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Completion Design and Equipment Selection to Facilitate Operations in a New Deepwater Region

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Abstract

Mauritania and Senegal are emerging oil and gas producers with new oilfield infrastructure being developed. However, exciting new Deepwater Opportunities are starting to be developed with a 4 well subsea production well program recently being completed in the Greater Tortue Ahmeyim (GTA) field. The operator, having extensive deepwater experience globally, and regionally, completed a thorough set of extensive completion design studies with a view to installing fit for purpose completions to match the reservoir and environmental conditions which included:

Deepwater Wells (2,700m)
Limited Oilfield Infrastructure and logistics
Gas reservoir with risk of perched water / aquifer presence
High-rate gas wells > 220 MMscf/day per well
Multi-layer reservoirs
Potentially weak rock / borderline sand control requirement
Hydrate risks
This paper will examine the approach to completion design to deliver effective completions with life of well integrity/performance while simultaneously addressing the challenges of opening up a new oilfield region.

The completion selection process will be discussed in detail including the methodology whereby technical requirements for robust solutions in critical areas such as sand production risks and reservoir performance are weighed against more nebulous selection criteria such as in-region supplier capability (limited in a new region), desire for operational simplicity.

Fit for purpose completion designs have been installed in the first phase of 4 wells and the paper will detail the lessons learned and insight around the effectiveness of the decisions made including:

Sand control effectiveness of the Cased and Perforated Completion
Performance of wireline deployed perforating with dynamic underbalance incorporated
Impact of limited inventory in a new oilfield environment with minimal infrastructure
Impact of well clean-up in multi-layer wells from reduced production rates due to surface equipment limitations
Effective data acquisition in multi-layer reservoirs including PLTs, DFOS and PBU
Hydrate management in a relatively low temperature gas reservoir in deepwater
With the experience gained by Operator, the Partners and Service Companies completion design is already underway for the next phase of wells in 2025 with the desire to implement more complex Downhole Flow Control completions in highly deviated wells to address the subsequent challenge of multi-layer reservoirs with more aerial distribution. The design approach to meet this challenge will also be introduced in this paper.