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Gravity Slide Thrusting and Folded Faults in The Western Arbuckle Mountains and Vicinity, Southern Oklahoma

Documentation for one or more major gravity slide thrusts and numerous lesser slides is recognized in the Eola, Southeast Hoover and Southwest Davis oil fields and in the Western Arbuckle Mountains, Garvin and Murray Counties, Oklahoma. The gravity slide area initially covered portions of at least nine townships, was more than 30 miles (48 km) in length and five to six miles (8 to 10 km) in width. It involved a stratigraphic sequence greater than 5,000 ft (1,525 m) extending from the Lower Springer Formation into the upper portion of the Arbuckle Limestone. The major slides moved to the northeast and northwest, probably in Middle Pennsylvanian. The slides and the faults were subsequently isoclinally folded in Late Pennsylvanian. Small depositional structures within beds ranging from the Arbuckle Limestone through the Viola Limestone indicate the area was seismically active during deposition and probably also was subject to gravity sliding in the early Paleozoic. The tensional updip segment of a major folded slide fault now coincides with the trace of the Washita Valley fault. The compressional end of the slide coincides with the Reagan fault in the east and the frontal Eola fault in the west. In the Lake Classen area the latest folding has turned all the formations involved in the slide, and the associated faults, to a near vertical position. Thus, the slide is exposed in a "profile view" on the south limb of the overturned Washita Valley syncline. On the north, normal limb of the Washita Valley syncline, the slide is exposed in "plan view" with the Dougherty anticline and related folds representing compressional folding at the toe of the slide. The major slide fault and the Washita Valley fault now share the same trace, but separate movements are still recognizable, the slides moving north, northeast and northwest followed by thrusting and probably left lateral displacement along the Washita Valley fault. Compressional folding and thrusting in the toe of the slide and extensional faulting along the trailing edge are both recognized. Several tectonic breccias that crop out in the Arbuckle Mountains near the top of the Kinblade Formation of the Arbuckle Limestone probably mark the orogenic event. Tectonic breccias within the fault zone also are interpreted in several wells in the Eola field, and, in the past, have been identified as Eola Conglomerate (Pontotoc). The Arbuckle Limestone, which was beneath at least 5000 ft (1,525 m) of younger strata, was exposed immediately following the slide, which explains the inclusion of boulders and cobbles of this formation as major constituents in the earliest known Middle Pennsylvanian conglomerates in this area. The interpretation also explains the absence of any record in the geological column of the sequential erosion of strata overlying the Arbuckle Group.