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Application of Sonar Flow Measurement for Field Wide Surveillance of a Mature Gas Field

Abstract

Centrica Energy operates the South and North Morecambe Fields, which are among the largest in the UK Continental Shelf in terms of original reserves. Current production is approximately 200 million cubic feet of gas per day, which is 5% of the indigenous UK production or 3.5% of the UK gas demand. Monitoring real-time production surveillance rates from each well in the field provides critical information for Centrica Energy's reservoir management and workover planning. Centrica Energy explored the range of potential replacement technologies for the existing venturi meters, including installing new in-line differential pressure meters of several types, as well as traditional ultrasonic type meters. Parameters considered include the cost of acquisition, installation and the total cost of ownership, measurement quality and repeatability. Turndown ratio, or the instrument's measurement range, was also an important consideration as this instrument was expected to measure well production throughout the declining life of the field.

In 2010, Centrica Energy trialed a SONAR meter on one well to assess its applicability to the well conditions in the Morecambe fields. The SONAR meters, applied at that time, were a new class of SONAR meter technology that had been developed specifically for Type I and Type II wet gas wellhead measurement. After evaluating the performance of the SONAR meter for one year, Centrica Energy installed SONAR flow meters on all 44 producing wells across 6 platforms. SONAR meters clamp onto the existing pipework allowing installation without shutting in the well and incurring the associated lost production, reducing management of change and HSE exposure. This paper describes the importance of real-time production surveillance for reservoir management and for making informed decisions concerning workover strategy and prioritization. In addition, this paper presents the production data collected over an extended time period and the challenges presented by the field wide implementation of a new class of flow meter technology.

Introduction

SOUTH AND NORTH MORECAMBE FIELDS:

The South Morecambe Gas Field is located in the East Irish Sea Basin in Blocks 110/2a, 110/3a and 110/8a, some 26 miles due west of Blackpool. It was discovered by well 110/2-1 in 1974 and commenced production in 1985. The reservoir is in the Triassic Sherwood Sandstone Group, laid down in a rapidly subsiding basin under continental semi-arid conditions.

The South Morecambe reservoir is produced from five platforms and a total of 34 wells via volumetric depletion. Slant-drilling techniques were used in the initial development because the reservoir is shallow. Each of the five platforms has a single sub-vertical well and several slant wells. All five production platforms are connected to the Central Processing Platform (CPC) via a 24" line, and the entire production is then piped to Barrow via a 36" sea-line. The 34 active production wells consist of 5 vertical wells, 2 long reach wells and 27 slant wells. The wells are gathered to 5 drilling platforms which are a Normally Unmanned Installations. The gas is then piped to the Central Processing Platform before being compressed and sent to shore for further processing.
