Identifying and Characterising Flow Assurance Issues

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Introduction

• Flow assurance specialists have long faced the challenge of maintaining continuous flow throughout subsea pipelines.

• Over time, deposits can build up - leading to potential blockages, restricted production and ultimately a shortfall in revenue.

• When these issues arise, operators are faced with the problem of determining the exact location, extent and nature of the build-up / blockage, without risking damage to the pipeline, or making the blockage worse by improper corrective action.

• Research indicates that 50-80% of remediation attempts fail first time.

• This is largely due to a limited knowledge of exactly where, what and how much material is causing the blockage.
Why use Explorer™ and Discovery™ for Flow Assurance:

- Determine the exact location, extent and nature of blockages in real time.
- Quickly visualise flow assurance issues online and non-intrusively
  - Enable rapid critical decisions to be made
- Get remediation right first time and unlock the full production potential of your subsea pipeline
Results are provided instantaneously and identify regions with flow assurance issues for further detailed tomographic deposit characterization scans by Discovery™, leading to efficient and cost effective remediation planning.
**Case Study – Gulf of Mexico**

- Subsea flowline had become plugged during a start-up operation.
- Initial remediation attempts failed
- Operator contacted Tracerco to inspect the pipeline to locate and characterise the blockage.
Locate the Blockage

Use Explorer™ to scan large lengths of pipeline for problem areas.
Locate the Blockage

• 3 distinct areas of increased density were identified for characterisation using Discovery™
Blockage Characterisation
Blockage Characterisation

100% Asphaltene blockage

60% Full of Asphaltene

Asphaltene with trapped gas

Mean density of pipeline contents
Pressure Communication

Additional Requirement to determine the extent of gas communication through the pipeline by measuring gas density increases as the pressure is increased.

In an unblocked pipeline:

\[ \text{Increase in gas pressure} + \text{Increase in gas density} = \text{Increase in gas density} \]

In a blocked pipeline:

\[ \text{Increase in gas pressure} + \text{No increase in gas density past the blockage} = \text{No increase in gas density past the blockage} \]
Pressure Communication

Low pressure density measurement results

- [0.02] g/cm³
- [0.02] g/cm³
- [0.01] g/cm³
- [0.01] g/cm³
High pressure density measurement results

- Increase in gas density observed up to 3rd deposit region but not beyond confirming complete blockage at that location.
Explorer™ & Discovery™ Case Study

Additional Requirement to determine the extent of gas communication through the pipeline by measuring gas density increases as the pressure is increased – tomogram images
Summary

• Locations of significant deposit identified by Explorer™

• Deposits characterised by Discovery™
  ➢ Deposit identified as asphaltene from its density
  ➢ Pressure communication was noted up to 3rd deposit region which was confirmed as a full-bore blockage

• Operator was able to make an informed decision to formulate an appropriate remediation plan

“...In just ten minutes of scanning, Discovery™ has shown me more about the condition of this pipeline than I have obtained from all of my modelling over the last two years...”

Gulf of Mexico Operator
Questions?