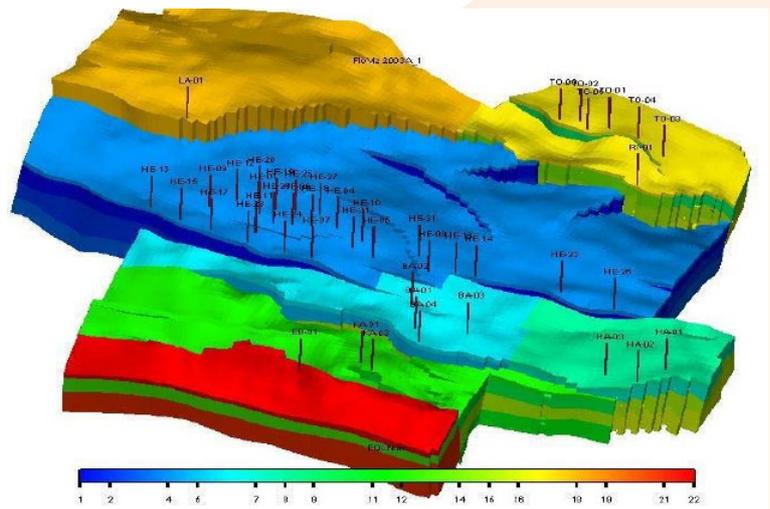


FIELD REJUVENATION CASE STUDY

GNPOC Joint Venture - Heglig Field
Muglad Basin, Sudan

AWT DISCIPLINES

Reservoir Engineering
Production Technology
Completions Engineering
Artificial Lift Design
Facility Engineering



PROJECT BACKGROUND

The Heglig onshore oil field is located in the Muglad Basin, 700 km southwest of Khartoum, the capital of Sudan.

The field was operated by the Greater Nile Petroleum Operating Company (GNPOC).

Despite the field achieving an oil production rate of 50,000 bpd, the field water cut rose to an alarming 250,000 bpd which was a serious production impediment.

Amidst competition from numerous EMP companies, AWT in partnership with Petronas successfully won the contract to solve the issue of excess water breakthrough.

AWT WORKSCOPE

In conjunction with Petronas Research & Scientific Services (PRSS), AWT undertook a full field review of Greater Heglig's 8 complex onshore oil fields. The review aimed to assist in rejuvenating the fields through maximisation of recoverable reserves, identifying ways to manage excess water production, identifying problematic wells and providing remedial solutions and productivity enhancement.

Keeping these issues in mind, integrated and validated three-dimensional, three phase reservoir geological and simulation models were developed for all the Greater Heglig fields.

A detailed review of production history, well construction and well intervention records was also undertaken.

AWT ADDED VALUE

Detailed field development plan simulations and interrogation of well records revealed sub-optimal well integrity as the primary source of high water cut. Using AWT's state of the art Technology Deployment and Appraisal System (TDAS), a way forward for the rejuvenation of Greater Heglig was formulated.

AWT produced several future reservoir management strategies for the Heglig fields with a view of accessing the recoverable reserves. Key recommendations included:

- Remediation of existing wells through acute cement channel and micro annuli repair work to remediate wellbore integrity issues.
- Operationalisation of remedial activities to mitigate excessive water production through immediate well intervention programs.
- Strategic water disposal injection wells to efficiently drain remaining reservoirs

The proposed remedial well intervention programmes and new infill wells improved Greater Heglig's simulated field recovery factors by 8% to 24% with a maximum peak oil rate of 60,000 stb/d.

Through AWT's extensive experience in well integrity issues the study and recommendations were completed inside of 6 months (ahead of the industry average of 10-14 months) and within budget parameters. The proposed strategies were personally delivered to the GNPOC headquarters in Khartoum, Sudan.