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Horizontal Lateral Revitalization of a Low Permeable Carbonate Reservoir at the Bryant –G- Field, Midland County, Texas

ABSTRACT

The Bryant –G- Devonian Unit, located in central Midland County, produces gas and associated condensate from low permeability siliceous packstones of the Thirtyone Formation (Lochkovian-Pragian Age) at an approximate depth of 12,000 ft (3,660 m). Discovered in 1965, Texaco developed the field using approximately 160-acre spaced vertical well bores. A relatively flat production rate, advances in horizontal drilling technology, and offset operator activity, prompted Texaco to begin horizontal development of the field in 1996. Three-D seismic inversion, petrophysical analysis and geostatistics were incorporated into a 3-D geocellular model to produce reservoir target models for drilling operations. Over a two year period, laterals ranging from 1,270 to 5,440 ft (387 – 1,658 m) in length increased field production 30 fold (2 MMCFPD to 60 MMCFPD). Texaco continued field development between 1998 and 2001 by drilling both re-entry laterals from existing vertical producing wells and multi-lateral new drill wells. Tubing conveyed acid using ChevronTexaco's patented "Ported Sub Treatment System" was used to stimulate the open hole laterals following drilling. Wells characteristically flow for 2 - 4 years prior to artificial lift (plunger lift) installation. Horizontal drilling difficulties included miss-set or unset whipstocks, lost circulation (mostly in re-entry heels) and well bore geometry control issues.