cycles that significant reserves of oil and gas have been discovered. In the Upper Cretaceous, a major transgression joined the northern and southern seas into a large seaway crossing the downwarping basin, and lapping against the uplifted Front Range. This Laramide tectonic activity reached its peak during the Eocene with the basin acquiring its present configuration.

22. LEONARD E. THOMAS, Marathon Oil Company, Casper, Wyoming

GENERALIZED HISTORY OF SEDIMENTATION AND STRUCTURAL DEVELOPMENT OF BIG HORN BASIN

The Big Horn basin of northwest Wyoming is primarily a Laramide structural basin. The area has been a portion of larger sedimentary basins throughout most of geologic history.

The basin is located on the eastern shelf of the Cordilleran geosyncline, east of the hinge line separating the shelf from the former deep parts of the syncline.

Local structural deformation on the sites of several Laramide anticlines in the basin is suggested by slight thinning noticeable in strata of Ordovician age. Local structural influence upon the present-day basin, however, is not evident until at least as late as the beginning of Upper Cretaceous.

During the pre-Laramide eras, periods of regional movements indicate a "see-saw" action with repeated northerly tilting, deposition, emergence and erosion which resulted in truncation of the Ordovician, Devonian and Mississippian sediments from north to south. There is a complete absence of Silurian sediments.

During Pennsylvanian, Permian and Triassic, the area of the present-day basin underwent southerly tilting, deposition, erosion and truncation that resulted in the formations thinning from south to north.

Jurassic and Lower Cretaceous formations show an increase in thickness from south to north. They also show the development of a low-relief structural arch that appears to be the buried, northwest-plunging nose of the Casper arch and Laramide Range in south and central Wyoming.

By the beginning of Upper Cretaceous time the embryo of a structural basin may have been present which affected some of the basal sands of the Frontier Formation.

Later transgressions and regressions of the Upper Cretaceous seas continued until the Laramide Orogeny came into strong evidence at the beginning of Fort Union time. The period of intense movement continued into Eocene with thrust faulting followed by deposition and partial erosion of volcanics on the western margin of the basin.

This movement resulted in peripheral mountain building, pronounced unconformities at the margins of the basin, the development of conglomerates in the Tertiary beds, and the development of the intense anticlinal folds preserved today.

23. BERNARD E. WEICHMAN, Superior Oil Company, Casper, Wyoming

GEOLOGICAL HISTORY OF THE POWDER RIVER BASIN, WYOMING

Precambrian igneous and metamorphic rocks underlie the Powder River basin. Their distribution is uncertain because of lack of subsurface control.

For the purpose of this paper the geologic section is divided into eight rock units. Some of these rock units cross time boundaries between periods.

Rock Unit 1 includes Cambrian and Lower Ordovician sediments deposited by a sea that began transgressing eastward during Middle Cambrian time and regressed at the close of Lower Ordovician time. Following this regression all sediments in Rock Unit I were eroded from the extreme southeastern part of the Powder River basin.

Rock Unit 2 is bounded by the "St. Peters Break" of post-Lower Ordovician time at the base and the Upper Silurian unconformity at the top. The sea in which these beds were deposited transgressed southward from the Williston basin. Sediments of this unit thin southward due to Upper Silurian erosion.

Rock Unit 3 includes the predominantly carbonate rocks of Devonian and Mississippian age. Four unconformities can be mapped within this unit; one at the top of the Devonian, one between the Lower and Middle Mississippian, one between the Middle and Upper Mississippian and one at the top of the Mississippian. Widespread karst topography characterizes the upper surface of the unit at the top of the Mississippian.

Rock Unit 4 includes the Pennsylvanian and Lower Permian rocks. Lower Permian tectonics and erosion breached folds subsequently buried under Unit 5.

Rock Unit 5 includes the Permian and Triassic redbeds and associated carbonates and evaporites. Large-scale uplift and erosion prior to Jurassic formed an unconformity at the top of this unit.

Rock Unit 6 includes all Jurassic rocks and the transition sediments at the base of the Cretaceous.

Rock Unit 7 begins with the transgression in Early Cretaceous time and the deposition of a dominantly shale sequence subdivided by four economically important regressive cycles. The top of Rock Unit 7 is the top of the Cretaceous, a major and early pulse of the Laramide orogeny.

Rock Unit 8 includes all beds of Tertiary age. The present-day configuration of the Powder River basin and the major structures and fault systems were formed at this time (Laramide orogeny). Tertiary sedimentation was controlled by the present basin outline. Previous sedimentation was related to tectonic features of a much broader area than the Powder River basin.

24. S. B. ANDERSON and C. G. CARLSON, North Dakota Geological Survey, Grand Forks, North Dakota

SEDIMENTARY AND TECTONIC HISTORY OF NORTH DAKOTA PORTION OF WILLISTON BASIN

The Williston basin is a structural and sedimentary basin which covers 51,600 square miles in North Dakota and contains sedimentary rocks of every geologic period from the Cambrian through the Tertiary. The maximum known thickness is 15,128 feet in a well in McKenzie County in Western North Dakota.

The Upper Cambrian to Lower Ordovician Epochs are represented by the Deadwood Formation which represent stable shelf deposits extending eastward from the Cordilleran geosyncline. The Williston structural basin began in Middle Ordovician time with a relatively thin clastic sequence (Winnipeg Group) followed by predominantly carbonate deposition (Red River, Stony Mountain and Stonewall Formations). Carbonate deposition continued through Lower and Middle Silurian (Interlake Formation) followed by a period of erosion marked by a major unconformity.

During the Middle and Upper Devonian Epochs the Williston basin was a part of the larger western Canada basin of deposition which was marked by predominantly carbonate deposition with a thick evaporite in the lower part (Prairie Formation) and cyclical carbonates with some thin clastic and evaporite beds in the upper part