notified of his election and certification; except that, an applicant that is notified of his election and certification after June 30 shall have his prepaid dues credited in full as payment of annual dues for the calendar year following his election and certification."

The Advisory Board recommended that the Institute consider having 2 meetings each year, for a half-day each, in conjunction with the AAPG and GSA annual meetings. The Executive Committee decided to poll the membership on the question.

Another Advisory Board recommendation was to establish an associate member category. This was referred to the Membership Committee for a study and report at the July Executive Committee meeting.

Proposed changes in the Bylaws of the West Virginia Section were approved and the committee decided to publish the proceedings of the Education Symposium at the GSA Miami meeting in TCG.

The next Executive Committee meeting will be July 10 near Pittsburgh, Pa.

THE GEOLOGIST'S ROLE IN MINERAL EXPLORATION
Paper presented at 1974 Annual Meeting in Golden, Colorado
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Consultant
Denver, Colorado

The mining geologist has the greatest challenge ever, to find the mineral deposits needed in the future. The most obvious reason is because as the old saying goes, "most of the easy-to-find surface deposits have already been found". You and I know that this is modified as new minerals become economic, new processes evolve, and new government regulations make us look at the surface in a new way.

Why should we look for more mineral deposits? Many companies have many years' reserves of many minerals. A few are in short supply, especially on a local (U.S.) basis. This subject of "why look" - I will not go into today.

Society, years ago, decided that they liked and wanted the products of a mining industry. Just recently in the midst of the energy crisis this affluent society (world-wide) decided that they are willing to pay the price for the continued good life, although perhaps at a lower rate of growth and expansion. Therefore someone is going to find the raw materials needed, and at a profit. And so one might say, "why not me?"

There are many serious and seemingly insurmountable obstacles before the mining industry. But I, personally, as an exploration geologist and we, collectively, I believe must approach the total situation optimistically. With that approach I will try to state what we are doing and then what we must do to find minerals for the world's consumption.

Historically, an individual or a company decided that someone else would pay for a given mineral. So they went out and tried to find a deposit that would fit all of their criteria set up for that period of time. The individual could normally move faster than an organization so he went out independently and found his commercial deposit. In this early-day process, geologists played an insignificant role and even geology played a limited role. An individual of average intelligence, once exposed to the most significant guides to ore could with persistence find the exposed ore bodies. His development work usually consisted of hi-grading to get a rapid return on his money. Also, many such prospectors preferred to sell to a company, and to take that grubstake to do more prospecting.

Meanwhile, back at the corporation headquarters action would also be planned, but the company employee who went out looking for mineral deposits probably did not carry the title of geologist. However, through time there did evolve the general approach that geologists were supposed to find the ore and mining engineers were supposed to produce it. To this day, especially among medium or small-size companies, the above stated distinction is not specific or clearly defined and followed.

Quick to develop were two other groupings of geologists, namely government-academic and consultants. I believe we have been wise in insisting that government policies should be to make regional studies and basic geologic area mapping with enough specific individual ore bodies studied to provide the profession with published case histories.

This vast library of geologic information has accumulated in spite of the basic philosophy that a consultant or company geologist was, and in many cases still is, principally concerned with money and not geology. By this I mean
that most projects are never thoroughly studied geologically, and most projects are never finished. Such things as the ultimate source of the uranium is never proven and to the accountant this is a very academic and unnecessary goal of the company. Partly as a result of unfinished projects, but more realistically because of close-mouthed company policies, the geology of most projects is never published. The influx of oil companies into the mining field has loosened up that policy considerably. Also, I admit, if one knows how and really needs information, it can often be obtained— but not for publication.

Many geologists have stated to me that they are not paid enough for their valuable services to a producing company. Some now have different types of profit sharing. A few companies permit geologists to have a percent override on a project. In the discussion period, I would like you to comment on what your company does.

Let us take a look at what the mining industry has done with a few commodities, and then look at what is now happening with them. Later as time permits, I will discuss government policies.

Copper. There are published reports of very large reserves of low-grade copper in porphyries at many geographic locations in the U.S. and elsewhere in the world. Why would a major company ask their geologists to look for copper? As I understand it, the reasons have been (1) we might find a higher-grade deposit, (2) we might find a much more favorable mining condition, (3) and lately we might find a major deposit in a location more environmentally desirable for open mining. Those of us who do not have reserves may say that present mines may turn out to be too expensive to mine in the future—or on occasion—we don't believe they have the reserves and thus we would have a chance in the market.

It must be admitted that the copper market is a large one and no one company has a monopoly. This alone is enough for many companies to look for copper. Also, another major attraction is that ore bodies are large and mining can be projected for 40 years or more. This permits longer range financing and a guaranteed return on their money. Today—that is the key statement and foundation for major company exploration—namely a guarantee. More on that subject later.

Aluminum. The exploration for alumina-bearing minerals in the U.S. up to 1970 was insignificant, with most large reserves of bauxite found in foreign areas. The energy crisis really made influential people realize that dependence on foreign sources was not the best of national policies.

In Utah and Colorado extensive exploration has indicated large reserves of alunite and anorthosite. These will be substitute sources of alumina. Work on alunite is more advanced and appears to be more economic.

High-alumina clays and other materials are also being looked at. Since the aluminum market is so large there is room for many different approaches. I think this one will be exciting to watch.

Molybdenum. Moly is produced as a by-product from several copper and a few other mines. However, a near monopoly exists with one company's three mines in Colorado. They also are working on additional moly deposits. I know of a couple myself, that I'm not talking about.

From my own point of view and knowledge, I do not see why any company would explore for moly. One attraction, again, is the large size of the deposits.

Sulfur. In 1973—10 million tons of sulfur was consumed in the United States. Sulfur is one of the most abundant and widely distributed elements on earth. We experienced one of man's worst cases of mismanagement in the false shortage of sulfur in 1967, and the false glut of sulfur in 1972. The overproduction was caused by rapid short-term changes in amount of sulfur removed from other commodities, for environmental quality controls.

Sulfur is one of the commodities which requires a more than an average amount of vertical control within a company. If you do not use sulfur or have a contract for its sale, you should not be in the sulfur business. Similar commodities are iron ore and limestone for cement.

I believe that exploration geologists must be on the watch for geographically favorably located sulfur. I say this because much larger quantities of sulfuric acid and other solvents will be used in solution-mining and heap-leaching operations.

