AWT INTERNATIONAL

WELL INTEGRITY
CASE STUDY

DNO ASA - Tawke Field

Kurdistan Region of Iraq

AWT DISCIPLINES

Well Integrity

Well 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. However, a planned gas injection programme for enhanced oil recovery had the potential to increase the surface well pressure above that of the original well design.

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

AWT WORKSCOPE

AWT was awarded two separate but related well integrity scopes of work.

1. A well integrity assessment for twenty of the highest priority wells in the Tawke field, under their current low pressure operating conditions rather than any modified conditions after the commencement of future gas injection.

2. Development of Well Integrity Risk Assessment Framework to:

➢ Provide an overview of the well integrity status of the Tawke well inventory
➢ Assist well surveillance engineers to focus their efforts on maintaining relevant data for well integrity decision-making
➢ Allow trends to be monitored and supports recommendations improvements to work practices and/or capability
➢ Enable available well integrity maintenance resources (personnel and equipment) to be deployed in the most effective manner, including addressing the highest risk wells as appropriate
➢ Provides continuous visibility of well integrity status for DNO management.

AWT ADDED VALUE

The well Integrity assessment study assisted DNO to better organise their well Integrity related data and provide a baseline well integrity status. Recommendations were also made for the ongoing maintenance of well integrity. The study could also be used as a basis for assessing and managing integrity of the wells under future gas injection conditions in the field.

A Well Integrity Risk Assessment (WIRA) framework was successfully developed to assist operational and technical support teams with the work flow and visibility required for well integrity activity planning and operational decision making

The WIRA inputs may be classified as:

➢ Well construction details
➢ Well production conditions

The well construction details were used to assign a Well Construction Risk Category based on four simple well construction characteristics. A lower risk category number was associated with a greater level of well integrity for the well design and this risk category is generally fairly static.

AWT DISCIPLINES

Well Integrity

Well 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. However, a planned gas injection programme for enhanced oil recovery had the potential to increase the surface well pressure above that of the original well design.

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

The well production conditions, including the annulus pressure behaviour and the flowing well characteristics should be regularly updated as these well conditions are more likely to change over time.

After entering the required input data for a well, the WIRA framework generates a risk ranking, numbered from 1 to 10. These rankings are grouped into colour coded risk categories which dictate whether any corrective actions are required and the urgency of such actions.

While the WIRA framework was prescriptive in the well construction inputs that are required to describe a well and the number of barriers that are currently available, it was fairly non-prescriptive in the details that describe the well's future or current ability to flow naturally, as the amount of well performance data available for a given well will vary.

Therefore it was Intended that the surveillance engineers should assess whether the oil GOR is increasing or whether the well is able to flow naturally based on the data that is available.

The remaining WIRA well production condition inputs, namely, the annulus pressures, are used to monitor and verify the integrity of the existing barriers at any point in time.

In summary, the ongoing management of well integrity using the WIRA framework requires:

➤ Continuous or frequent monitoring of A and B annulus pressures

➤ Regular verification of SCSSV, wellhead and tree valves and seals

➤ Anomalous annulus pressure diagnostics (incl. pressure bleed down)

➤ Updated GOR estimates from well testing, sampling, pump performance characteristics or well flow performance modelling

➤ Assessment of natural flow potential from well flow performance modelling

Once implemented and operationalised, the Well Integrity Risk Assessment (WIRA) framework would provide DNO operational personnel, technical support teams and line management with visibility over the well integrity status of the well stock, to prioritise corrective actions and to assist with resource planning and scheduling, such as workover rigs, slickline units or well testing packages.