OIL FIELD DEVELOPMENT
CASE STUDY

ROC Oil - Cliff Head

Offshore Perth Basin, Australia

AWT DISCIPLINES

Production Technology

Completions Engineering

Flow Assurance

Production Chemistry

Artificial Lift Design

PROJECT BACKGROUND

The Cliff Head oil field represented the first commercial oil discovery in the offshore Perth Basin. The field was operated by ROC Oil (WA) Pty Ltd. (37.5% holding) on behalf of joint venture partners; AWE Oil (Western Australia) Pty Ltd (27.5%), ARC (Offshore PB) Limited (30.0%) and CIECO Exploration & Production (Australia) Pty Ltd (5.0%)

Location:
Production License WA-31-L,
20 km south of Dongara, Western Australia

Reserves:
15.7 MMstb (initial recoverable)

Nature of the Field:
Complex offshore fields
High wax appearance temperature
High pour point
Stacked variable permeability Permian sand layers

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

AWT WORKSCOPE

Following successful appraisal wells confirming commercial hydrocarbon reserves, ROC and its JV partners sanctioned full field development of Cliff Head in 2005 AWT was engaged to provide input in various technical disciplines. In conjunction with the Operator's Project Team, AWT contributed to in-depth flow assurance studies, production chemistry studies, detailed completion design, equipment specification and procurement by competitive tender. AWT also provided early input into the platform design such that completion and well servicing activities could be effectively conducted throughout the life of the asset.

Due to the characteristics of the Cliff Head crude and the nature of the reservoir, it was concluded all production wells would require some form of artificial lift. In recognition of this requirement, ROC and AWT undertook a comprehensive investigation of available artificial lift technologies in order to determine the most appropriate type, secure the best hardware and develop a deployment strategy. Coiled tubing deployed ESPs were recommended and accepted for this project—the first application of such technology in Australia.

ROC's development drilling campaign resulted in the successful construction of 2 water injection wells and 6 production wells. AWT concurrently implemented well completions work incorporating the following technical innovations:

- Interventionless reservoir management - zonal selectivity, permanent downhole gauges which were expected to result in improved recoveries, and down hole chemical injection system.
- Maximised flexibility from Electric Submersible Pumps (ESPs) through the use of Variable Speed Drives and ESP specification levels.
- Cost effective well construction through the use of swelling elastomer packers and pre-drilled liners.
- Positive isolation of reservoir during workover/ESP deployment operations minimising potential for formation damage.
- Design, procurement, commissioning and installation of a ROC owned and maintained, permanently installed offshore coiled tubing unit (CTU) for deployment and recovery of ESPs.
- Environmental considerations - ability to flush wells to production system prior to workover.
- Cost-savings resulting from the smaller deck space and loading requirements of the platform and jacket as a result of the coiled tubing (CT) deployed ESP system.

CTU Commissioning

Offshore CTU Installation

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Conventional offshore completions work requires the use of a rig for down-hole ESP deployment. The design selected, in consultation with AWT, enabled coiled tubing deployed ESPs to be installed concurrently with drilling activities, which saved substantial time in the overall well construction programme and enabled commissioning of the production system to commence early.

Following the successful well completions phase, Cliff Head was brought online with some selected involvement from AWT and produced at rates in excess of 10,000 bopd from 2 deviated and 4 horizontal ESP lifted wells, with the capacity to produce in excess of 15,000 bfpd. The ESP deployment has successfully maintained flow rates through 14 km of production system from down-hole completions to the onshore Arrowsmith Processing Plant. AWT also assisted ROC in developing an innovative hot water injection / spike water circulation system to prevent wax precipitation and improve flow assurance in the pipeline.

AWT VALUE ADDED

AWT is able to assist with long term life-of-asset value and flow assurance for the strategically important Cliff Head field. AWT's ESP management expertise will lead to reduced ESP workover times (~100 platform hours vs conventional ~180 platform hours), reductions in ESP downtimes through decreased equipment mobilisation, improved personnel mobilisation times and rigorous acceptance testing of production-critical equipment.

Post project commissioning, AWT continued to honour its commitment to life-of-asset production optimisation through:

- Monitoring and supporting the ROC Operating Team in all aspects of ESP performance.
- Planning and management of all well servicing activities.
- Rapid response and provision of experienced well servicing personnel for CT ESP replacement.
- Training of operations personnel in elements of ESP and CT maintenance and operations, flow assurance and chemical injection.

CT-ESP Installation
Concurrent with Drilling

CT-ESP Deployment