In preparation for this paper I asked a company what minerals they were looking for. They are a medium-sized oil company recently come into the mineral business. They said that they own so much land in a certain state that every time something happened the environmentalists blamed them. So their policy is to move strongly into coal, but only western coal and only underground. They think they will have a better chance fighting MESA underground, than they would several environmental groups on surface mining. They also are not looking for iron, limestone, sulfur, gypsum or such commodities.

What is your company's policy? Is such a policy a major restraint on exploration?

Gold. The price of gold is about $165 per ounce, yet new mines have been very slow to come into production. One kind of project that geologists can help to get going would be like the new Silurian black shale project in Manhattan, Nevada. The shale may average 0.8 ounce of gold per ton. The tonnage is in the billions. They surface mine the shale, pile it in 42,000-ton heaps and leach with cyanide. Their experiment is successful and they are going into production.

Base metals. I was recently reminded that the lead-zinc deposits in the Missouri New Lead Belt are believed to have an organic origin. Also that this origin came when the area was at 20° south latitude. Exploration of limestone beds at 20° north latitude of the same age proved those beds contain similar lead deposits. If plate tectonics can lead us to other commercial deposits, geologists should hopefully be out ahead of management and lending the way with many more such theories. What is your company doing on research on plate tectonics?

Uranium. Uranium exploration has occupied much of my time since 1947, as it has for many of you here today. However, the price and general business climate has not generated the proven reserves needed for future nuclear plants. The recent energy crisis seems to have alarmed federal agencies more than some uranium producers. As a result, the federal and state governments are rushing back into the uranium-thorium field. The USGS again has a large staff working on regional as well as detailed areal mapping. The AEC, directly and through contractors and subcontractors, is still trying to hire large numbers of uranium geologists. They say they are coordinating efforts with all agencies and contractors. They will not drill for ore, but will drill for geologic information. This is a key point because usually the governmental appraisal is on the surface only.
Drilling is the key to finding new ore bodies now and in the future.

Geologists, in concert with metallurgists, are going to have to take a more active role in promoting low-grade but large-volume commodities. I know, by my own experience, where very large amounts of uranium are in the ground. The difficulty is in convincing conservative management that they must do more research in processing techniques so we can use the lower grade materials. It may also help if more geologists become the managers.

I would like to discuss many more commodities, but time does not permit right now.

As some of you know, I am the only geologist in the world who is a registered lobbyist. Up until just recently I worked full time on Colorado legislation, along with federal bills and hearings. Now that exploration for mining has picked up I am back in the consulting business. There is a moral to that story - that is why I mentioned it. Someone - geologists, that is - must do some lobbying work on state and federal level. Secondly, the main thing I learned as a lobbyist is that we have great power over the legislature and the general public - if we study and learn how to use it. Thirdly, we also have great power and ability to act and get things done outside the government and before government acts. There is tremendous opportunity for AIPG to help the profession and the public at the same time. One individual working alone, as I do, cannot make a living as a consultant and work full time as a lobbyist. Therefore, companies will have to assign geologists - I don't mean lawyers - part- or full-time to work on government relations. As happened to me - overnight, a new law or decision can put you out of business. If there is time in the discussion period I can elaborate on this if you wish.

Government policies. Living on the surface of the earth is a dangerous thing. Most people, including you and me, tend to forget this. The constant threat of earthquakes, hurricanes, floods, fires, volcanoes and other catastrophic events has made the people immune to the idea that they are in personal danger. They also become immune to the idea that there is danger from many unseen or even unknown items such as cosmic rays, sun spots, radioactivity, car-exhaust fumes, etc.

My theme is that we have to live in this environment as near a predictable, steady pattern as the human brain can conceive. If we panic because a new danger is exposed by a fanatic, we may over-compensate against other major activities and thus find ourselves in a constant series of short-term crises. This, unfortunately is where the U. S. and the world are today.

There are enough natural resources on this earth to maintain our good life, provided there is enough lead time and enough incentive for individuals or groups to develop these resources. If one resource becomes exhausted, we have found and will find a substitute for it.

Unfortunately, in my view, there is a tendency today if a shortage or a crisis develops, for a cry of "let the federal government solve it".

Let us take a look at some specific local laws and then get back to federal laws. Two new laws in Colorado give County Commissioners new and broader powers. The first is HB 1529 which requires the commissioners to weigh alternatives before allowing new houses to be built on a commercial gravel or coal deposit. As the law now reads, the permit cannot be issued until the gravel or coal is mined. In the more comprehensive land-use law HB 1441, the commissioners have the right and obligation to weigh economic benefits of a mineral deposit versus some permanent building or other industrial use. I am sure these types of laws will have more far-reaching affect than many geologists believe.

The federal laws that have had a devastating and dampening affect on exploration are the Environmental Protection Act, and the air and water acts. Actually, the severe initial effect took the form that money budgeted for exploration were spent on environmental controls, and hundreds of mining geologists were fired. That firing process stopped only about May of this year. Companies are returning to exploration, but are having a hard time finding experienced geologists. Many geologists are already working for oil companies.

The same type of hiring and firing policies have existed for 30 years, with peak years of mining exploration in 1944, 1957, 1969 and probably 1977. I believe AIPG should deal with this problem, and I seek your opinion in the discussion period.

Many more federal agencies have mining geologists on their staffs. Here in the west the most significant are the U. S. Forest Service and the U. S. Bureau of Land Management. Their geologists tell me that they have been right in the middle of policy-making on such items as the new coal-lease system and the forest regulations of September 1.

The BLM is in the process of inventorying all natural resources by areas, and are especially asking geologists to have an input through workshops. The next two will be on this campus on November 6 and 7.

Federal and state taxing and regulation procedures have forced most mining companies to a position of receiving a maximum of 10% on their investments. This in turn causes the companies to say that they want a guarantee that they will make that 10%. This bears directly on exploration - namely, many companies will not engage in exploration, and very few will do wildcard exploration. This led to the trend in 1967 of two or more geologists getting together to form an exploration company, usually with the name "resources" attached. A few of them succeeded financially, but by 1971 most had gone out of business. I have not seen a clear picture of any new form of exploration teams developing in the 1970s.

Joint ventures are now the favorite way of getting talent, money and motivation all in one package. Yet even these joint ventures will find that most of the new capital investments must come from profits generated internally. This poses a very serious major problem if Congress continues to drain off those profits. I believe geologists have to speak up more on these policy matters, or industry will be in much worse shape than it is in at this time. How do you feel about it?

In conclusion, I come back to an optimistic approach and say that someone will have to look for these minerals. You may reply - "why not me?" So I will see you in the field next to a pile of drill cuttings from a new alunite ore body.

