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A New Wireless Retrofit Solution

Abstract

Real time reservoir monitoring is critical for the effective management of any reservoir. Permanently installed reservoir monitoring instrumentation is generally installed as standard practice in the majority of offshore wells and whilst the reliability of such systems has improved significantly over the last decade, there are still many examples of wells around the world where these systems have failed prematurely.

The Mungo Platform, located in the UK Central North Sea, has several wells in which the permanently installed monitoring systems failed early on in the life of the wells. In the absence of any real time reservoir pressure / temperature data, a compromise solution has been to install long term memory gauges in the wells so that reservoir monitoring, all be it using historic data, has been possible. Being relatively compact in size and a Normally Unmanned Installation (NUI), well intervention operations on Mungo are logistically challenging, with limited deck space for rig up and with personnel having to shuttle from the Marnock platform located around 24km away.

A newly emergent wireless reservoir monitoring technology that can be retrofitted into existing wells and can transmit data to surface in real time was viewed as an attractive alternative to performing regular well interventions to gather historic data using memory gauges. Whilst the wireless gauge technology has a growing track record in the subsea and onshore well environments, signal attenuation in the offshore platform environment presents particular challenges that had previously prevented the technology from being retrofitted into such wells. A concept was developed for offshore platform wells having failed permanent cabled gauge systems, whereby the cable and gauge infrastructure of the failed permanent gauge system should, under the right conditions, act a conduit for the wireless gauge signal to be transferred to surface. To test the theory, a proof of concept trial was performed in Mungo well W160. A wireless gauge system was retrofitted into the well using standard slickline equipment and real time reservoir pressure and temperature data was successfully transmitted to surface using the failed permanent gauge system as a signal pick-up.

This world first successful retrofit application of a new wireless monitoring technology into an offshore platform well, marks a milestone achievement in enabling the restoration of real time reservoir data without having to perform a well workover. This technology breakthrough is of significance in many situations where cabled in-well monitoring systems have failed. Collecting real time data from well W160 provided several benefits; the well production could be optimised on a daily basis, pressure build-up analysis could be performed, a new well target location was determined and the reservoir panel water injection response was optimised.

Introduction

The BP operated Mungo Field is located at the edge of the Eastern Central Graben in the UK sector of the North Sea, about 240km east of Aberdeen and sits in around 90m of water. First discovered in May 1989 it was developed as part of the Eastern Trough Area Project (ETAP) and saw first production in 1998. (See Figure 1)

Mungo is a large oilfield with a small natural gas cap. The productive Forties, Lista and Maureen formations, which are Palaeocene sandstones, ring a salt diapir. The field has been developed under combined water and gas injection on a NUI located above the field. The Mungo NUI is tied back to the central processing facility (CPF), which is located over the Marnock field. The CPF handles the fluids produced by Mungo and also serves as the accommodation base for personnel shuttling to the Mungo NUI.