

IPTC 11049

Integrated Strategies for the Offshore and Subsurface Development Associated With Qatar's LNG Development Strategy

K.S. Al-Rumaihi, RasGas Co. Ltd.

This abstract was prepared for presentation at the 2005 International Petroleum Technology Conference held in Doha, Qatar, 21–23 November 2005.

Abstract

RasGas and Qatargas produce gas from an area of Qatar's North Field covering more than 6,000 square kilometers, located some 100 km offshore Ras Laffan, north-east of Qatar. The North Field was discovered in 1971, and is the world's largest non-associated gas field with reported reserves of more than 900 Tscf. The gas is contained in the massive limestone and dolomite Khuff Formation. The reservoir fluid is a gas condensate, and contains CO₂, H₂S, and N₂, along with small quantities of He.

RasGas and Qatargas are developing this area as part of the overall North Field development, to supply gas to LNG and gas sales projects. Qatargas commenced production from three platforms to supply three 3.0 MMTPA LNG trains in 1996. RasGas commenced production from three platforms to supply two 3.0 MMTPA trains in 1999. Production from an additional platform to supply RasGas's first 4.7 MMTPA LNG train commenced in 2004, and production from a further platform to supply a second 4.7 MMTPA Train 4 will start in 2005, along with production from another platform to supply the Al Khaleej gas sales project. RasGas will bring an additional platform on-stream to supply another 4.7 MMTPA train in 2007. RasGas and Qatargas will start up four giant LNG trains between 2007 and 2009, which will be the largest LNG trains in the world with a capacity of 7.8 MMTPA. A total of 15 wellhead platforms will supply gas to all these projects.

Production is through a combination of 7' and 9 5/8' wells. RasGas's 9 5/8' Optimized Big Bore (OBB) design is the largest capacity offshore gas well in the world. Vertical and deviated production wells are drilled from conventional 9 and 15 slot platforms for 7' completions, and 9 and 12 slot platforms for OBB wells. Platforms are designed to handle up to 1.5 Bscf/d of production, and have well test facilities. Offshore dehydration is used for both RasGas Trains 1 and 2, and Qatargas Trains 1,2, and 3, but all subsequent projects use an innovative wet gas pipeline design for transportation to onshore LNG plants.

In order to optimize development and minimize overall costs, RasGas is executing subsurface development for both RasGas and Qatargas. These activities include design, drilling, completion, and formation evaluation of both vertical data wells and development wells.

Extensive use is made of data wells to gather reservoir information. Vertical data wells are typically drilled from all platforms, and are evaluated to gain vital information on deliverability, gas composition, and rock properties. A combination of single and multi-zone completions are used to ensure optimal reservoir depletion, while gathering performance data needed for optimal reservoir management.

Technology innovation and integration has been fundamental to the success of this development, and many record setting achievements in this development. Examples of this in the areas of well design, pipeline design, coring, fluid sampling, completion technology, and drilling technology will be highlighted.