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Structural Model of the Painter and East Painter Reservoir Structures, Wyoming Fold-Thrust Belt

The Painter and East Painter Reservoir structures are located in the hanging wall of Absaroka thrust in the Wyoming fold-thrust belt. A detailed structural study has been conducted to understand the three-dimensional geometry and evolution of the structures. The study utilizes interpreted logs and dipmeter data from over fifty wells penetrating the Triassic-Jurassic section. A series of four area-balanced cross sections have been constructed through the structures. These cross sections have been integrated with the well data to develop a three-dimensional model. The Painter and East Painter structures are interpreted as a pair of opposite-verging fault-related folds within the Triassic-Jurassic units. Both structures are characterized by gentle to moderate-dipping back limbs and steep to vertical front limbs. The front limbs of both structures contain forelimb thrust faults with small displacements. A tight syncline separates the two structures and contains a number of out-of-syncline thrusts. Cross sections through the structures are restored using line-length balancing for the Nugget sandstones and the Twin Creek limestones, and area balancing of the Ankareh shales and Thaynes limestones. The location of the structures is probably controlled by frictional resistance to fault slip along the hanging wall ramp within the Triassic-Jurassic units in the Absaroka thrust. The structures formed primarily by faulted detachment folding, involving a transition from asymmetric detachment folding to progressive fault propagation with increasing shortening. This kinematic model is supported by the ductile deformational behavior of the basal Thaynes and Ankareh units, and the relatively small displacements on the forelimb thrusts.