Thank you for your kind attention.
I. The question this talk addresses is: "What is the outlook for future employment of geologists in the U. S. Geological Survey?" The term "outlook" relates not only to number of jobs and salaries, but also to characteristics of the organization, working atmosphere, general philosophy, and directions of work. Because the Survey is an organization in transition, it is necessary to review its organization and history so as to better understand what this total "outlook" may be.

II. Responsibilities and Organization of the U. S. Geological Survey

A. Charge of the Geological Survey -- in organic act of 1879 which established USGS, the Survey was charged with: "the classification of the public lands and examination of the geological structure, mineral resources and products of the national domain" -- emended subsequently -- "to authorize examinations outside the national domain when determined by the Secretary to be in the National interest.'

B. Organization -- total personnel: 8332 -- four main operating Divisions -- several administrative and service Divisions

1. Topographic Division: all topographic mapping, photo mapping, etc. -- employs primarily Engineers, Cartographers, etc. -- total employment in FY 1974 = 1,750 ±

2. Water Resources Division: conducts research in hydrologic topics and also collects, analyzes, and interprets data as to source, quality, quantity, distribution, movement, and availability of Nation's ground water -- employs primarily Engineers, Hydrologists, Geologists, Chemists, Mathematicians, Physicists, Biologists -- total employment in FY 1974 = 3,000 ±


4. Geologic Division: geologic research arm of USGS -- basic research + applied research in areal geology and topical geology -- input on mineral resources to Government -- advisory, not regulatory:
   a. One of fastest growing Divisions

III. In order to understand what working in the USGS is like, it's necessary to review the history of the U. S. Geological Survey -- the oldest scientific agency in Government -- since 1879

A. Evolved from 4 independent surveys of the 1870's -- Wheeler, Hayden, King, Powell

B. First Director + Clarence King -- 2 years -- recruited superb staff

C. Second Director = John Wesley Powell -- gave it long-range general directions:
   1. Topographic mapping = began tradition of very high standards
   2. Water Resources = re land use and agricultural planning of Frontier Regions particularly in the arid West.
   3. Geologic research = in tradition of G. K. Gilbert, Clarence Dutton, etc.; also, areal geology by people like N. H. Dorton

D. A new aspect of Survey responsibility -- establishment of Mineral Lands -- Regulatory function
   1. Mineral leasing act of 1920 = "Land Classification Branch"
   2. 1926 became "Conservation Branch" (later Division)
   3. In 1953 CD took over supervision of OCS lease operations
   4. Conservation Division thus has a different mission from Geologic Division -- a mission of "applied geology" in contrast to "applied research" -- and the Conservation Division has accordingly hired a different type of geologist.

E. Main accomplishments 1880 - 1970
   1. Influence on land use re water availability late 1800's -- land and water laws -- WRD
   2. Topographic maps of entire U. S. -- Topo Div.
   3. Mineral resources on public lands -- mostly early input (Naval Petr. Reserves; coal lands; phosphate deposits) in GD; later Cons. Div.
   4. Strategic minerals program of WW II, also AEC uranium program -- GD

*This is in the form of an expanded outline, or a condensed text. Ed.
5. Expanded basic geologic research programs -- NASA, USGS involved in Moon Exploration -- GD

6. Earthquake research -- GD

7. Areal geologic studies -- definitive geologic maps in strategic areas -- GD

8. Survey of primitive and wilderness areas -- GD

IV. Recent Events and Survey response to them

A. Topographic and Water Resources Division -- generally static growth; consistent set of duties

B. Conservation Division -- is experiencing rapid current growth particularly FY 1975, in response to OCS development and potential coal and oil-shale development on public lands.

C. Geologic Division --

1. Funding -- dramatic growth since 1960 from $10 million to slightly more than $100 million in 1975

2. Generally static staffing for past few years -- but substantial new hiring in response to FY 1975-79 President's Energy Program ($10 billion -- 5 years).

D. The Geologic Division is in transition

1. Until 1970, in general the Nation had mineral sufficiency, and the country was still being explored -- in such a setting, areal geology and basic geologic research were compatible with this submature state of mineral development -- it was kinda nice to have definitive mapping work to assist in minerals and fuels exploration -- but the Survey's work really didn't make all that much difference because the country had enough minerals and the economy was healthy.

2. Now, beginning in the last few years, the Nation is abruptly insufficient in fuels, and a serious mineral shortage also looms on the horizon -- and these factors bear crucially on the economic health of the Nation. Suddenly the U. S. Government needs reliable, impartial advice and counsel on mineral resources. The Offices of Energy Resources and Mineral Resources in general, and Oil and Gas Branch in particular, have been breaking new ground, conducting research to:
   a) improve and stimulate exploration
   b) assess remaining energy potential of frontier areas.

3. Thus the traditional activities of the Geologic Division are expanding:
   a) Areal Geology
   b) Petrology of Mineral Commodities
   c) Exploration Techniques

New Responsibilities

(d) Resource Appraisal
(e) Long-range Mineral Supply Prediction
(f) Economic theory of Exploration

V. Hiring patterns, staff characteristics, etc.

A. "Profile" of Geologic Division -- most geologists and geophysicists in USGS

1. Distribution of staff (1974):
   800 geologists; 200 geophysicists; 120 chemists; 120 others
   360 technicians; 300 administrative and clerical

2. Annual attrition:
   -- 40-50 total prof./yr. = 4% +; retirements, deaths, resignations (compared with major oil co. = 13% + yr.)
   -- resignation = 10 + yr.
   -- terminations - very few - difficulties involved

3. Geoscientists:
   -- average age (full-time career professionals) = 47
   -- been with USGS = 21 years; 2 peaks --
   (1) post war, Uranium boom;
   (2) Heavy metals, Earthquake
   -- Average grade = GS-12.8 = $21,000 + yr.
   -- education = 1/4 BS; 1/4 MS; 1/2 Ph. D
   (recent trend)

B. Current salary scales, benefits, etc.

1. BS -- no experience GS-5 = $8,500 +
   MS -- no experience GS-7-9 = $10,500-
   12,800
   Ph. D. -- no experience GS-12 = $16,500 +

   For all practical purposes GS-15 is top of line $30,000 +

2. Meeting competitive salary scales of industry: tough to compete in middle years.

3. As need for experienced personnel grows, and the limit on full-time positions continues, a pattern of hiring retired industry professionals on a temporary basis can be expected.

4. Fringe benefits + = to major company but Federal government doesn't pay Social Security = $5-800/yr.

5. Vacation: 13 days/yr. for first 3 years
   20 days/yr. for 3-20 years
   26 days/yr. after 20 years

6. Retirement: 7% (matched) contribution -- can retire at 55 -- very good retirement system compared with most industry plans -- but can choose to work till mandatory retirement at age 70.

