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Incremental Oil Recovery Using Horizontal Drilling in a Compartmentalized Oolitic Reservoir, San Andres Formation, West Texas

Oolitic carbonates and associated facies of the San Andres Formation (Permian) produce hydrocarbons at Olson field, west Texas. Lithofacies are argillaceous mudstones, dolomitized fusulinid-peloid packstones and wackestones, ooid-peloid grainstones and packstones, and siliciclastic sediments. The reservoir is stratigraphically compartmentalized by the presence of lenticular oolite deposits overlain by algal-laminated mudstones, siltstones, and pore-filling anhydrite cement. Interwell communication is poor, as indicated by highly variable bottomhole pressures and poor, erratic waterflood response.

In 1991, the field operator drilled a medium-radius lateral hole on a downhill slant (deviation=85 degrees) along a line N45E for a distance of 2,750 ft (838 m). At TD (total depth), the well was approximately 50 ft (15 m) due west of an offset vertical well. At this depth, an FMS (Formation MicroScanner) log showed the lateral hole had intersected an artificial fracture created in the 1980's in the nearby vertical well. The FMS tool did not image any other significant fractures in the lateral borehole.

The intersection of the hydraulic fracture by the lateral borehole had significant economic impact. The production rate in the vertical well jumped from a few barrels per day to an average of 70 BOPD and less than 20 BWPD. Relatively high flow rates have been maintained in the following years. Projected incremental oil recovery is about 150,000 barrels, roughly equivalent to production from an average well drilled during early life of the field. This approach - intentional drilling of a pre-existing hydrofracture - could add new life to many older, compartmentalized reservoirs.