

The planning of this vast program is now nearing completion; the execution of the program and the analysis of the ensuing data will involve scientists from institutions throughout the country. The IGY will afford unprecedented opportunities for participation and achievement by scientists and their institutions and should constitute the greatest peace-time stimulus yet to geophysics.

As comprehensive and far-flung as the U. S. program is, it is only part of the international effort. It may well be that the "large view," so typical in astronomy and global geophysics, attendant on the mutual and fruitful cooperation of most of the world in the IGY, will eventually give the IGY a value far transcending the gathering of data and the observation of physical processes.

CHARLES F. PARK, JR., dean of the School of Mineral Sciences, Stanford University, California
Training of Geologists

How can geology attract and train the best high-school graduates? The competition for potential leaders in science is keener than ever. Geology obtains a small part of the good science students, but needs to be better known in high schools.

High-school and undergraduate college training should enable a student to assume a responsible place as a citizen. Ideally he should have breadth of training, he should write well, and he should have a core of solid knowledge upon which to build in future years. Four years are insufficient for adequate training of a geologist for independent work. At least a fifth year of concentrated study in his specialty is necessary. For research and teaching the student needs to obtain a doctorate degree. Geology, more so than the exact sciences and engineering, requires careful weighing of sometimes tenuous evidence. Small classes and close contact with experienced men are recommended.

Successful geologists must be enthusiastic about their science, and their moral integrity must be unquestioned. They must also have ideas and imagination, and possess the courage and drive to implement these ideas.

Industry is becoming increasingly aware of the need to support higher education. Many ways of extending such help exist.

J. P. ROCKFELLOW, manager of employment, Union Oil Company of California
Jobs and Geologists

A planned and well organized recruitment program is essential to a company requiring technically trained college graduates in the present era of scarcity. Not only must the job seek the man, but the recruiter must schedule his interviews in compliance with college routines as varied as the colleges themselves.

In general, the recruiting program must know its company's manpower needs; where people with the essential training are likely to be found; how and when to conduct interviews; and how to successfully conclude an offer.

The technical recruit is examined as to his scholastic progress, intelligence, mental alertness, physical fitness, social likes and dislikes, initiative, experience, and general character traits. The geological recruit, in addition, is classified as to the depth of his geological interest and his potential development.

The employing of a recruit is only the beginning. It must be followed by proper introduction to the company; a broad introductory training schedule; wise supervision; and the affording of opportunities that will utilize the recruit's knowledge and holds his interest.

The field of petroleum geology, like most other fields of endeavor, is crowded at the bottom with students who hold "degrees" but begging at the top for men who can find oil.

WALLACE E. PRATT, past vice-president, Standard Oil Company (New Jersey)
Geologist's Long-Term Forecast of Petroleum Supply and Demand

The petroleum—oil and natural gas—have been called upon during the past 20 years to assume a constantly increasing share of the burden of supplying the energy demand of this country. Over the same period this total demand has doubled. At present the petroleum furnish two-thirds of all the energy consumed in the United States. Twenty years hence, in 1975, the petroleum industry expects demand for these fuels still to amount to two-thirds of our total energy requirements. These figures mean that demand for energy in the form of oil and natural gas has trebled over the last two decades and will double again over the next two. In the rest of the Free World the situation is similar, but even more aggravated.

Throughout the history of the petroleum industry, a period now almost a century long, this country and its government have manifested recurrent anxiety as to the adequacy of our petroleum resource. This anxiety prevails widely again to-day in the face of an imminent future demand of unprecedented proportions. Some of the most esteemed, best informed students of the petroleum industry have recently concluded, independently of each other, that the all-time peak of petroleum production in the United States will have been attained within the next 10 years. In the face of these predictions how can the industry hope to meet a multiplying demand over the next 20 years?

This paper attempts to present evidence that justifies the confidence of the industry that it will be able to meet the anticipated demand. Certain current trends are emphasized as significant: (1) the historic record of exploration and discovery in the industry which has consistently mounted in proportion to increased demand; (2) the historic record that expert opinion has persistently underestimated the volume of the undiscovered petroleum resource; (3) the prospects for future recovery of oil excluded from present estimates of proved and potential reserves as commercially unrecoverable.

A. C. RUBEL, president, Union Oil Company of California
Oil or Alibis

Management believes the sole purpose of its exploration team is to find new oil and gas at a cost less than present realization, in amounts sufficient to replace current production, and provide a reserve for future operations and growth.

To accomplish this objective it is assumed that members of the team are properly prepared by education, experience, and temperament to do the job.

"Tools and equipment" are available in the many aides and services of paleontology, geophysics, electric logging and its related determinations, mud logging, areal surveying, and the resources of our research organizations.

A vast record of past and current technology, theory, and accomplishment within the industry on a global scale is available through the A.A.P.G., other technical societies, and by reference text books on the subjects.

Close contact between exploration and development activities is essential to provide the exploration department with first-hand knowledge of well-drilling techniques and to furnish detailed subsurface data which are often the basis of more regional studies.

Management expects the exploration team to have an economic measure of its operations in order that the contemplated expenditures bear a reasonable relationship to possible returns.

The successful exploration team is the one which can integrate and use the tools and principles to the best advantage in finding oil.

ED J. HAMNER, director in charge of exploration, Humble Oil and Refining Company, Houston, Texas
Explore or Liquidate

An oil company which does not find or acquire new reserves of oil and gas in sufficient quantities to balance the rate of production from old reserves is in sure process of liquidation.

The exploration team including geological, geophysical, and other work, which is the company's best hope for finding new reserves, is usually charged with that direct responsibility. Unfortunately, there is a feeling often expressed in both large and small groups that management in many companies does not show full respect for, or complete understanding of, the exploration team. Management is often charged with being too critical of exploration when a wildcat proves dry. Exploration charges that management often refuses to consider or acquire good prospects when they are conceived by the geologist or geophysicist without giving proper reasons for such rejections. These and other things cause a feeling of frustration to arise in exploration whose morale becomes seriously injured, even to the point where resulting discouraged efforts seriously impair its full value to the company. The feelings on the part of management and exploration toward each other are discussed in some detail. It is pointed out that perhaps neither management nor exploration understands the other well enough to perform its respective offices properly.

Growing exploration alumni lists of many companies testify eloquently to these facts. This discussion concludes that both exploration and management should educate themselves to the degree that they will be able to understand the other's perspective and his real desire to contribute to the growth and prosperity of his company. A high degree of cooperation and coordination of management and exploration relations will surely result in a much longer life for the industry and will put off for a long time the day when liquidation may begin.

GRAHAM B. MOODY, petroleum consultant, Berkeley, California
Economics of Exploration

The major function of exploration is to find sufficient oil (this term includes natural gas and associated liquids) to meet the continually increasing peace-time needs of the free world and to build up surplus productive capacity which will be available in case of war. This means that, over a period of years, additions to oil reserves must be greater than production if we expect supply to continue meeting demand.

It is evident that economic exploration must find oil at a cost which, when added to development and producing costs, gives a total per barrel cost less than the posted price for the crude. If it fails to do this it will cease to be a vital phase of the oil industry. Exploratory costs (total, per-barrel-discovered and per-barrel-produced) have been on the upgrade for a number of years; the trend is still up. Some published figures suggest that exploration is becoming a non-economic endeavor. This