

Public Executive Summary

Title: Fiber Containing Sweep Fluids for Ultra-Deepwater Drilling Applications

Name of Offeror: The University of Oklahoma

Project Director/Principal Investigator: Dr. Ramadan Ahmed

Additional participants: M-I SWACO

Solicitation Number: RFP2008DW2902 (08121-2902-07)

Project Start Date: January 5, 2010

Project End Date: January 4, 2012

Total Estimated Cost:	\$	150,131.00
RPSEA Maximum Share:	\$	118,014.00
The University of Oklahoma Cost Share:	\$	30,060.00

Regular drilling sweep procedures require circulation of a certain volume of sweep fluid, which is different from the fluid used for drilling. Due to the narrow operating pressure window, the conventional hole cleaning procedures are inefficient in completely preventing the formation of a cuttings bed in ultra deepwater (UDW) wells. Difficult drilling conditions and expensive offshore operations associated with hole cleaning problems (lost circulation and stuck pipe) are driving the development of new and efficient cuttings transport technologies. The development of new fluid systems such as fiber sweep for UDW drilling will provide optimum hole cleaning along with minimal lost circulation and stuck pipe.

The overall objectives of this project are to: 1) improve the understanding of fiber sweeps; 2) develop fiber sweep systems that improve hole cleaning in UDW drilling operations; 3) minimize loss circulation, stuck pipe and other hole cleaning related problems; 4) develop models and correlations that can be used to predict fiber sweep performance to ease designing procedures and optimize sweep applications; 5) recommend the best practices to perform fiber sweeps; 6) reduce drilling costs and improve operational safety; and 7) develop sweep technology that minimizes the impacts of drilling on the natural environment.

In order to achieve the proposed objectives, literature review and theoretical studies will be carried out on fiber containing fluids. Bench-top screening tests will be conducted to select base fluids that are suitable for fiber sweep applications and formulate fiber sweeps. Particle settling velocity experiments will be performed using the base fluids and fiber sweeps to determine the contribution of fiber drag (i.e. drag force that originates due to hydrodynamic and mechanical interactions of fibers and solids particles) to the total drag force. Extensive flow loop experiments will be carried out to study rheology, hydraulics and hole cleaning performance of the base fluids and fiber sweeps. After completions of the experiments, a mechanistic model will be developed to optimize the performance of fiber sweep. Experimental data and correlations obtained from the settling velocity experiments and rheology tests will be used to develop and calibrate the model.

The proposed study will provide the necessary information, methods and tools that help the industry to apply fiber sweeps in UDW drilling operations more efficiently and effectively. More specifically, it will deliver: 1) formulations of stable fiber containing sweep fluids; 2) experimental database describing hole cleaning performance of fiber sweeps; 3) correlations and mathematical models that are useful for designing and optimization of fiber sweep applications; and 4) recommendation and guidelines for field operations.

Development of fiber sweep technology can have a tremendous impact in improving drilling success in the ultra deepwater applications. Fiber sweep provides significant benefits in drilling UDW wells, including: reduction in lost circulation and stuck pipe; improved drilling rate and reduced costs; improved safety; reduced quantity of liquid required for drilling; and minimized environmental impact. The proposed study will expand the use of fiber sweep for exploration and development of ultra deepwater resources that contain considerable oil reserve and have the potential to substantially increase the total US oil production.

The University of Oklahoma and M-I SWACO will provide 20% of the total project budget as cost share.

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