C. Advancement

1. Publication and reports are main product and an important basis for promotion -- nonformal or unstructured administrative accomplishments are increasingly being recognized.
2. Promotion list generated by peers, supported and argued out at successively higher levels by Branch Chiefs and Office Chiefs -- this is inevitably a subjective process involving personalities, but fundamentally, promotion is based on performance, and it originates with one's peer group.

3. Raises -- beyond scheduled increases (+3%-+5%)
   --cost of living increases (+5%)-8%
   --quality increases, cash awards for superior performance

VI. Advantages and Disadvantages of Survey Employment

A. Advantages
   --Stability of location
   --Scientific atmosphere and interaction with other scientists
   --Freedom of activity
   --Job security
   --Serve nation in worthwhile activity
   --Publication privileges
   --Adequate salary and benefits
   --Informal working atmosphere
   --Modern equipment and scientific support

B. Disadvantages
   --Very conservative organization, resistant to change
   --Slow moving, red tape: 3 months to hire, 6 months to execute contract
   --Work often not utilized by Government
   --Isolation from industrial contacts
   --Substandard professional offices in recent years in some areas
   --Frequently short of operating funds

VII. Future events and Survey response to them

A. Hiring
   1) Water Resources -- slow growth--attrition = 25-50 ± yr.
   2) Conservation -- rapid near-term growth - 400 ± in next year, then 50-100 ± yr. thereafter -- both experienced men + new graduates -- so far, salaries have tended to be lower than GD
   3) Geologic Division -- sustained growth for next few years--replaced attrition = 50 ± yr., + additional 200 ± yr., for a few years -- in Energy first, then Minerals fields.

   1. Augment (not replace) traditional research activities.
   2. Closer interaction with Industry as Nation recognizes necessity for productive cooperation between Government and Industry.
   3. Short-term research that contributes to exploration capability.
   4. Active and utilized advisory capacity toward Department of Interior, ERDA, other elements in Federal Government in matters of mineral development.

G. Focus on resource-base (practical rather theoretical) of U. S.

C. What kind of Geoscientist will Geologic Division be looking for --
   1. Probably MS or Ph.D., excellent technical background
   2. Need youth as well as experience professionals
   3. Most of all, must have this attribute:
      A professional who recognizes and is motivated by the Nation's needs, not just the needs of Science.

D. Influence and Effect of ERDA and DENR
   2. DENR: ERDA May come Interior (and USGS) during 54th NOAA Congress
   3. Survey should remain cohesive as an Earth Science organization

E. From this review, it is clear that the U. S. Geological Survey and in particular, the Geologic Division has successfully responded in the past to the Nation's needs. Now the USGS is faced with the most urgent and important challenge of its 50-year history, as the Nation enters a period of mineral insufficiency. USGS is now mobilizing, and when the Survey can:

   --acquire experienced personnel in economic geology;
   --augment its traditional research function with resource-oriented geology;
   --achieve an effective interaction with Industry;
   --escape its traditional, rather passive, "earth-science information" role and assert itself on critical scientific and technical issues in the field of National mineral development

1. THEN, the Geologic Division, and the U. S. Geological Survey will indeed become an extraordinarily constructive force as the Nation adapts to the stringencies of the Fuels and Minerals pinch of the next decades ...

2. And the Director of the U. S. Geological Survey will be one of the most significant Government leaders, as he shows the Nation the available options for mineral development and utilization, and the consequences of each option ...

3. So... to return to the question with which we began -- "What is the outlook for future employment of geologists in the U. S. Geological Survey?"

As all these things come about, a professional career as a geologist with the USGS will become even more
...exciting as a scientist
...rewarding as a professional
...and enormously fulfilling as a
citizen.

WALLACE PRATT

Wallace Pratt, whose name has been an institution in petroleum geology for the past 50 years, was interviewed recently by Mr. William C. Griggs, a research associate of the College of Engineering at Texas Tech University. The recording was taped under the auspices of a program of the National Park Service through the Department of Park Administration at Texas Tech, designed to perpetuate the historical facts leading to the acquisition of the Guadalupe Mountains National Park in Texas. As many AIPG members may not know, Mr. Pratt's donation of his extensive land holdings (several square miles) helped create that National Park.

President Frank Conselman urged that AIPG offer to readers of the Proceedings Mr. Pratt's enjoyment of his profession of geology, so that AIPG members and other geologists could see the zest for geology that Mr. Pratt held throughout his life and which was captured in this interview. It is appropriate that such a testimonial be printed along with the foregoing report of student attendance at this AIPG Annual Meeting's Program and Banquet. Readers should be aware that the interviewer was not a geologist, and that the purpose of the interview was such that no propaganda generation for geology was intended.

The Editor

GRIGGS:

Mr. Pratt, if you were a young man getting ready to start all over again what profession would you go into?

PRATT:

Geology

GRIGGS:

No question?

PRATT:

None whatever! Society needs geologists today — will need geologists tomorrow — more than ever. Geology, of course, is the science of the planet Earth and we are still desperately ignorant about the earth, our only habitat, our home and the home of all life as we know it. In our ignorance we have so grievously abused our habitat, our earthly home, as to make large parts of it uninhabitable for mankind. We have done this through ignorance. We have learned a great deal about our Mother Earth, particularly in the last 200 years, but the most significant two things we have learned are (1) how much we have learned that is false — not true — and (2) how much there is that we still have to learn.

Society must train geologists whose growing knowledge of the earth will enable us to avoid other — possibly fatal — mistakes in the future. But having said all this, I suppose the real reason I would choose geology as a way of life is that it involves doing what I like best to do. Fortunately, the things we like best to do are usually the things we do best.

GRIGGS:

Where is the next big oil discovery going to be, Mr. Pratt?

PRATT:

Nobody knows! But it is safe to predict that it will be somewhere on the continental shelves of the earth, rather than on any of the continental platforms. I should make it clear that I exclude the USSR, which, probably possesses more undiscovered oil and gas on land than any other nation (unless it be Saudi Arabia). In addition, the USSR also possesses extensive, promising continental shelves in the Siberian Arctic.

The continental shelves of the United States contain vast oil resources already proved -- off the Arctic coast of Alaska, 2 million barrels daily ready to be produced; off the Los Angeles Basin another quarter million barrels proven; in the Gulf of Mexico a similarly large volume of additional oil could be made available if sufficient additional drilling were permitted. If all this potential domestic production were coming into our market, we could eliminate most of the imports we are now forced to bring in at exorbitant cost from the Middle East. The discoveries of the giant new oil fields off our Arctic coast and our Southern California coast were both made 5 years ago, yet neither discovery has yet been permitted to send a barrel of oil to market.

