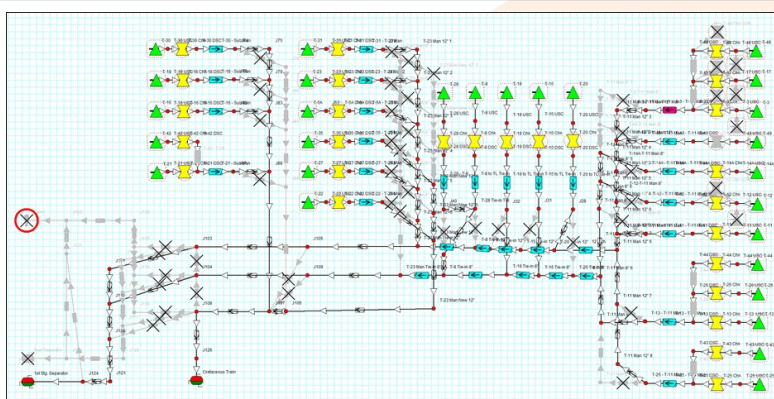


INTEGRATED PRODUCTION SYSTEM CASE STUDY

DNO ASA - Tawke Field
Kurdistan Region of Iraq

AWT DISCIPLINES

Production Technology
Production Engineering



PROJECT BACKGROUND

DNO ASA, the Norwegian oil and gas operator, entered the semi-autonomous Kurdistan region, close to Iraq's border with Turkey, in 2004 as one of the first international oil companies in the region. With one of the highest oil production rates in Kurdistan, the Tawke licence area is of strategic importance for both the Kurdistan Regional Government (KRG) and DNO. It is the largest foreign-operated oil asset in the Kurdistan.

The Tawke Field is a fractured carbonate oil field, developed primarily with horizontal wells. The wells are low pressure, low GOR oil wells that are currently unable to flow naturally to surface.

DNO planned to implement an Enhanced Oil Recovery (EOR) project, specifically gas injection.

As part of this project an integrated production system model (IPSM) was required to simulate the effects of gas injectors on the production network as a whole and specifically the effect of gas breakthrough on nearby wells.

AWT WORKSCOPE

The scope of work consisted of two parts.

1. Well Deliverability & Production Profile Review / Optimisation (PROSPER)

PROSPER models were created for a total of 24 existing wells had and four (4) new wells. The well models were to be used to evaluate current and future well performance, specifically to determine the effect of high GOR on well and pump performance. The study was restricted to Tawke Cretaceous wells; a total of 28 wells, 21 with Electrical Submersible Pumps (ESP) and 7 wells with Progressive Cavity Pump (PCP) for artificial lift.

The second purpose of creating matched PROSPER models was for integration into the GAP model, for the network modelling part of the study.

2. Network Planning and Optimisation (GAP):

The second part of the study was to create an Integrated Production System Model for the cretaceous wells only. The GAP model was designed to integrate the aforementioned well models, along with pipeline/flowline data, choke models and separators representing the inlets to the individual Tawke CPF individual trains.

After matching the model to initial conditions, the GAP modelling to be used to test theoretical "gas breakthrough" scenarios by running multiple scenarios of varying GOR on wells adjacent to the planned gas injectors, to observe the impact of the higher backpressure, resulting from higher GOR, on field oil production.

The study was restricted to Tawke Cretaceous wells; a total of 28 wells; 21 with Electrical Submersible Pumps (ESP) and 7 wells with Progressive Cavity Pumps (PCP).

AWT ADDED VALUE

The integrated production system model allowed the high back pressure wells and scenarios to be identified and solutions to be proposed to avoid the reduction in liquid production rates.

Recommendations were also made to improve the accuracy of the PROSPER models, improve stability of the GAP models, and increase the utility of the GAP model by adding the lower pressure Jeribe wells and gathering system to the model.

These enlightenments allowed DNO to proceed with the gas injection EOR project with more certainty.

After handing over the matched IPSM to DNO, their technical staff will be able to run further sensitivities on additional scenarios not covered in the study, as well as maintain and enhance the model as required.

For more information contact:

Tel: (+603) 2162 3127 or visit our website at: www.awtinternational.com