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STRUCTURAL FRAMEWORK OF THE WESTERN WILLISTON BASIN, NORTHEAST MONTANA AND ADJACENT AREAS.

BY

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ABSTRACT

A paleostructural study of the western part of the Williston basin identified five periods of tectonic activity during the Phanerozoic: Early Devonian; Late Devonian; Late Mississippian; Late Triassic; and Late Cretaceous - Early Tertiary. No data are available to establish pre-Silurian paleostructural history. Paleostructural trends defined by alignment of isopach thins and thicks strike north, northwest and northeast. These structural trends are interpreted as representing zones of weakness in the basement formed during Precambrian time. Deformation occurred recurrently along pre-existing zones of weakness in the basement. Block-coupling style of deformation occurred in the segmented basement that propagated upward, creating structures in the overlying strata.

A north-trending fault zone east of Poplar, Montana was active during Early Devonian deformation and remained periodically active since then. This fault zone with presently downthrown to the east is interpreted as representing a major shear zone in the basement. Northwest-trending paleostructural features were documented to be active periodically since Silurian to present time.

Northeast-trending paleostructures were dominantly active during Early Mississipian to Late Paleozoic time, and were probably developed in response to the extension of the Montana trough. Recurrent movement with reversed displacement on some of the northeast-trending faults occurred during the Laramide deformation.

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