Finally, perhaps our best hunting grounds for giant new domestic oil fields is the extensive continental shelf off our Atlantic coast. But this promising area we have not been permitted even to explore. Not a single test well has gone down there. The populace along the coast line fears drilling for oil would mar their view out over the Atlantic and would foul their bathing beaches. Yet the drilling platforms for test exploratory wells, and for recovering the oil if any oil were discovered, would almost certainly be erected 30 or 40, or even 100 miles, out at sea.

GRIGGS:

The holiday visitors on the beaches would not even be able to see them?

PRATT:

That is right. They would be so far out at sea that the earth's curvature would put them below our range of vision from the coast.

But I have wandered a long way off from Guadalupe National Park. I must apologize for sounding off on this occasion and at such length on the problems of the American oil industry.

A BONUS

Hollis Dole presented a most interesting and informative address, replete with excellent slides, about the efforts of Colony Development operation on oil shale in western Colorado. We had taken notes on his speech, which was off-the-cuff, but our notes are merely a hollow shell of what he said. Thus, because we felt that AIPG members could profit from the full treatment, we agreed to substitute the modified text of the same address, which he delivered, a couple of weeks later as part of the United Bank of Denver Seminar. The illustrations which follow his report were taken directly from his slides.
But when the time is ripe, we hope to be in a position to commence construction within six months.

Before elaborating on the Colony plans, let me review a little of the venture's history.

Colony was formed in 1964 with The Oil Shale Corporation (TOSCO), Standard Oil of Ohio (SOHIO), and Cleveland-Cliffs Iron Company as the participants.

The acronym "COLONY", for your edification, is derived from Colorado -- where the privately owned oil-shale deposit is located; Ohio -- the home offices of Schio and Cliffs; and New York -- which at that time was the headquarters for TOSCO.

Shortly after its formation, Colony constructed a 1,000 ton a day retort utilizing the TOSCO II process on its private land near the headwaters of Parachute Creek, in Garfield County. This semi-works plant was designed on the basis of work in TOSCO's laboratory and pilot plant over the previous 10 years.

In 1969, Atlantic Richfield Company joined the venture as the operator. The semi-works plant was modified and, after continuous operation to obtain the needed engineering and environmental information for the design of a commercial plant, the field demonstration was concluded in 1972. Following the successful operation of the TOSCO II semi-works plant, Atlantic Richfield and TOSCO continued planning for a commercial plant.

In January of this year, (1974) Ashland Oil, Inc. and Shell Oil Company joined with Atlantic Richfield and TOSCO in this planning work. Also this year, (1974) SOHIO and Cliffs relinquished all association with Colony. So, even though the acronym "COLONY" no longer applies, the name was too well known and respected to give up.

In June of 1973, C. F. Braun & Company was selected to design a 50,000 BFD shale-oil complex utilizing the TOSCO II process. After 15 months and 376,000 man-hours at a cost of over $10 million, the engineering design was completed in October 1974.

The results of the definitive engineering design indicated that the complex would cost in excess of $800 million over the 3-year construction period. This price tag compares with a 1973 engineering estimate for the complex of around $300 million, and represents an increase in construction cost estimates of nearly 40% in the last 6 months!

If this inflation rate appears high, it must be remembered that inflation has had a greater impact on capital goods than on most other sectors of the economy. And shale-oil production requires not only large capital commitments, but high operating costs as well.

In the case of the Colony venture, capital commitments would be required to build an underground mine that would produce 66,000 tons of oil shale a day, automatically making it the largest production from an underground mine in the world; to erect a primary crusher that would be as tall as a 10-story building; to construct a pyrolysis unit that would be about the size of the Denver Hilton Hotel; to build a refinery that, although not having a broad product slate, would produce 42,000 bbls. of very low-sulfur fuel oil per calendar day, 51,000 tons of ammonia per year (which should delight the farmers), 68,000 tons of sulfur per year, and 272,000 tons of coke per year, and would be as sophisticated as the most modern refinery of today.

To operate the complex, Colony would need to employ
over 1,000 full-time employees and build a new town to house our employees, their families and others, capable of accommodating 3,500 people.

If you couple debilitating inflation with a lack of a specific Federal policy to bring supplemental sources onto our energy team, it can be readily understood why it is prudent for Colony to "let the dust settle" or let the "crystal ball clear," whichever might be appropriate. Industry has enough of a gamble in the technical aspects of the scale-up to a commercial complex of 10 times the semi-works plant, without multiplying the odds against itself.

Colony's plans were to begin construction of the commercial plant in May of 1975, so obviously we are in a high state of readiness. Our decision to pause does not mean that we will stop all our work, nor does it mean that we have lost faith in the need for shale oil. But, the drive to a construction start will be wound down.

However, our expenditures in the wait and watch period will be substantial. For instance, we will finish the work now underway on the access road from the valley floor to the plateau top, where the pyrolysis unit and refinery are to be located.

We will finish the work underway on the railroad spur off the D&RGW mainline along the Colorado River at the town of Grand Valley; continue to update much of the engineering work; continue our rock-mechanics program in our pilot mine so that we will have as much information as possible on the response of the pillars to mining; establish another new revegetation plot or the plateau top; monitor our air, water, and revegetation plot to give us a still higher degree of confidence in the analyses already completed; maintain our environmental teams to add to the experience we have gained over the past 5 years of intensive environmental work; make all preparations to construct our planned community -- but we will not begin any construction as the planned community is only for the purpose of alleviating strip development in the Rifle-Grand Junction region, to hold employees at our operation, and to meet our social obligations to the area.

All work beyond planning for the new community will be stopped, and will not commence until the decision to go ahead on plant construction is made.

Because our planning, monitoring and basic preparation work will continue, we are urging the U. S. Bureau of Land Management to also continue their work in addressing our environmental impact analyses. The receipt of the E. I. S. and the many permits is critical to the timing of start up. Without these necessary prerequisites, plant construction could be delayed by many months, or possibly years, regardless of how much preparation work we do.

It would seem to me that this interim period is ideally suited for public dialogue to clear up public apprehension of oil-shale development. It would not only tend to dispel many of the environmental concerns, but it would also bring out those matters that might possibly be left unaddressed at a sufficiently early time so that others who are involved in oil shale development will be able to consider them as their environmental work progresses.

