



National Engineering
Laboratory

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Case Study:

Tackling the Production of Heavy Oil
Fields

Evaluation of a Multiphase Flow Meter in Emulsified Flows

TÜV SÜD National Engineering Laboratory's client required evaluation of a multiphase flow meter in a heavy oil field located offshore in Western Australia. The oil field had a strong tendency to form emulsions due to mixing of the oil with produced water. The bulk of today's flow meters have not been evaluated for highly viscous emulsified flows. Furthermore, there are few test laboratories in the world that are capable of replicating these challenging conditions .

Issue

Heavy oil fields account for over 70% of remaining oil reserves worldwide. However, in the presence of water, emulsions can form leading to serious measurement challenges. The bulk of today's flow metering technologies have not been evaluated in oil-water emulsions. This causes major problems when reporting the amount of oil produced for fiscal taxation and allocation purposes.

The accuracy of flow meters is also critical to control the production processes, however there are few laboratories in the world capable of testing meters with high viscosity emulsion flows.

OVERVIEW

Client name	Confidential
Industry	Oil & Gas

Approach

In conjunction with the oil and gas operator, TÜV SÜD National Engineering Laboratory established the range of operational flow conditions in the field. Thereafter, TÜV SÜD National Engineering Laboratory undertook a comprehensive test programme to establish the capabilities of the facility for testing multiphase flow meters in highly viscous water-in-oil emulsions. The flow meter was installed in TÜV SÜD National Engineering Laboratory's multiphase test facility and subjected to a range of testing representative of field conditions.

Solutions

The multiphase flow meter was required to satisfy a measurement uncertainty of 6% when installed in the field.

By qualifying our test facility for emulsion flow testing the client was able to demonstrate a measurement uncertainty of 2.6%, which was a major improvement on the 6% reporting requirement.

Benefits

The testing was of major benefit to the operator and their stakeholders. It substantially reduced the financial exposure relating to measurement uncertainty. This allowed greater accuracy when reporting the amount of oil produced from the field for fiscal purposes.

By establishing real-time accurate multiphase metering for process monitoring purposes, it was estimated that the field would yield an extra 6% in oil recovery. Over a 10-day period, an additional 5,500 barrels of oil were produced each day. In monetary terms, based on current oil prices at \$80 per barrel, this would equate to an extra \$440,000 per day.

