

influence oil and gas exploration in the state during the months ahead. One was the discovery of oil in the Permian Kaibab Limestone in the relatively undrilled Kaiparowits region in the south-central part of the state. Several large anticlines there, which are either untested or inadequately tested, are underlain by the Kaibab Limestone. Beneath the Kaibab several good reservoir sandstones of Permian age are also present.

The other important development is the continued westward extension of oil production from sandstones near the base of the Tertiary Green River Formation at the Red Wash field. Exploratory drilling westward from Red Wash, along the depositional strike of the Green River Formation for a distance of 30 miles, and stimulated largely by successful development at Red Wash, has resulted in two new Green River oil discoveries from sandstone. Two other Green River oil discoveries were completed along this trend in 1962. A large area with relatively few dry holes, an excellent success ratio and additional factors favorable for successful exploration is indicated.

Other exploration and development trends in Utah include a decline in exploratory drilling and an increase in both oil and gas production in Utah in 1963 over 1962. So far in 1964, oil production has dropped slightly and gas production has remained about the same.

Two dry wildcat wells have been drilled in Nevada and two in Idaho since 1962.

Two good development wells were completed in the Eagle Springs oil field in Nevada during the same period.

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REVIEW OF EXPLORATION ACTIVITY, EASTERN COLORADO AND WESTERN NEBRASKA IN 1963

During 1963, 426 wells were drilled in eastern Colorado versus 606 for 1962, registering a 30 per cent decline in drilling activity. The 234 exploratory wells resulted in 21 discoveries, yielding a success ratio of 9 per cent. Important developments in 1963 included continued exploration and development in Washington County, and a revitalized emphasis on Pennsylvanian production in southeastern Colorado. Oil production declined from 21,898,579 barrels in 1962 to 16,809,109 barrels in 1963, while gas production remained about constant—28,289 MMCF in 1962 and 29,020 MMCF in 1963.

During 1963, 537 wells were drilled in western Nebraska versus 645 for 1962, representing a 16.7 per cent decrease in drilling activity. The 288 exploratory tests resulted in 24 discoveries, for a success ratio of 8.05 per cent. Important developments in 1963 included a northwestern extension of the Sleepy Hollow field in Red Willow County, establishment of northernmost production in the Nebraska portion of the Denver basin

at Scottsbluff County, and Lansing-Kansas City discoveries in Red Willow County between Ackman and the Silver Creek fields. Oil and gas production declined from 30,703,000 barrels and 24,200 MMCF in 1962 to 26,912,000 barrels and 15,470 MMCF in 1963.

There was a 27 per cent decrease in geophysical activity in eastern Colorado but the decline was stronger, 77 per cent in Nebraska.

Early statistics listing the drilling activity for the first half of 1964 indicate a reversal of the 1962, 1963 trend.

H. W. PRAETORIUS and D. L. WALKER, Humble Oil and Refining Company, Durango, Colorado EXPLORATION AND DEVELOPMENT ACTIVITY, FOUR CORNERS AREA

Exploratory drilling in the Paradox basin in 1963 and early 1964 was concentrated in the Aneth area in southeastern Utah where it was prompted by expiring Navajo Indian leases. The principal objectives were Pennsylvanian carbonates which produce oil at the Aneth and Ismay fields. Reserves discovered by this effort were negligible. Elsewhere in the basin a new depth record, 16,237 feet, was set for the State of Utah in the Salt Anticline area, and in southwestern Colorado an active leasing and drilling play developed on a Pennsylvanian carbonate trend marginal to the Paradox evaporite basin.

In the San Juan basin of Colorado and New Mexico, development of gas reserves from the Cretaceous Dakota Sandstone in the Basin Dakota field continued at the rate of approximately 200 completions per year. Exploration drilling for oil in the Cretaceous Gallup Sandstone slowed somewhat but development drilling continued at the Many Rocks field where 53 producing wells have now been completed. A small Gallup oil field was discovered at South Waterflow and it presently consists of seven producing wells.

The most significant development influencing industry activity in the Four Corners was the offering for lease by the Navajo Indians of approximately two million acres of tribal land in Arizona, New Mexico, and Utah. Industry interest was particularly high in the Black Mesa basin of northeastern Arizona where much of the acreage was made available for the first time. The high bid of \$935 per acre for rank wildcat acreage reflects the intensity of this interest. A few wildcats have been drilled around the margins of the Black Mesa basin; however, the central portion of the basin which is entirely Indian land, is virtually undrilled. Geological information is meager but Pennsylvanian, Mississippian and Devonian beds appear to have the most potential for the development of significant hydrocarbon reserves.