

affiliations with other closely related specialties it was also necessary to define professional engineers and association active members and to point out the similarities in their academic and professional backgrounds, codes of ethics and modes of procedures.

An abbreviated summary of the principal conclusions arrived at in the study is that:

1. Some A.A.P.G. members neither require nor desire certification, whereas others both desire and require it in order to carry out their work successfully.

2. Certification of many scientific specialties (and registration as required) has been proven to be beneficial both to the specialists concerned and to the public.

3. The established practice of registering engineers, many of whom are more closely related to certain geological specialties than they are to other engineering specialties, places geologists at a competitive disadvantage.

4. Problems of non-uniformity in academic and other aspects of professional standards from state to state, or from one area to another, will to some extent be corrected for petroleum geologists, on a worldwide basis, through the certification of A.A.P.G. members.

5. A.A.P.G. should not represent itself as being the only means for certification of petroleum geologists qualified for registration. The Association does, however, possess the natural facilities for greatly simplifying the procedure on a very effective and practical basis. No other organization on earth can speak for the professional integrity and qualifications of petroleum geologists on an authoritative basis.

6. Although it is recognized that many petroleum geologists require to be registered, registration by A.A.P.G. of its own members is neither desirable nor feasible. It is, however, hoped that some of the problems of certification and/or liaison with local registration bodies can be assumed by affiliated geological societies.

In keeping the conclusions arrived at the Executive Committee recommended that the Business Committee propose an amendment to the Constitution that would in effect empower the Association to certify to its own members, on a purely voluntary basis.

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Subsequent to the publication of this paper, at the Annual Association Business Meeting, held in May 1964, the proposed amendment was passed and subsequently approved in a vote of the membership, by a substantial majority.

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"Mineral Diversification in the Oil Industry"

It appears inevitable that in the future the oil industry will be faced with some of the largest mining projects ever conceived if it is to maintain its position in the energy field. It will take organization and planning to meet the new era of fuel development ahead. Development of tar sands, oil shales, offshore mineral deposits and many other large natural resources in this country and throughout the world offers an inviting opportunity for oil companies to expand their operations into new investment fields.

One fundamental precept in the industry is that investments in natural resources must continue if the industry is to prosper. The potential for growth in the petroleum business still exists, of course, but the industry is faced with a number of problems, as you well know. These problems add to the pressures of management in their planning for survival.

No doubt, these problems are now influencing, to a considerable extent, some of the current trends in the industry. After experiencing periods of excess capacity and saturated market, the oil companies have directed efforts to develop new outlets or new products. Some U.S. operators have taken advantage of certain tax benefits in minor diversification skirmishes. Others, operating in underdeveloped countries, have been motivated by the deep desire to encourage needed basic industries as a partner in the development and economic stabilization of the country involved.

Of course, there are also the conventional business desires for merger and diversification to achieve an evening-out of the extreme fluctuations of traditional business, for better use of unused research, engineering, production and marketing skills, or to capitalize on certain operating advantages.

While most activities on the part of the oil companies may be considered as directed toward vertical integration, the point is that the oil companies who have been investigating raw materials throughout their history are now playing around the fringes of the mining industry fields—fossil fuels—and even metals.

There are many reasons why mining offers a natural attraction for oil companies. The necessary qualifications, technical talents, and managerial skills available in the oil industry and applicable in mining are as follows:

1. Exploration staff—wide experience.
2. Broad experience in natural resource developments and financing.

3. Broad research involving natural resource products, and unexploited research accomplishments.
4. Broad experience in dealing with governments.
5. Highly diversified staff.
6. Experience in joint ventures.
7. Strong financial position and capacity to commit funds.
8. Experience in offshore development.
9. Broad knowledge in basic industries.
10. Management with the proper temperament, interest in business of natural resource development, and competence in organization.

A warning is justified as regards diversification into the mining field whether it be a large company or a small one. One can't go into the game half-heartedly, and a company can't play the game without adjusting its thinking and its staffing so as to follow the rules of the game.

In support of this contention, we may mention the experience of the mining companies in the oil and gas business. Overall, their experience cannot be described as wholly successful. In many cases mining companies entered the oil and gas business as a hedge against greatly fluctuating prices, particularly if they were in a one-metal industry like lead, zinc or copper. The gas divisions of the mining companies were never given the serious attention that the main mining business received.

It is interesting to note that many oil companies have been very much concerned about the future place of nuclear fuels. Considerable thought, numerous investigations and economic studies have been devoted to this subject over the past few years. It appears that the wholesale use of tar sands and oil shales should be given consideration ahead of competitive aspects of the nuclear energy field. The reasons are:

1. The relative magnitude of the reserves
2. The "within reasonable reach" of costs
3. The ease of application of products to markets
4. The greater social benefits to local areas, and
5. The more favorable, or less hazardous conditions for introducing a local industry

Timing is extremely important in business, as everyone knows, and in this matter of diversification, it is a key factor. Many oil companies have been waiting until the time is ripe. Personally, I believe that the time is running out. The necessary preparation for a well-organized oil company to get into mining will take time. It is therefore my

opinion that these companies should go into some of the smaller mining type operations first. This will give them experience and help them to develop a capable mining staff.