We feel that Colony, in its 20-volume, 6,500-page Environmental Impact Analysis and supporting appendices that involved the work of nearly 100 authorities in different environmental disciplines and cost in excess of $3 million, has done the most thorough job of understanding and responding to the environmental and social consequences of any proposed resource development to date.

I would like to point out that development of a shale-oil industry could be the first major new industry to be started after the passage of the National Environmental Policy Act, the Clean Air Act, and the Federal Water Pollution Control Amendments of 1972.

It will be conforming to the laws that Congress has passed, and to the desires of the people that greater attention be paid to the environmental consequences of industrial development.

The activities under the Federal prototype leasing plan, as well as the activities on private land, are such that oil shale will be developed right, the first time. Going forward to completion on our E. I. S. and other permits will certainly contribute to this goal.

A little earlier I referred to the "environmental concerns" on oil-shale development. I suppose that many of these concerns are natural because there has never been a commercial shale-oil plant built, and there is always a fear by some of the unknown.

It probably won't do much good, but let me address some of these areas of high visibility to see if I can dispel concern, at least to this audience.

I will confess I am handicapped because all I can deal with is facts. The "what ifs," "maybe's," "could be's," "possibly's" will really have to wait for many of their answers until several commercial plants have been built and operated for a few years. Only then will we actually have the real answers.

The most recent concern that has appeared in the news has come from the Project Independence Blueprint. The headlines in The Denver Post of November 12 stated, "Marginal Impact Seen For Oil Shale." The inference is that because shale oil cannot contribute much to energy supply by 1985, and because of its cost and possible environmental results, oil shale should not be developed.

I don't believe anyone would argue that shale oil is the sole answer to our nation's energy short fall, but then I'm not sure that any one energy source is.

Left unsaid is that no matter how little shale-oil will contribute, it will be needed. Also left unsaid is that before a full blown shale oil industry can be developed, the technology and costs must be fully understood.

This will require 4 or 5 commercial plants, and the lead time for this giant step is at least 10 years. Once this hurdle is overcome, then our nation would be in a better position to respond to any shut-off or threat of shut-off of overseas oil, by having known technology on which to build efficient plants on an orderly basis.

To me, the technical capability to produce oil from shale and other supplementary sources is the real goal of independence in energy supply.

Another news story that bothered me was a report appearing in the Rocky Mountain News of October 31. In an interview with a reporter, S. David Freeman, Director of the Ford Foundation Energy Policy Project, said he doubts that Congress ever will grant oil-shale industry demands for Federal price supports. He said it would make more sense for the United States to buy foreign oil at $12 a barrel than to produce oil shale at the same price.
Now, contrast this with headlines in *The Denver Post* of the day before, "Oil Will Finance Foes of Israel." The report, datelined Rabat, Morocco, stated, "The Arab Summit Conference has ended with a pledge of more than $2 billion a year in oil money to Israel's enemy neighbors... Morocco's King Hussein II, saying he spoke for all Arab nations, said Wednesday the United States and Israel must recognize the P.L.O. or face the threat of a new Middle East war in which Arab oil money will ensure victory. Arab diplomats called his statement a virtual ultimatum."

I find these two news articles difficult to reconcile.

We've heard a lot in recent weeks about "net energy balance." Apparently this refers to the energy consumed in producing an energy material to be marketed. The production of shale oil is compared to the production of other energy sources, including natural gas, conventional oil, and coal.

The story is that it takes more energy to produce shale oil than it does these others -- ergo, shale oil is a poor choice. I could certainly agree with, if there was free-world access to the other energy materials and if there was an unlimited quantity of oil, gas, and coal available to our economy.

But there are problems with natural gas, which perhaps has the best energy input-output ration.

The Oil & Gas Journal of November 4 quotes Columbia Gas as saying that "production from presently proved domestic (natural gas) reserves will be short in covering usage by 15% in 1975 and 30% in 1980. These shortages, unless corrected, will result in a curtailment of service to industry customers by 25% in 1975 and 57% in 1980, 'with accompanying massive unemployment.'"

The American Gas Association places the national shortage -- the supply-demand gap -- at 15 trillion cu. ft. in 1985. Compare this to our use of natural gas, this year, of 23 trillion cu. ft.

We haven't found as much gas as we have used in any single year since 1967, and the supply-demand gap grows greater each year; so even though gas may be more "efficient" than shale oil, the problem is that we do not have enough to go around.

The same problem applies to conventional oil, which is probably the next most efficient energy source.

The Oil & Gas Journal's November 11 edition reported that "new crude reserves added by exploration in 1958 were estimated at nearly 3.7 billion bbls, but by 1973 this had dropped to about 2.2 billion bbls. The drain on petroleum reserves was enormous. Liquids production increased from 7.9 million b/d in 1959 to 10.9 million b/d in 1973; but petroleum demand was still not satisfied. It jumped from 9.75 million b/d to 17.5 million b/d. To close the gap, the Nation's imports increased from 1.8 million b/d in 1959 to 8.2 million b/d in 1973. This figure, imports represented about 25% of domestic supply."

The National Petroleum Council, in analyzing future production stated, "Conventional domestic liquids production is expected to reverse its recent decline and grow at an average annual rate of 1.3% hitting 13.2 million b/d by 1985 and 13.9 million b/d in 1990."

But by 1985 the estimated demand for oil is expected to be around 23 billion b/d and by 1990 nearly 24 billion b/d. So I say to those who are enamored with the "energy balance" argument, "Oil is dandy but it isn't all that handy."

Coal's efficiency ranks below oil and gas but, unlike oil and gas, we have an extraordinarily large amount of it. Of all the energy options open to us, coal has the best opportunity for rapid development and for reducing our dependence on overseas energy supply sources.

When burned directly under boilers, coal is an efficient energy-producing material. But most coals are dirty and, when stack-gas scrubbers devices are used, the efficiency drops rapidly -- if it is, if scrubbers will work, and this hasn't been proven yet.

Converting coal to liquid and gaseous forms also reduces the efficiency below that of shale oil. But commercial coal-conversion plants, like shale-oil plants, have yet to be built and, as a matter of fact, are probably farther in the future than shale-oil plants.

So when the talk is about the efficiency of coal, it is necessary to determine how coal is to be used and if it can be used.

To sum this up, I would say that the discussion on "energy balance" is a good academic discussion, but the only thing it proves is something we already knew. That is, the days of cheap and efficient energy are over and from now on the cost is going to go up, and the efficiency is going down.

