in the Judith River formation rimrock bounding the higher structural part of the dome have failed to establish production.

To determine the relation of these wells to surface structure, a reconnaissance with the aid of air photos was undertaken during the 1958 field season. An attempt was made to find mappable units in the apparently monotonous Upper Cretaceous sequence cropping out on the central part of the dome. Although lithologic changes in these formations are subtle, it is believed that substantial progress has been made in recognizing the distribution of these rocks. As a result a better understanding of the structural configuration of Porcupine dome has been reached.

From this preliminary work several important exploratory possibilities are suggested.

1. The highest structural point on the dome has not been tested.
2. The most prominent anticlinal axial trend, approximately 36 miles in length, has not been drilled for a distance of 30 miles. Several untested closures are indicated along the trend.
3. The present structure of the dome is essentially the result of Laramide orogeny. Application of hydrodynamic factors, as modified by stratigraphic controls and ensuing time, points to possible areas for oil and/or gas entrapment.

It is concluded that Porcupine dome has not been adequately explored and that its possibilities for hydrocarbon production can be determined only by the drilling of favorably positioned wells.

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Examples of Hydrodynamics in Williston Basin at Poplar and North Tioga Fields

One of the generally accepted inferences with regard to the Williston basin has been that it should be relatively free from hydrodynamic influences. However, a large proportion of the pools in this basin have inclined oil-water contacts and, in some, tilting is an essential feature of the trap. Two excellent examples of such fields are the Poplar pool in northeastern Montana and the North Tioga pool on the north end of the Nesson trend. The reservoir in the Charles formation at Poplar has a readily demonstrable tilt in the oil-water contact of approximately 40 feet per mile north-northeast. At North Tioga a dip of the same order of magnitude, but toward the southeast, is apparent in the water table in the Mission Canyon formation. In both places, log and sample studies show that the tilting can not be ascribed to an "apparent condition" arising from stratigraphic changes. The tilt at Poplar is merely an interesting aberration in an essentially structural accumulation. On the other hand, hydrodynamics is a necessary component of the trap at North Tioga.

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Core Examination

The Oxbow-Carnduff field of southeastern Saskatchewan emphasizes the need of detailed lithological studies in evaluating a reservoir. A critical comparison of routine core analysis and detailed core studies in the field shows that a substantial percentage of the reservoir unit, which has porosity and permeability above a reasonable lower cut-off, is ineffective and unstained. The effective pay within the unit is determined not only by its porosity and permeability but also by the grain size of the carbonate. This example points out the need of full use of core examination in conjunction with core analysis in the evaluation of a reservoir.

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Structural Control Related to Stratigraphic Traps, Piceance Creek Basin, Colorado

Few if any accumulations of petroleum classified as being of stratigraphic origin are totally independent of structural control. In a consideration of the stratigraphic potential of a basin, therefore, it is prerequisite that due consideration be given to at least the principal structural deformations that have occurred within the basin during and since the deposition of the most prospective formations.

Scrutiny of thickness variations in the sediments the Piceance Creek basin reveals that the basic tectonic framework controlling the present configuration of the basin was in evidence at least as early as the oldest Cretaceous sediments represented in the basin. Stronger border components, such as the Uncompahgre arch, the White River uplift, and possibly the Douglas Creek arch are identifiable as positive structural elements during earlier periods, and were periodically active in influencing the nature of deposition within the Piceance Creek basin from Cretaceous through Eocene time.

With the exception of a few features deep within the basin, where data is not available or is inconclusive, thickness variations within the Mancos shale section indicate either early or continued phases in the structural development of all of the principal components forming the tectonic framework of the present basin. The Danforth Hills anticline on the northeastern side of the basin is revealed as an active positive area during Mancos time. The Douglas Creek arch is clearly defined by a relatively thin Mancos shale section.

Thickness variations of the later Cretaceous sediments (Mesaverde) indicate continued structural development of the basin similar to Mancos time, though of a greater magnitude.