Current industry data suggest that the total initial quantity of crude oil (whether producible or not) accumulated in reservoirs in the United States, excluding Alaska, was of the order of 350–500 billion barrels, and that the initial reserves of natural gas were about 800–1,200 trillion cubic feet. American Petroleum Institute data indicate that since 1925 production of crude oil in the United States has lagged discovery and development by the nearly constant amount of 10–11 years. Discovery is thus a preview of production by approximately this period. The peak of discovery and development of crude oil occurred about 1952–1953, which suggests that the peak of production should occur 10–11 years later. The peak of estimated proved reserves, which should occur about halfway between the peaks of discovery and production, actually was reached late in 1957.

Comparable data for natural gas suggest that the peak of production should not be reached before 1970, or shortly thereafter.

## Conservation of Oil and Gas and Its Relation to Exploration

WILLIAM J. MURRAY, JR., Texas Railroad Commission, Austin

If this nation is to possess the domestic recoverable reserves of petroleum so vital to our future security and progress, improved conservation practices and increased exploratory efforts are essential. These two important phases of petroleum activity, frequently considered independent or competitive, are significantly interrelated.

The considerable progress in petroleum conservation during the last two decades presents an interesting record and one of which the industry can be proud; but, if in the future, the new miscible phase drive and thermal recovery processes are applied where feasible and the conventional but improved gas drive and water flood techniques adopted elsewhere, it would appear that the industry stands on the threshold of the greatest improvement in oil recovery in its entire history. Additionally, the flaring of gas well or casinghead gas can be reduced to an insignificant percentage of the total volume produced.

Such improved conservation can conceivably have negative as well as positive effects on exploration. The negative effects which have been suggested, if they become significant, can be minimized by wise regulation. On the positive side, such improved recovery can make additional funds available for exploration from the petroleum industry itself and attract more outside venture capital.

Experience with the new recovery techniques may convincingly demonstrate that wider spacing than presently practiced can be followed with greater rather than reduced ultimate recovery, thereby offsetting the present trend of rapidly rising development costs. But if this goal is to be attained, development wells must be located with regard to structural position and recovery mechanism involved rather than distance from property lines and offset obligations. Wells should be initially completed in a manner suitable for ultimate secondary recovery operations without redrilling or expensive reworking.

Proof of past economic waste, tolerated by the industry and ignored by some regulatory bodies on the assumption that they are precluded by statute from considering it, is found in many of the modern efficient pressure maintenance operations, wherein up to half of the wells are shut in, either because they are not needed or are improperly located and completed.

Survival of the domestic petroleum industry and preservation of national security require that the exploration-development geologist and the conservation reservoir engineer work together more closely in the future in order to attain maximum efficiency of recovery and minimize such economic waste. In this effort they will require and deserve the support and cooperation of management, landmen, attorneys, land and royalty owners, and legislative and regulatory bodies.