Another topic I would like to express some views on is that of "conservation." Certainly the cornerstone of any energy policy must be conservation. Our profligate ways can no longer continue and we should save in every way that is possible. And in contrast to increasing energy supply, this is an option that takes little if any lead time.

Proof that it can contribute is the fact that oil demand in 1974 may decline by as much as 2% from 1973, the first downturn in history. This trend is attributable to physical restraints early in the year and higher prices the rest of the time.

So, conservation is working. But conservation of energy has finite limits, which, if exceeded, have a deleterious effect on the economy and our present standard of living.

If the proponents of conservation are for cutting the fat out, I'm all for them. If, however, the proponents of conservation feel that we can save our way out of our energy problem, then I think they are misguided or have other ideas in mind.

The relationship between energy conservation and energy production is not on an either/or basis. Instead, the implacable requirement facing us is for both.

The truth is, we have no choice; we are bound by the harshest necessity both to conserve energy and to produce it in every way of which we are capable. Energy conservation is not an alternative to energy production, and never will be.

Our position is similar to that of a man who has happily been living it up on his inheritance, until the trustee tells him he's going to be broke in 6 months. It's quite in order for him to save wherever he can, but he'd better get out and go to work, too, or all the saving in the world won't keep him from starving to death when the money runs out.

And now I would like to address some of the environmental concerns that have been raised concerning oil-shale development.

The first one has to do with our ability to revegetate
the spent shale -- that is, the material that is left after the oil-like material has been removed from the shale.

We have been working on this problem since 1965 through a series of studies, from greenhouse to field plots. We have some grass in the original test plots that has survived 6 years -- the last 4 years without any maintenance. This is a native wheat grass.

We have learned much about the process of how to grow and what to grow, including both grasses and shrubs. As would be expected, those plants which grow naturally in some of the more salty native soils are readily adapted to the processed shale, which is almost identical in chemical composition to the native rock with the hydrocarbons removed.

The processed shale, prior to leaching, is quite salty. In order to get a good stand, we must first leach some of the salt from the top foot or so of processed shale. With the addition of fertilizer and water, we quickly get a good growth of vegetation in the first growing season. We are now working to determine how long it will take to build up a soil base which will permanently support an adequate stand of vegetation without maintenance. It appears that this period will be less than 5 years.

We are confident, and have the evidence to show, that we can revegetate the waste material.

Mr. Morton Winston, President of TOSCO, commented to his stockholders at a meeting last June on the reported cancer-causing agents in the spent shale remaining after processing by the TOSCO II process.

I would like to quote from Mr. Winston's statement:

"Recently it was suggested that processed oil shale residues might be cancer-causing agents received extraordinary and frightening publicity. Because of that publicity the Colorado Board of Health held hearings on that question. It emerged that the scare arose because of a report issued by the Denver Research Institute indicating that cancer-causing elements were found in processed shale residues.

"The fact is that such agents are found in the residues, but the concentrations are between 15 and 100 parts per billion.

"To put that fact in perspective, you should know that there are 300 parts per billion of the same agents found in dead oak leaves; 1,000 to 5,000 parts per billion in ordinary coal dust, and 10,000 to 100,000 parts per billion in common road asphalt. Moreover, the average American adult consumes 10 milligrams of those potential cancer-causing substances per year in the fruits and vegetables that he eats. To equal that intake from spent shale it would, for example, be necessary to eat 475 pounds of it per year.

"Dr. William Covode, one of the two physicians on the Colorado State Board of Health, said:

"I can't think of anything that isn't cancer-causing if you eat too much of it or get too close to it, and I deplore that this thing has been thrown out in scare fashion."

Another area that has received wide publicity on why oil shale shouldn't be developed is the amount of water needed, and its availability. Ancillary to this is the effect of salinity on the Colorado River.

Water requirements for an oil-shale plant vary with the degree of upgrading of the oil, but the generally accepted figure is 10 to 12 cubic feet per second (CFS) for a 50,000 bbl/day plant, or about 8,000 acre feet (a.f.)/year.

The population generated by such a plant would be about 6,000 people, which would require around 2 cfs or 1,400 a.f./year.

Power requirements for the plant are about 100 megawatts, and the estimated additional water needed to generate this power would be approximately 2 cfs.

(As a matter of interest, a 50,000 bbl. per day oil-shale plant could produce, as a by-product, enough coke to generate the needed power.)

To get back to the water requirements, the average flow of the Colorado River past Colony's plant site is about 3,500 cfs. Our plant would take only about 3/10 of one percent of that flow.

As has been pointed out many times, the availability of water could well limit the size of an oil-shale industry, but studies indicate that there is adequate water available for a good sized industry.

The report on "water for energy in the Upper Colorado River Basin" by the Department of the Interior gives a range of 6.3 -- 5.8 million a.f./year of water available to the upper states. Using the more conservative estimate, Colorado's share would be 3 million a.f. Reducing this by current depletions of 2.1 million a.f. leaves about 852,000 a.f. for future development, of which a significant portion is available for oil shale.

Mr. Felix L. Sparks, Director of the Colorado Water Conservation Board, in a speech at the Colorado School of Mines' 7th Oil Shale Symposium, stated that 50,000 a.f./year is available from Green Mountain Reservoir and possibly 70,000 a.f. from Ruedi Reservoir.

Colony proposes to use water from Green Mountain for its plant, and currently has a contract pending with the Bureau of Reclamation awaiting completion of our Environmental Impact Statement.

There are other Bureau of Reclamation projects such as West Divide and Yellow Jacket in the planning stage, as well as Colorado River Water Conservation District projects and private filings.

In the area of pollution control, our plans are to have a "no discharge" operation which will require that our water usage be totally consumptive. The only water escaping will be that which evaporates from the cooling towers.

All of the water from the process will be used in moistening the processed shale. Since the water remains in place in the compacted processed shale and does not infiltrate through the pile, the processed shale pile will serve as a ready-made water disposal area.

To prevent downstream contamination from surface runoff from the disposal pile, catchment dams will be built downstream of the disposal area. Also, the shale will be placed at the head of upland valleys, thereby eliminating the problem of streams running across the pile.

Water collected in the catchment dams will be pumped to the plant and used for moistening the processed shale.

I think it is obvious that the impact of a single plant on the flow of the Colorado River System will be negligible.
The degree of the impact of an industry will vary in relation to the size of the industry, and the size of the industry will probably depend on national energy policy.

Improved irrigation practices, resulting in the reduction of nonproductive use of water, could provide much of the water needed for oil shale without taking agricultural lands out of service.

The impact of oil shale on salinity has been the subject of much discussion.

