9. JOHN S. RUNGE, Petroleum geologist, Casper, Wyoming

EXPLORATION FOR OIL AND GAS IN WYOMING, 1964–1965

In the past 12 months significant new discoveries of oil and gas have been completed in the Powder River, Wind River, and Washakie basins. The eastern Powder River basin continues to lead the State in the number of new discoveries. However, remote discoveries of Minnelusa oil in the center of the Powder River basin, gas in deeper portions of the Wind River basin, and gas in several areas along the rim of the Washakie basin have provided new exploration frontiers. Thermal stimulation as a completion technique for exploratory wells also has provided a new exploration frontier.

Deeper drilling in the center of the Powder River basin found oil in the Minnelusa in a structural trap and caused the largest land play that the State has had in several years. Multi-pay gas discoveries in the deeper portion of the Wind River basin, combined with new gas outlets, have provided new exploration incentive for this area. Three gas discoveries along the rim of the Washakie basin have stimulated interest in the exploration potential of this sparsely drilled area.

Thermal stimulation as a completion technique in previously unproductive areas has attracted large lease-hold investments in several basins. Pilot projects which were underway during the past 12 months have met with mixed results, several appearing to be successful whereas others appear to be in question. The coming year is expected to reveal additional data concerning the parameters for successful thermal-stimulation projects.

A review of exploratory statistics of the past 20 years reveals that Wyoming has been on an exploratory success-ratio plateau for the last 10 years with an average of 12.6 per cent of all exploratory wells completed as producers. The stratigraphic and combination type traps discovered during this period are 60–70 per cent of the total; structural traps are in the minority. This ratio in classification of new discoveries is expected to continue in the near future.

The decline in leaseholds on Federal and Indian lands of 25 per cent during the last 5 years indicates the change from "protection leaseholds" to "drillable leaseholds." The result is the increasing availability of leases at lower prices and the upgrading of exploratory prospects. This is expected to have a favorable effect on the success ratio of exploratory wells.

Wyoming's stable growth in production and reserves of petroleum and the rapid cash flow from unrestricted production combine to make a favorable climate for exploration investment. The increasing diversity in exploration techniques and the numerous areas available for exploration are expected to challenge every geologist working in Wyoming.

10. KYE TROUT, Petroleum engineer and geologist, Bismarck, North Dakota

EXPLORATION AND DEVELOPMENT HIGH-LIGHTS IN NORTH DAKOTA, 1964–1965

The year 1964 was one of renewed activity and interest in North Dakota oil exploration and development with highly significant increases in both wildcatting and development drilling. Indications are that this trend is continuing into 1965, with activity levels the highest since 1958.

At the beginning of 1965, North Dakota official figures showed 2,065 oil wells and 28 gas wells producing from 103 oil pools and two gas fields.

A new center of drilling interest continues in Billings County with development of dual-completion wells from productive Tyler (Pennsylvanian) and Madison (Mississippian) zones. Deeper exploration for Devonian objectives is underway in McKenzie County, spurred by good wells with attractive economic considerations.

In the shallower north-central North Dakota areas, exploration and development of numerous stratigraphic sequences in Mississippian sections encourage continuing efforts in the vicinity of prolific producing areas. Sherwood field (Madison-Mississippian) has undergone its third significant re-definition and extension development since discovery in 1957. Other discoveries from the same zone have been made, and the hunt for other stratigraphic fields in the Mission Canyon remains a prime factor in North Dakota exploration. Attractive wells in the City of Mohall and Mouse River Park fields have been developed.

Several major lease acquisition programs reminiscent of earlier North Dakota Williston basin days were conducted in Golden Valley, Morton, Grant, Stark, and Sioux Counties, notably by Amerada and Pure, indicating extension of exploratory interest into untested areas. An awakening of renewed exploratory interest in some of North Dakota's "east-side" counties is under way.

A prime factor in North Dakota's oil picture has been, and is, the enlightened and favorable regulatory environment. Adequate markets and transportation facilities, with reasonably good crude oil prices, prevail and make North Dakota competitive with other oil- and gas-producing areas. Dual-completion prospects, moderate lease prices, sensible well spacing, and good well productivities, together with rapid penetration rates and nominal drilling costs, create attractive economic climates for oil operators; North Dakota will remain near the top of the exploration and development ledger in the coming months as a good place to do business and to look for oil and gas.

11. D. D. MCLEAN AND H. B. SAWATZKY, Geophysical and Evaluation Division, Saskatchewan Department of Mineral Resources, Regina, Saskatchewan

RECENT MINERAL DISCOVERIES IN SEDIMENTARY BASIN AREA OF SASKATCHEWAN AND POSSIBLE FUTURE DEVELOPMENTS

The demand for Saskatchewan crude oil, the proximity to market, the high success ratio, the large potash reserves, coupled with the newly formed government incentive measures, have created a program of rapid expansion within the mineral industry of Saskatchewan.

During 1964 more than 1,200 wells were drilled in search of petroleum, natural gas, and helium and more than 70 in the search for potash.

Several significant field step-outs and new discoveries were made in Saskatchewan within the known (Lower Cretaceous, Jurassic, and Mississippian) petroleum reservoirs during 1964 and early 1965. The lower Paleozoic formations offer the most exciting possibilities for future developments.

Many of the hydrocarbon traps in Saskatchewan are a combination of stratigraphic and structural features and, therefore, a total approach to exploration employing both geophysical and geological methods is emphasized. Case history studies are important as examples of successful techniques. In potash exploration