

CASE STUDY

GPC — GALOC FIELD, PHILIPPINES



AWT Disciplines

Well EPCM

Drilling

Completions

Subsea

Production Technology

Background

The Galoc oil field, operated by Galoc Production Company W.L.L. (GPC), represented the first commercial offshore oil development in the Philippines in three decades. Pre development estimates of recoverable reserves were approximately 10 MMstb of oil.

The Galoc field, discovered in 1981, is situated offshore of Palawan Island in 270 to 800m of water and comprise a thin oil column in a low permeability tertiary turbidity sandstone reservoir. Numerous drill stem tests were conducted in the development wells, with mixed results.

Galoc-1, a vertical development well, was re-entered in 1988 and a 3 extended production test was conducted. Galoc-1 was re-entered in 1989 and a horizontal sidetrack was drilled and tested. Following analysis by GPC of the available well data, the large range of reserves uncertainty that remained required a phase development approach to minimise development risk.

An initial two well Phase 1 development with a significant appraisal component was decided upon. Two horizontal wells and a single pilot hole were required to meet both the appraisal and development objectives.

AWT Workscope

Following AWT's engagement in the conceptual pre-FEED field development studies, AWT was awarded the Well Engineering Procurement Construction Management (EPCM) contract for the field development by GPC. This contract covered all well construction work up to the installation of the subsea trees.

AWT was required to interface closely with the small GPC project team; installation and facilities management in Singapore and subsurface support based in London. Since GPC was a new entity without established systems and procedures, AWT was involved and/or responsible for setting up project systems and controls as well as executing the work. The challenge was to implement a cost effective field development, while achieving the appraisal and full fields development objectives.

AWT provided Well WPCM input into all phases of the project including supporting the Final Investment Decision (FID) by the Joint Venture. This included:

- preparing work plans,
- preliminary well designs,
- well costs and schedules,
- contracting the drilling unit,
- securing the used subsea trees and tree refurbishment contractor,
- tendering for long lead well construction materials,
- setup of project management systems and controls to enable management of the future procurement and field activities.

AWT also provided input into various critical project documents such as the Plan of Development, Environmental Management Plan and Reservoir Development Plan.



After FID, AWT tendered awarded and negotiated contracts on behalf of GPC for all well engineering and construction related services. These ranged from multi-million dollar bundled services contracts with Schlumberger and Weatherford to minor service orders such as weather forecasting. AWT also established all of the services required to support the drilling and completion of the development wells, in a remote location with limited established oilfield infrastructure. This included support vessels, aviation, marine supply base, freight forwarding and logistics support.

AWT prepared all well construction documentation and procedures on behalf of GPC, including:

- Geological prognosis
- Drilling & completion programs
- Coring program
- Logging program
- Emergency Response Plan

GPC's development drilling and completion campaign resulted in the successful construction of two horizontal oil production 6 production wells to be tied in to a moored FPSO.

Innovation

AWT implemented this work utilising the following notable features and innovations:

- batch drilling and completion sequences with adjacent seabed locations for both wells in relatively shallow water
- long horizontal wells drilled with rotary steerable drilling assemblies and synthetic oil based mud
- customised reservoir drill-in fluid design to minimise formation damage. This work identified a “critical velocity” for fines migration and permeability impairment.
- use of refurbished subsea trees and IWOC system (originally used by Statoil on the Gullfaks field, Norway)
- conversion of subsea installation tooling allowing a monobore completion riser system rather than the obsolete ex-Gullfaks dual bore riser.
- installation of subsea trees from a less than optimal moored drillship configuration
- use of wireless downhole gauges to enable reservoir data to be obtained where the subsea tree was not equipped with electrical penetrations
- procurement of the subsea production chokes and well control panel and free issue to the FPSO contractor on behalf of GPC
- logistics management for a remote site, including drilling unit mobilisation from Singapore



Following the well completions phase, the wells were flowed to the drilling unit and productivities were at the upper end of the expected range and much better than achieved in the earlier wells. During the clean-up flows, production rates were constrained to avoid irreversible damage due to fines migration.

At all stages of the project, the AWT team interfaced closely with GPC and its other primary contractors to ensure alignment of priorities and worksopes. Inputs from other specialist personnel were provided or sourced by AWT as required e.g. HSE, emergency response, risk management, lifting equipment certification.

