ration). The discovery was drilled in an attempt to extend the prolific production developed in the 1950's in Washington County southwestward into Arapahoe County. As of March 1, 1971, the field had fifty-three wells producing from the Lower Cretaceous "J" sand. Cumulative production was 742,000 barrels of oil. Development drilling is still being conducted.

Production in Peoria is from a Lower Cretaceous Muddy "J" channel sand with a maximum thickness of forty-five feet. Porosities are as high as 19%, with permeabilities ranging as high as 1,400 md.

Relatively shallow drilling depths (top of pay at 6,500 feet), inexpensive drilling costs, and high yield wells exhibited by this field have been the stimulus for extensive drilling activity in the south-central D-J Basin.

*Amoco Production Company, Denver, Colo.

PROJECT RULISON AND OTHER UNDERGROUND NUCLEAR TECHNOLOGY

G. W. FRANK*

December 14, 1970

Austral Oil Company's Project Rulison is the second joint industry-government sponsored gas stimulation experiment in the United States using a nuclear explosive, and was made possible under the provisions of the United States Atomic Energy's Plowshare Program.

Project Rulison, detonated September 10, 1969, was designed to evaluate the potential of developing the 2500'-3000' thick gas bearing Mesaverde formation in the Rulison Field, Garfield County, Colorado, using nuclear explosives.

The 40-kiloton explosive was emplaced and fired at a depth of 8426' inside 10-¾" casing on a .72" diameter multiconductor armored cable. The detonation created a chimney in the order of 300-350' high and 75' in radius.

The project was accomplished in complete safety without harm to any person. Gaseous radiation concentrations were approximately ¼ of that originally predicted and have radically declined during the early testing.

It is presently apparent that nuclear explosives can be developed which will have in the order of 1/10th the Rulison residual tritium, the main gaseous radionuclide of concern.

Although technical feasibility has been proven, economic feasibility has not yet been proven. It appears, however, that the use of multiple explosives fired simultaneously in the same wellbore will expose the massive sand thickness to a single elongated chimney and consequently greatly increase the flow rate.

At this point many of the major technological problems have been solved and the remaining ones will surely be solved in the near future. If this technology is successful it could be extremely helpful in meeting our increasing energy requirements.

*Austral Oil Company, Inc., Houston, Texas

PETROLEUM EXPLORATION

DR. WILLIAM C. GUSSOW*

November 9, 1970

Recent studies in petroleum exploration have been concerned with the application of reservoir and production engineering to the problems of migration and accumulation of gas and oil underground. The law of gravity explains the distribution of gas, oil, and water in a reservoir, but the principle of differential entrapment explains why many good traps are dry while adjacent structures are prolific oil fields. This simple principle explains why some traps are gas fields and contain no oil and why gas is trapped downdip in some areas while synclinal oil occurs in others. In reality, the principle of differential entrapment carries the structural theory to its logical conclusion. Whenever two or more fluids of different gravities accumulate in a trap, the heavier fluid is displaced. This is a fundamental law and is the basis of differential entrapment. Every oil accumulation owes its origin to the fact that a lighter fluid (oil) displaces a heavier fluid (water). Without differential entrapment, there would be no oil fields.

*Union Oil Company, La Brea, California