

CASE STUDY**LOCATION**

Deepwater Gulf of Mexico

CHALLENGE

Perform a comprehensive Engineering Assessment to identify likely location(s) and nature of blockage and support in the onshore planning and offshore execution phases of a flowline blockage remediation project. Where at all possible, look for ways to minimize the field execution phase duration and save cost.

Additionally, post blockage remediation, provide buffer pill medium and volume as well as flushing schedule recommendations.

SOLUTION

Detailed review of the reservoir fluid and field's trend data, along with a methodic blockage assessment workflow, was able to identify the likely nature and location of the blockage(s).

Preliminary work understanding the permanent facilities and proposed intervention equipment, lead to the selection of a two-headed blockage remediation approach.

As part of this remediation plan, a novel technique which utilized nitrogen injection with the purpose of reducing the blockage remediation duration was implemented.

Hydrate Remediation Using Nitrogen

Provided complete hydrate blockage remediation support from initial onshore Engineering Assessment to execution planning and eventual successful field execution

A GoM operator ready to commence flowline decommissioning requested support in the remediation of a blockage which, at the time, had been present in their flowline for over two years. The Engineering Assessment scope included:

- Reservoir fluid review to identify field's main flow assurance concerns.
- Detailed review of the field's pressure and temperature data and events leading up to blockage occurrence. Detailed review of the operations undertaken following blockage detection.
- Identification of likely nature and location of blockage.
- Approximation of hydrate dissociation time with single and dual-sided depressurization using specialized CSMPlug software from Colorado School of Mines.

Working closely with hydrate research scientist and CSM professor, Dr. Amadeu Sum, a novel idea of utilizing nitrogen to 'crumble' the hydrate structure and significantly reduce the blockage remediation time was proposed. This approach was then further matured by GATE engineers and a field procedure was developed.

During offshore execution, GATE provided engineering services onboard the Multi-Service Vessel as well as continuous onshore support. Once the equipment was installed and tested, execution commenced and within less than 10 days the blockage had been cleared and full hydraulic communication across the flowline confirmed. The focus then shifted to flushing the flowline according to the pre-defined schedule and this too was completed without any complications.

Technical Achievements & Benefits

- Successfully remediated a challenging hydrate blockage in an insulated flowline which last produced gas condensate over two and a half years ago.
- Successfully flushed the flowline and passed static sheen test allowing for remaining flowline decommissioning activities to continue.
- Successfully utilized nitrogen to help with the hydrate blockage remediation operation; one of the first known such field attempts.
- It is believed the usage of nitrogen significantly reduced the remediation time (in the order of days), in comparison to simply approaching with single-sided depressurization.
- Industry and academia collaboration to solve a technically challenging problem: Operator ↔ Consultancy ↔ Service Provider ↔ Academia
- Worked hand-in-hand with the equipment service provider to define a suitable approach which could be implemented offshore and yield success.