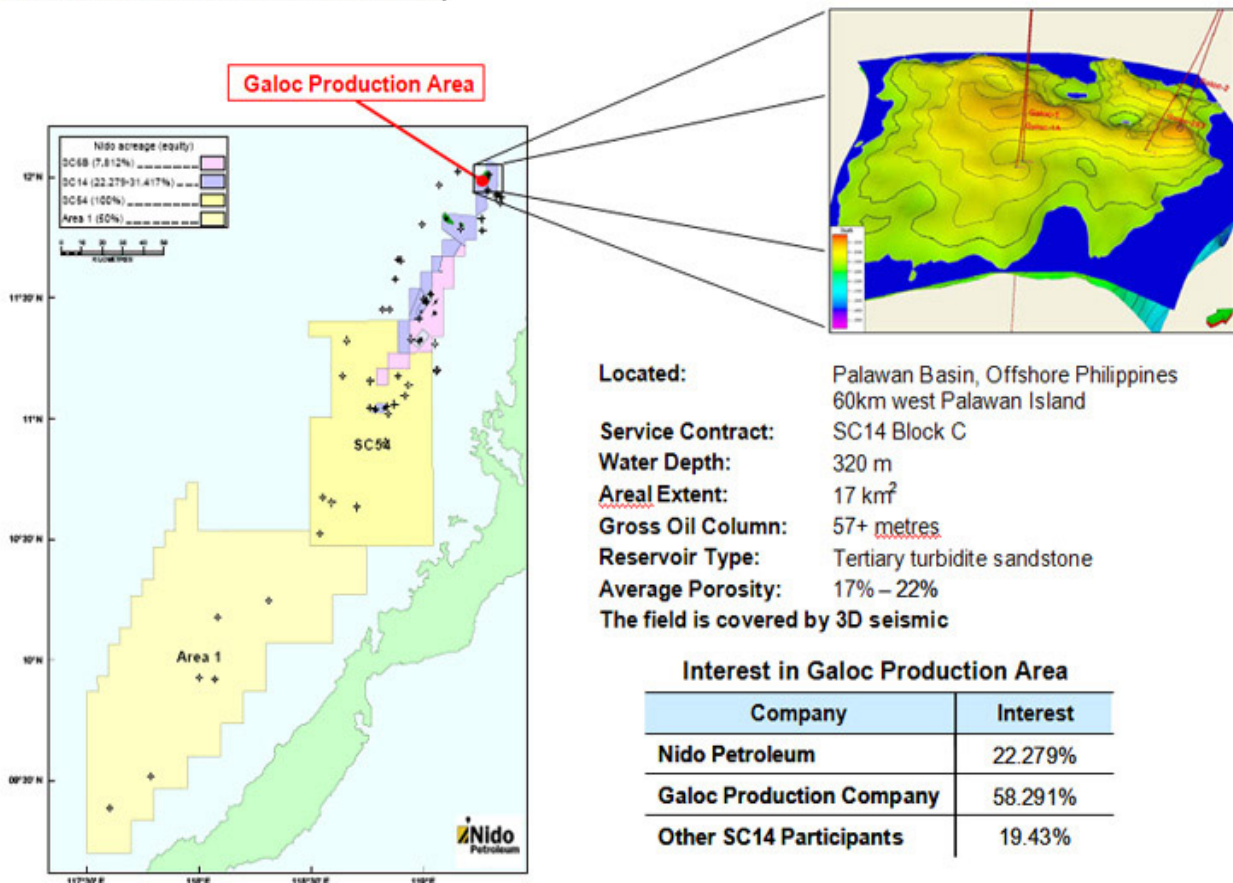
Added Value

AWT added value by conducting a campaign free from reportable lost time injuries or environmental incidents, despite of operating during the typhoon season in the South China Sea and ensuring long term life-of-asset value.

Following the well construction phase, AWT has continued to honour its commitment to life-of-asset optimisation through:

- supporting the facilities installation,
- preparing final well reports
- testing and commissioning work
- assisting with production well start-up and well testing guidelines
- facilitating contract closeout

Galoc Oil Field: Reference Guide



References

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