



An Atmosphere of Encouragement

At the Distinguished Scholarship Banquet of the Petroleum and Geological Engineers Club, students hear a prominent alumnus and oil company president cite the scope and challenges of today's vital oil industry

By J. E. HESTON

J. E. Heston (left) is a 1931 graduate of the University and president of Cities Service Oil Company of Tulsa.

Tonight I direct my words particularly to the budding geological and petroleum engineers among you. You are members of a group important to me, to my industry and to an economy and a society dependent for its continuance upon the technologies with which you have chosen to grapple.

Some of you, at least, chose your future careers because of encouragement you received from the University and from people in the petroleum business. Hopefully, that atmosphere of encouragement will stimulate your ambition, your determination and your intellectual reach. Since I know you have plenty of time—apart from your engineering and technical studies—to browse through literature, I'm sure you will recall that Thomas Macauley, in his essay, "On the Athenian Orators," suggested that the reason they were the greatest the world has seen was that in Athens, "oratory received such encouragement as it has never since obtained." Macauley went on to comment that "genius is subject to the same laws which regulate the production of cotton and molasses. The supply adjusts itself to the demand. The quantity may be diminished by restriction and multiplied by bounties."

Now, I suspect that the creation of genius demands more than wishful thinking. But I don't doubt for a moment that an atmosphere of encouragement has much to do with channeling talent into areas of immediate interest. So it is, for example, that in recent years we have heard wistful voices proclaiming that oil and gas have "lost their glamour" and that the aura of excitement and challenge which once enveloped our industry has left us to swirl frivolously about the exotic frontiers of the atom, of electronics, of space. These great new frontiers are inviting and important. These disciplines burst upon us with the suddenness of a summer storm. They have swamped the pages of our daily press, filled our periodicals, flashed dramatically across our television screens. They have captured the public fancy. They are today favorite topics of conversation among all of us. Thus has been created an atmosphere of encouragement that certainly, and understandably, seizes the imagination of many of our good, young minds and lures them—as man has always been lured—down paths that promise the breathtaking vistas of the unexplored.

But let me remind you: The new, interposing itself between the familiar and the eye of the beholder, obscures the reality behind the eclipsing body. The unopened doors in our own petroleum industry offer challenges and rewards that carry an even greater immediate importance to our civilization. For instance, without any intention to disparage our thrusts into space, I suggest that if we announced the abandonment of our moon program because of technical problems, it would occasion but a fraction of public concern that would arise if we announced our service stations would be closed, even briefly, because of a shortage of gasoline. The latter announcement would hit every American truck and automobile squarely in its gas tank. Try, sometime, to visualize what it would be like. We found in World War II that we couldn't even successfully curb the voracious public appetite for gasoline.

And the consternation resulting from a national gasoline shortage would be intensified because of a simple fact,

one so obvious that it rarely comes to mind: The American public has been conditioned to believe it simply can't happen here. For a century, the American oil industry has met shifting, ballooning demand so adroitly, so efficiently, with such apparent ease that today it is an absolute necessity, but taken completely for granted by 190 million people.

Don't misunderstand. I think that's the way it must be. A hundred, perhaps even 50, years ago it could not have been said that adequate and continuing oil production was a "must" for America. Had there been no Colonel Drake, no discoveries of ways and means to find, produce and process petroleum, man's needs and his ingenuity would have joined to prod him to find and put to use other sources of the energy he must have if his civilization is to flower. An oil scientist recently remarked that "If man's ingenuity through the years had been directed to the utilization of solar energy instead of to the development of devices to consume fossil fuels, it is quite conceivable that we might today have a solar economy just as effective and efficient as our present fossil fuel economy."

Doubtless that is true. But the point here is that there *was* a Colonel Drake, supplies of oil and gas *were* made available, so abundantly that today they are sources of about 75 percent of all the energy consumed in the United States.

Colonel Drake's well, opening the way to the smooth, steady development of oil and gas production, sparked an inventive explosion that showered our economy with work-performing devices geared to oil and gas consumption.

Today we speculate on and experiment with alternate sources of energy; and inevitably, of course, they will be called upon to meet man's expanding needs. One day he will harness the sun, develop more ways to use atomic fission and fusion, perhaps draw power from the spin of the earth itself, or identify and yoke some source of energy not yet discovered or even dreamed of. But do not interpret that statement as the text of a requiem for oil. The challenges and the promises that led men of my generation to elect careers in petroleum have not been diminished. For your generation, they have been increased.

If current rates of petroleum consumption—in the range of 11 million barrels a day in the United States—seem to be staggering to the imagination, the experts who make our forecasts tell us they are modest compared to the expected needs of the future. As for oil, it is predicted by the United States Department of the Interior that by 1980—just 15 years away—demand for liquid petroleum in this country will reach 17 and a half million barrels a day. That is an increase of some 65 percent over today's rates. For natural gas, the demand is expected to rise from the current 16.7 trillion cubic feet per year to 21 trillion in only 10 years. World-wide the growth is expected to be even more spectacular.

