



Baker Oil Tools Sets New Horizontal Gravel Packing Records - Captain Field, UK North Sea

HOUSTON, TEXAS (October 5, 2001) - Baker Oil Tools recently set another horizontal gravel packing record with a 7324 ft (2232m) completion in the Texaco operated Captain field in the UK North Sea. This surpassed the previous horizontal gravel packing record of 4,000 ft, which Baker Oil Tools set in November 1998. The Korean Captain Company Limited is a partner in the field.

In May 2001, the Texaco Captain 13/22a - B2 well was completed at a total depth of 19,990 ft MD (6093 m) as an open hole gravel pack using 5-1/2-in. x 230 micron with medium weave Baker Oil Tools EXCLUDER™ screens. Prior to the completion, the well consisted of a 11-3/4-in. x 9-5/8-in. tapered casing string set at 7,048ft MD (2148 m) and a drilled 8-1/2-in. hole to a total depth of 14,372 ft MD (4380 m). The horizontal section was begun at a true vertical depth of 2,915 ft (888 m).

Gravel Packing Objectives

The objective of gravel packing is to stabilize the open hole, prevent formation sand movement, and protect screens from plugging and erosion. The resulting completion should provide reliable long-term well productivity and enhanced reservoir drainage. To accomplish these objectives, Texaco and Baker designed and implemented a systems approach that integrates customized drill-in fluids, high-rate displacement and hole cleaning procedures, and Baker Oil Tools' EXCLUDER™ Extended Longevity Sand Control Screen, CS-300 Open Hole Gravel Packing system, BetaBreaker™ Valves and FLCV™'s (fluid loss control valve).

The completion procedure was designed to control fluid loss in the horizontal section with very high permeability (1?12 Darcy) and a very small operating window between formation pressure and fracture pressure.

Completion Operations

The horizontal hole was drilled with a 9.6 ppg water based calcium carbonate drill-in fluid. Then the entire well was displaced to 9.6 ppg filtered NaCl/KCl brine using a high rate well displacement. The cleanliness of the brine returns from the well were less than 0.01% solids content prior to deploying the gravel pack assembly.

The gravel pack assembly with 4-in. internal washpipe string and Baker CS-300™ Open Hole Gravel Pack Service Tools was successfully deployed in the well. A Baker Model "SC-2R" Packer was set at 6,827 ft MD. The end of the screen assembly was at 13,990 ft MD. The service tools, designed to maintain hydrostatic pressure on the open hole filter cake, were successfully released from the packer and the various circulating positions were confirmed. In addition, four Baker Oil Tools BetaBreaker valves were run in the washpipe to assist in maintaining bottomhole treating pressure below fracture pressure.

Using Baker's GPDesign horizontal gravel pack design software, engineers determined the required pump rate and gravel concentration to pack the well. The well was successfully gravel packed with 174,920 lbs of 16/30 gravel pack sand or 104% of the open hole annular volume calculated from the MWD ADN caliper log. Completion brine was used as the gravel carrier fluid. Approximately 70% returns were maintained while pumping the gravel pack which took 60 hrs. Sand loading was maintained at a very low level (average 0.15 ppga) throughout the job. During pumping, all four BetaBreaker valves operated as designed, allowing the treatment to be pumped at a constant rate of 7 bpm without exceeding fracture pressure. After the gravel pack screened out, the excess gravel was successfully circulated from the workstring, and the service string was then pulled above the Baker Oil Tools FLCV. Prior to closing the valve losses of 60 bph were noted, and losses were reduced to zero when the valve was closed.

Earlier Completions

The first of the 4,000-ft horizontal gravel packs was installed in Captain in November 1998 following extensive technical, operations and logistics planning. Using a brine carrier fluid, 137,000 lbs of gravel was placed in the annulus between the borehole and the EXCLUDER screen. Gravel placement was successful despite the presence of a non-cemented open hole sidetrack in the final 4,000 ft long horizontal interval.

The gravel packed wells in the field have exhibited more consistent well productivities in line with reservoir performance expectations and with no signs of plugging. As the need to gravel pack laterals of increasing length continues, Baker Oil Tools has developed new technology to meet these challenges. Some examples include EXCLUDER screen, the CS-300 Open Hole Gravel Packing System, the BetaBreaker Valve, and the FLCV fluidloss control valve Baker Oil Tools, is a world leader in total completion, workover, and fishing solutions that help exploration and production companies optimize their hydrocarbon

recovery investment. Baker Oil Tools solutions are based on advanced downhole and surface technology, practically applied, to help operators produce at the highest levels and the lowest cost throughout the life of the reservoir.

Baker Hughes is a leading provider of drilling, formation evaluation, completion and production products and services to the worldwide oil and gas industry.