Appendix 12 of Colony’s Environmental Impact Analysis includes the results of a study on this subject by Professor Gaylor Skogereboe, of Colorado State University. In that report, he states that the effect of Colony’s plant on the salinity of the Colorado River would be an increase of 1/50 of one percent or 0.12 mg/l at Hoover Dam as compared to the present salinity of 730 mg/l.

Professor Skogereboe’s report describes several alternatives for decreasing the salinity, as follow:

1. Desalination of mineralized springs which contribute salt to the river.
2. Improved irrigation practices to reduce excessive water use and return flows which carry salt to the river.
3. Lining of irrigation canals with an impermeable material to reduce losses and return flows.
4. Utilization of water having a salinity greater than 730 mg/l, to satisfy part of the oil shale water needs.
5. Removal from service of some marginal irrigated lands.

The Department of the Interior report also discusses these measures, and points out that some of the projects have been authorized by Congress. It states that implementation of the Grand Valley Project alone would remove 200,000 tons of salt per year from the river, with a resultant effect of decreasing the salinity of 19 mg/l at Imperial Dam.

This compares to an increase of 0.12 mg/l from a single plant, or 1.2 mg/l from 10 such plants.

According to Skogereboe, lining of approximately 10 miles of irrigation canal would mitigate any salinity detriments at Hoover Dam resulting from 10 cfs diversion for one oil-shale plant.

There are many more concerns, but I hope I have made my point — and that is, oil-shale development has been about the most research subject you can imagine. If there are any particular concerns that are bothering AIPG members I will be glad to discuss them with you, refer you to one of our scientists or engineers, or you can consult a copy of our voluminous and detailed Environmental Impact Analyses. If we don’t have a good answer for you, we’ll get it.

What I have said to you today concerning the decision to delay start of construction applies only to the Colony project.

As you know, the same participants that comprise the Colony group were also the successful bidders on the Colorado B tract in the Federal Prototype Leasing Program. The work on the C-tract is going ahead at an ever-accelerating rate.

And if this doesn't say something about the faith of the participating companies in oil shale, I don't know what I can add. But if it is necessary to reassure you, I will repeat what I said earlier:

"Shale oils as a supplement or substitute to conventional energy supply is an option that must be elevated beyond the 'topic of conversation' level. It is no longer a matter of which energy source we should use; it is a matter of obtaining energy from whatever source we can get it -- and to get all we can -- fast."

And we are ready to get it, given half a chance.
GUIDELINES FOR PREPARATION OF REPORTS OF AIPG COMMITTEES

Allen F. Agnew

Introduction

The work of an AIPG Committee has little value to AIPG members if it remains in the correspondence files or in the minds of the committee members. Thus, committee reports provide a historical record and alert us about forthcoming issues and actions. To assure effectiveness, reports must be not only accurate and complete but also clearly and simply written so that they will be read. They should emphasize service to the geologic profession and thus emphasize professional issues of concern to AIPG members.

The chairman should review and evaluate the results of his committee's activities and decide which are worth reporting. He should transmit two copies of the report—one to the President and one to the Executive Director. If the chairman feels that no formal report is called for, a letter report (with a copy to the Executive Director) should suffice.

Each Committee report will be acted upon by the Executive Committee in one of a number of appropriate ways, including (1) acceptance by the Ex Com, (2) action to be taken by the Ex Com, (3) referral to the membership for action. In addition all Committee reports, with appropriate editing, will be published in the Proceedings issue of The Professional Geologist.

Elements

The report should contain at least the following:

1. A brief statement of the charge to the committee by the AIPG Executive Committee (for standing committees) or the AIPG President (for ad hoc committees).

2. Highlights of committee activities during the year, including actions taken or recommended to the Executive Committee or the membership.

3. Recommended activities for the committee in the ensuing year.

4. Enlarged discussion of selected specific items noted under No. 2.

5. List of all activities during the year, including issues discussed at each meeting or by correspondence.

Deadline

Because committee reports may constitute an important element of the agenda for the meetings of the Executive Committee and the Advisory Board, they must be in the hands of the Executive Director one full week ahead of the Annual meeting date, to allow time for duplication of pertinent parts as needed.

Summary

Each chairman must submit a report of the committee activities to the AIPG President, one week before the annual meeting. The report must be informative, clear, and should stress service.
COURSES IN HISTORY OF GEOLOGY?
Behrnegrell W. Brown
Hattiesburg, Mississippi

Geology is the only "professional" discipline which
seems to ignore its own history as if it were the invention of
some bright kid in 1975. In the legal profession the law is
mostly made up of the history of law, or "precedent". In medi-
cine only a quack would not recognize the caduceus of Hermes.
But how many geologists are there who could take pride in such
facts of professional history as these:

1. The poet Goethite (geohite) was a mineralogist
also.

2. The chemist Bunsen (the Bunsen burner) did geo-
logic work in Iceland.

3. Charles Lyell, geologist, abandoned law practice
to become the first professional geologist (he
made a living at it).

4. Celsius (the thermometer) was the first to quan-
tify isostasy.

Let us not insult our forebears by asking what we can do
to promote professionalism in geology. Ours is a profession
that knew more professional pride a century ago! Geologists
were knighted (T. S. Hunt). Geology was so popular with the
public that Charles Lyell lectured thousands in Boston (most
of the town turned out!)

Professionalism is mostly appreciating our origin and
development. Now where could we find a course in the history
of geology?

PROFESSIONAL PARAGRAPHS

Dr. Douglas G. Patchen has been selected as the re-
cipient of the first annual "West Virginia Section of the Ameri-
can Institute of Professional Geologists Best Paper Award" for
the most outstanding paper presented in the Geology and Min-
ing Section of the 55th annual meeting of the West Virginia
Academy of Science held recently at Marshall University. Dr.
Patchen is a Petroleum Geologist and Head of the Oil and Gas
Section of the Morgantown-based West Virginia Geological and
Economic Survey.

The official presentation of the award for Dr. Patchen's
title "Depositional Environments of the Oswego Sand-
stone (Upper Ordovician), Oswego County, New York" will be
made at the annual meeting of the Academy to be held at Beth-
any College near Wheeling next year.

Announcing the winner of the award, Larry D. Woodfork,
President of the State AIPG Section, commented, "One of the
functions of our professional organization is to promote the
science of geology. Dr. Patchen's research typifies the high
caliber of scholarship in the geosciences that our award is
intended to encourage and publically acknowledge. A vigor-
ous program of geologic research is of vital importance to the
State's vast extractive energy and mineral industries whose
gross total value of raw products exceeded $2.4 billion in 1974."