

Public Executive Summary

Title: Heavy Viscous Oil PVT for Ultra-Deepwater Program

Name of Offeror: Schlumberger

Project Director/Principal Investigator: Gao Jinglin

Solicitation Number: RFP2008DW2201 (08121-2201-02)

Project Start Date: July 27, 2011

Project End Date: July 27, 2012

Total Estimated Cost: \$ 666,658.00

RPSEA Maximum Share: 496,294.00

Schlumberger Cost Share: 163,697.00

Project objectives

The objectives of this project include 1) Evaluation of current practice in heavy viscous oil PVT measurement, correlation and models; experimental validation of the models; 2) Development and recommendation of best practices of sample handing and laboratory measurement methods. 3) Study the impact of solvent and commingling of different fluids on viscosity change and asphaltene instability; examination of the existing models and mixing rules in handling the property change. 4) Report conditions where multiple phases exist.

Description of the project, including methods

The experimental program for the proposed heavy viscous oil PVT study includes the sample preparation and preliminary analyses such as dewatering/cleaning of live heavy oil samples (demulsification) with various techniques, GOR, composition and API measurement of clean oil samples, etc. The best practice and sample preparation procedure will be documented. Before measuring the viscosities of heavy viscous oil mixture (HVO) with solvents, the asphaltene titration tests will be performed with each solvent in order to check the compatibility of solvent with original heavy oil with respect to asphaltene precipitation. The HVO and HVO mixture density will then be measured with electromagnetic viscometer (EMV) and capillary viscometer for various types of fluids. The density of each HVO and HVO mixture will be measured at the P-T and concentrations points as viscosity with HPHT Anton-Parr densitometer. The details of the experimental method and proposed technology are discussed in the following sections.

Key deliverables associated with the project

A consolidated report documenting the work performed in each task will be prepared. The deliverables for all technical work task report will include the following:

- Task 5 – Develop and verify “best practice” sample preparation document for cleaning and sampling heavy oils, while maintaining sample integrity, for analysis.

- Task 6 – Develop and validate procedures for determining the viscosity and density of a series of mixtures that will be used to test and validate existing mixture rules for viscosity and density for oils mixed with oils, gases mixed with oils, and solvents mixed with oils.
- Task 7 – Develop and validate a “best practice” document for measurement of heavy oil viscosity determination as a function of temperature and pressure from experimental example results.
- Task 8 – Develop a benchmarked database for HVO and its mixtures with other crude oils and solvents, and evaluate the performance of existing HVO viscosity correlations as well as mixture viscosity models/correlations.

Other participants involved in performing the scope of work.

Name	Title	Designation	Years Experience	Role
Don Sieben	Quality Coach	Chem. Tech.	27 years in the industry, 20 years in DBR, specialized in lab procedures, particularly in heavy oil measurement, method development and quality control	Procedure execution and data QC, Assist in experimental design
Darcy Freemark	Lab Supervisor	Chem. Tech.	12 years in the industry, 8 years in DBR, specialized in lab procedures, method development and quality control	Oversees QHSE, mentoring experimental execution
Donavan Robinson	Fluid analysis specialist	Petroleum Engineering Technologist	1 year experience, 1 year in DBR, specialized I heavy oil measurement	Procedure execution
Heng-joo Ng	Scientific Advisor	Ph.D., P. Eng.	30 years in the industry, 30 years in DBR, specialized in fluid property measurement, modeling and consulting	Consulting, experimental design and data QC

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