

Abstract

Topic: Repair and Intervention of HPHT Flowlines

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The objective of this paper is to report progress and recent findings related to the remediation of damaged high-pressure, high-temperature (HPHT) flowlines in deep water. The flowline repair technology currently being developed utilizes an R&D process of systematically identifying technical gaps, and then developing methods to close those gaps.

While defects or damage to deep-water export pipelines and flowlines is a relatively rare, low-occurrence/high-consequence event, recently compiled information shows that flowline problems involving paraffin or hydrate plugs are more frequent than previously believed. In addition, removing these plugs is complex and difficult.

In 2014, thirteen paraffin plugs and four hydrate plugs occurred in the GOM and are keeping the affected lines out of service. In contrast, only a few flowline repairs are called for each year.

This paper builds in part on prior work by the authors described in OTC 23143 [2], which revealed that the traditional elastomer packer seals used for non-HPHT pipeline repair tools will extrude out of the packer cavity and leak when exposed to HPHT conditions that are common to thermally-insulated flowlines, rather than uninsulated export pipelines. As a result, sealing-system designs must utilize significantly improved sealing methods—replacing elastomer packers with diecast graphite packers used for traditional offshore pipeline seal systems.

This paper describes the critical technical gaps identified and closed while conducting a joint-industry program for a group of major international operators: (1) removal of wet insulation, (2) development of HPHT sealing systems and (3) development of a subsea coiled tubing insertion hot-tap system. The unique approach to developing the technical solutions to these technical gaps involved physical testing of the proposed solutions with test jigs to demonstrate their functionality.