Today, about 85 percent of petroleum's finished products are gasoline and other liquid fuels. Practically all authorities agree that the internal combustion engine—with changes and refinements—will remain predominant in transportation for many years to come. They also agree

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Mr. Heston's address has been adapted for use in the Sooner Magazine.

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that liquid fuels will continue to be indispensable because their function cannot be as efficiently served by other forms of energy. Attractive prices and other considerations seem to assure the continuing growth of demand for petroleum fuels for home heating, industrial purposes and many other uses.

But not only is petroleum a source of fuel and power: More than 1,000 products directly or indirectly derived from it are employed in home and industry. Asphalt and lubricating oils have long been commonplace essentials in our economy.

For petrochemicals, the dawn is just breaking. Detergents, synthetic rubber, synthetic fibers, plastics—most of these were not even in existence a few years ago. Today, we are told that petrochemicals account for 35 percent of all chemical production by volume and 70 percent of the value of all chemicals.

What will demand be in this almost unexplored area 15 years from now? That is almost anybody's guess. But looking at the breakthroughs of research in the immediate past, it is safe to say that by 1980 petroleum-based products will be far more widely used throughout our economy than they are today.

To meet this almost insatiable appetite, we will have to produce some 69 billion barrels of oil. And we will have to discover, between now and the end of 1980, some 90 billion barrels of new reserves, either within our country or readily available to it. This is a tremendous challenge, considering that since the Drake well in 1859—more than 100 years ago—cumulative domestic production has been *less* than 90 billion barrels.

Where will we get tomorrow's oil? In 1964 the United States Geological Survey concluded that ultimate reserves in the United States and adjoining continental shelves total some 300 billion barrels, not counting current proved reserves of some 39 billion barrels. The needed reserves are there—in place. Can we find them and produce them?

We have learned lots of tricks over the past 50 years. Today there is probably no industry in the world which uses such a wide variety of technological talents as ours. Geologists, geophysicists, geochemists, chemists, physicists and mathematicians are all engaged in hunting for oil. Chemists, almost all types of engineers, mathematicians, physicists and others are involved in production and, of course, in the refining and petrochemical sides of the business. Even the atomic physicists have been used to develop logging tools and to study the application of nuclear techniques to production and processing.

Yes, we have called in a formidable host of intellects to help reduce the gambling odds against finding oil with a drill bit and to make the stubborn formations yield their hoard. But more than ever we need the fresh approach, the persistent ingenuity. The easy games have all been played.

The element of chance will probably always be present in the oil industry. It is one of the reasons the business is interesting. But luck alone won't suffice, even though we go scientific and call it "the theory of probability." As geologists and geophysicists have studied methods for finding

favorable locations to drill for oil, a tremendous body of literature has been developed and the most sophisticated techniques available to us have been applied.

The fact remains: We still don't hunt for oil; we hunt for rocks, for rock conditions that would be favorable for the accumulation of oil. We do not know how to find oil directly. When we find favorable geological situations, we call in the driller for the moment of truth. A geologist recently told me that even with our present methods, we couldn't find the East Texas oil field today or even get a good advance lead that it was there. We would still have to depend on someone like Dad Joiner and his partner, Lady Luck, to step in and take a chance.

If the challenge still exists for the oil hunter, it is no less demanding in the field of oil production. In the easy days of prolific oil finding, before the days of conservation, when "gushers" were in the headlines and the countryside near a new well was drenched with crude oil, production technology and particularly the science of reservoir behavior was largely ignored. Who knew about it—and, for that matter, who cared? Business was booming, anyway. It was, of course, too good to last. When the plums had been picked, it became necessary to produce oil from the remainder of the reservoirs, and the science of petroleum engineering evolved. But don't think it's a mature science. It remains disconcertingly difficult, particularly the science of reservoir engineering.

We normally leave a lot more oil in the ground in an oil reservoir than is produced by permitting the reservoir to deplete itself. Even more unhappily, we leave about as much oil in the ground as we produce even after all our efforts of water flooding, gas driving or any other secondary recovery methods. And the reservoirs now being discovered are going to be your problem children.

Don't think we aren't trying to get the oil out. Many methods for oil recovery have been developed in laboratories within the past 10 years; miscible flood displacement, fire flooding, thick water, alcohol, to name a few. Uniformly, they were promising in the laboratory, far less so in the reservoirs. But mark this: Someone, some day, is going to find out how to wrest the last of the oil from stubborn sands.

Briefly, then, what I have said summarizes the opportunity and the challenge. If there has been in recent years any diminution in the "atmosphere of encouragement" surrounding the petroleum industry, perhaps we ourselves should take a share of the blame rather than attempting to argue that spectacular newcomers currently in the spotlight have been totally responsible.

This fact is inescapable: Since the beginning of this century our economy has become so intricately geared to hydrocarbons—and particularly to oil and gas—that, barring some totally unforeseen circumstance, it will remain so well beyond the century's close. Our principal concern is to see that petroleum products remain competitive in the marketplace and they will remain competitive as long as fresh minds supply new solutions to our problems. We are counting on our universities for these minds. END