Technical developments involving better mining equipment have also improved the outlook for mining, loading and handling large tonnages in underground operations where proper physical conditions exist. Here again, improvements have been made in rock control methods. Pilot mines have been responsible for developing first-hand information on shale mining as well as tar sand mining. A great deal of research has also been directed toward improving methods of extraction of the fuel elements. Considerable success has been achieved in the case of tar sands involving these new processing methods.

How well equipped are the oil companies for carrying on this preparation and planning? They are well staffed with fine research people. They are intelligent and have talent that an ordinary mining company may possibly attain. But they don't have the whole book of talents. In mining there are many unknowns and non-measurable factors requiring more judgment than likely to be the case of most other industries. There are new problems, and new processes are being dealt with.

Discussions in recent technical papers have called attention to potential offshore mineral resources. Of course, the oil companies are now involved with full-fledged offshore oil production. However, offshore development of minerals is not new to the mining industry. For many years cement materials and tin materials have been dredged offshore. More recently sulfur production and diamond production have been added to the list. There is every reason to expect new offshore projects in the future. Not only are there potential mineral deposits indicated, but conditions are continuously moving in the direction to make such deposits tempting projects for the future.

If oil companies are going offshore for oil, it is logical that they should consider going off shore for minerals, because each company gains a lot of experience in offshore work that can be valuable in other areas. As a matter of fact, many important mineral deposits, such as sulfur, potash, and uranium have been found by the oil companies.

The oil companies have not been taking advantage of these opportunities to any great extent heretofore because they have been able to expand within themselves, either vertically or horizontally. They have also been able to expand overseas. Now, however, the picture is changing and they are reaching the point of diminishing returns, at least in many areas.

Right here in the U.S. offshore deposits are definite possibilities for the future. Gravel, sand, cement materials, manganese and phosphate are definitely offshore work. There are also on shore opportunities too.

The tar sand and oil shale business must be initiated in the near future. Of course, an intelligent group must approach Congress and the states involved to obtain a reasonable tax on such ventures, but I am confident that our government will see the wisdom of such proposals and will take the necessary steps to provide the incentive for the development.

When you look at the picture and consider the fact that every year we are importing more and more things that only a few years back we never thought we'd bring in from other countries; we must recognize that we have a serious situation within the confines of our own boundaries. There are projects of great magnitude here in this country that have to be tackled and solved. What we must recognize, however, is that the potential exists. It is a matter of timing and techniques and economics. For example, there is one thing in particular that, in my opinion, could bring into being narrow profit margin projects and convert them to reasonable investment opportunities. This would be a proper point of application of the depletion allowance.

It is not a difficult matter for an oil company to diversify into the mining business. The necessary qualifications are already on hand. What is needed is careful investigation, thorough long-range planning, and research.

There are many likely answers to why some companies succeed and others fail. However, it must be said that the increasing complexities and magnitude of research for analyzing ventures make it difficult for a small independent concern with its limited staff to keep abreast of its need to replenish its reserves.

The most successful investments have resulted from seemingly "tailor-made" situations which actually came about after careful investigation and analysis of the facts. The results appear to be unbelievably easy, but planning in great depth was the underlying reason for success.

Technology is also an extremely important matter which must be considered in diversification planning. The size of modern equipment no longer appears to be an obstacle in future mining projects. Remote control devices, materials handling innovations—such as are used in the oil industry and the atomic energy industry—and other specialties, have been continually improved. New treatment processes have been developed, such as for the treatment of tar sands, and the result of this change in ingenuity of

equipment adaptation is that narrow-margin operations have become profitable ventures. It is not always necessary to depend upon an increase in demand to turn the scales in favor of a venture, as other conditions, due to technological changes, might be the key factors.

Long-term research projects are not new to the oil business. I, therefore, suggest that the companies in the petroleum industry adopt basic research for the big mining projects of the future. These steps must be undertaken, however, as soon as possible. Ten to fifteen years is not too much time for research, study, testing, developing, construction and operating phases for some of the large projects of the future to reach the actual production and profit stage.

Oil companies should first adopt a well-defined company policy and organize a study group to steer the program. The members of this group should have a broad background in basic industry, particularly in the mineral industry. Their task will be to review projects, analyze a mass of information to keep up with impending changes, and to select mineral projects that offer earning potential in the not-to-distant future.

There are large new mineral projects looming in the future that will require large capital investments. They will also require a combination of the best available skills and know-how. The oil industry is in an excellent position to meet this challenge and to assure its own expansion for the future.



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#### "Gas Occurrences in the Paleozoic Rocks of Western Alberta"

One-third of Canada's known natural gas resources, or 13.5 trillion cubic feet of indicated gas reserves, are contained in Paleozoic rocks of the Alberta Plains. The constant growth of Alberta's proved reserves since 1947 has encouraged the gas industry to seek extensive markets on the North American continent.

The Paleozoic rocks are predominantly shelf carbonates, limy marine shales and evaporates. These sediments are located on the eastern flank of the Alberta syncline and dip southwestward at an average of 40 feet per mile. They form a wedge which is over 5000 feet thick near the Rocky Mountain foothills and thin to the outcrop in the northeastern corner of the province. Emergence of the Alberta Plains between the end of Cambrian and Middle Devonian