

(Duperow, Nisku, Three Forks). Deposition was continuous or nearly continuous into the Mississippian, but the center of the Madison depositional basin was nearly coincident with the present Williston basin. It began with predominantly carbonate deposition with increasing evaporites in the upper part. The evaporites are mostly halite in the central basin area with anhydrite toward the flanks of the basin. Predominantly clastic deposition (Big Snowy Group) followed the evaporites and this was followed by another unconformity.

The Pennsylvanian and Permian periods are represented by clastics with minor carbonates (Minnekahta Formation) and some evaporites. This was a time of slight subsidence with the Williston basin area being part of a larger depositional area extending to the south and west. Similar conditions continued through the Triassic with fine grained clastics and some evaporites being deposited, followed by some non-marine redbeds and another unconformity.

The Williston structural basin had little effect on Jurassic or Cretaceous sedimentation so these periods are represented by eastward extensions of the predominantly fine grained clastics from the Rocky Mountain area seas. The Tertiary Period is represented by a wedge of predominantly non-marine beds which thickens westward toward the Rocky Mountain area.

EXPLORATION AND REVIEW PAPERS 1963-1964,
ROCKY MOUNTAIN REGION

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HIGHLIGHTS OF EXPLORATION IN MONTANA, APRIL, 1963-JULY, 1964

Exploration activity in Montana produced significant results in five widely separated areas:

- (1) Northwestern Montana (Sweetgrass Hills area)—Oil was discovered in the Cretaceous Sunburst Sandstone in the old Fred and George Creek—Arch Apex gas field area. Also significant was the possible linking of Jurassic Swift Sandstone oil production of Whitlash and Flat Coulee fields.
- (2) Northeastern Montana (Williston basin)—Nine new oil discoveries were made in Mississippian Mission Canyon, Devonian Nisku and Duperow, Silurian Interlake, and Ordovician Red River formations.
- (3) Central Montana (Big Snowy uplift)—Pennsylvanian Amsden oil was discovered on Pole Creek anticline. Extensions to Keg Coulee field provided new emphasis for Pennsylvanian Tyler Sandstone prospects.
- (4) South-central Montana (Big Horn basin)—Pennsylvanian Tensleep oil was discovered below a known gas cap in Northwest Elk basin field.
- (5) South-central Montana (Powder River basin)—The first discoveries of Tensleep oil in many years breathed new life into a long dormant part of the basin.

These events, along with recent renewed interest in previously ignored areas such as the intermontane basins of southwestern Montana, should ensure a high level of exploration activity throughout Montana in the months ahead.

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REVIEW OF EXPLORATION AND DEVELOPMENT IN NORTH AND SOUTH DAKOTA; 1963 AND FIRST HALF OF 1964

Development and exploration in North Dakota during 1963 was down from 1962. Exploration activity increased during late 1963. The area which received the most attention was the north-central portion of the state where the pools are chiefly found in stratigraphic traps.

There were 183 wells completed in North Dakota during 1963 and of these, 73 were wildcats. There were 9 discoveries for a wildcat success of 12.3%. Field and out-post wells numbered 110 with 76 producers. Perhaps the most significant discovery of 1963 was the Ordovician Red River production found in the Fryburg-Scoria field of Billings County. The other wildcat discoveries were found in the north-central part of the state.

There were 12 wildcats drilled in western South Dakota during 1963 with no discoveries. A total of five new producers were drilled in the known fields of Custer and Harding Counties. The highlight of activity in the state during 1963 was a widespread lease play.

A considerable increase in exploration activity has taken place in North Dakota during the first six months of 1964. The leading county in number of discoveries is Renville where four wildcats have been found productive. The most significant discovery has been the Mouse River Park field.

Drilling in South Dakota during the early part of 1964 has been confined to the western part of the state with most of the activity centered in Custer and Harding Counties.

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GEOLOGICAL EXPLORATION AND DEVELOPMENT IN WYOMING, 1963-1964

Oil and gas activity in Wyoming in 1963 and so far in 1964 was highlighted by interesting discoveries and developments which could have a far-reaching effect on future exploration in the state. In the way of what might be termed new and startling were: a Cretaceous Lewis Sandstone oil discovery at a rank wildcat in the Hanna basin; stratigraphic Tensleep accumulation discovered on the north side of the Big Horn basin; two widely separated Cretaceous Lakota Sandstone discoveries in the Powder River basin; a flurry of shallow Cretaceous Turner Sandstone drilling, also in the Powder River basin; experimental fire flooding and steam flooding at several places in the state; and two deep wells, Shell's 20,000-foot Madison test at Pavillion in the northwest portion of the Wind River basin and Texaco's 15,000-foot Jurassic Nugget gas well at Table Rock field in the Washakie basin.

The old standbys continued to furnish new reserves—the Minnelusa, Muddy, and Fall River (Dakota) reservoirs in the Powder River basin, and the Tertiary and Late Cretaceous oil and gas sandstones on the Big Piney La Barge platform in the Green River basin. At the Timber Creek field in the Powder River basin, discovered late in 1962, 1.5 million barrels of oil was produced during 1963. At Birch Creek, also discovered in 1962, on the La Barge platform, over 1.1 million barrels of oil was produced in 1963.

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EXPLORATION ACTIVITY AND OIL AND GAS DEVELOPMENT IN UTAH, NEVADA AND IDAHO SINCE JANUARY 1, 1963

Two significant developments which took place in Utah during the past 20 months are expected to strongly