Gullfaks Field: Towards 2030

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Introduction

The Gullfaks oil field is located on the Norwegian continental shelf in the northern North Sea. The field was discovered in 1978, and came on stream in 1986. Today there are more than 100 active production and injection wells. Peak production was reached in 1994, followed by an immediate decline. Since then it has been a continuously growing focus on increased oil recovery (IOR) methods. The effort has resulted in an increased recovery factor from expected 46% at the time of production start in 1986 to 61% in 2007. The ultimate goal is to end up with a recovery factor close to 70%. Several different technologies have contributed to the good results. However, the most important ones are time-lapse (4D) seismic, massive water circulation, water-alternating-gas injection and extensive exploration.

4D seismic

So far four repeated surveys have been acquired, resulting in the successful drilling of 14 infill targets. The impact of 4D seismic on value creation is conservatively estimated to be 992 Million US$. Consequently, it has been determined to continue the use of this technology. The 4D simultaneous elastic inversion that we have carried out represents a promising technology in that respect.

Injection

Massive water circulation, where several pore volumes of water is circulated through the reservoirs, is also representing a strong IOR tool, and may result in residual oil as low as 5% for the best reservoir units. Water-alternating-gas injection (WAG) is also playing an important role.

Exploration

Exploration in- and outside the Gullfaks production license has been very successful with a finding rate of some 85%. This is a result of courage and innovation in the planning phase and stretching the technology in the development phase. Even after 20 years of production the resource replacement rate has for several years been around 1. Today, 20 % of the production is due to exploration carried out during the last 6 years.