

Advanced Mud System for Microhole Coiled Tubing Drilling

DE-PS26-03NT15476

Goal

The overall objective of the project is to develop a mud system that is compatible with a coiled tubing drilling (CTD) system to drill microholes for vertical, horizontal, and multilateral drilling and completion applications. The system must be able to mix the required fluids, circulate that mixture downhole, clean and store the returned fluids, and perform these functions in an underbalanced condition with zero discharge and acceptable levels of environmental impact. A secondary objective is to design and test drilling with an abrasive slurry jet (ASJ) drilling system.

Performers

*Bandera Petroleum Exploration LLC
Tulsa, OK*

*Impact Technologies LLC
Tulsa, OK*

Results

The basic designs and concepts for the Advanced Mud System have been developed. The results include setting specifications for components of the system, including pumps to convey the drilling fluids downhole, a subsystem to process the returned well fluids, and a method to drill a hole in rock with an ASJ.

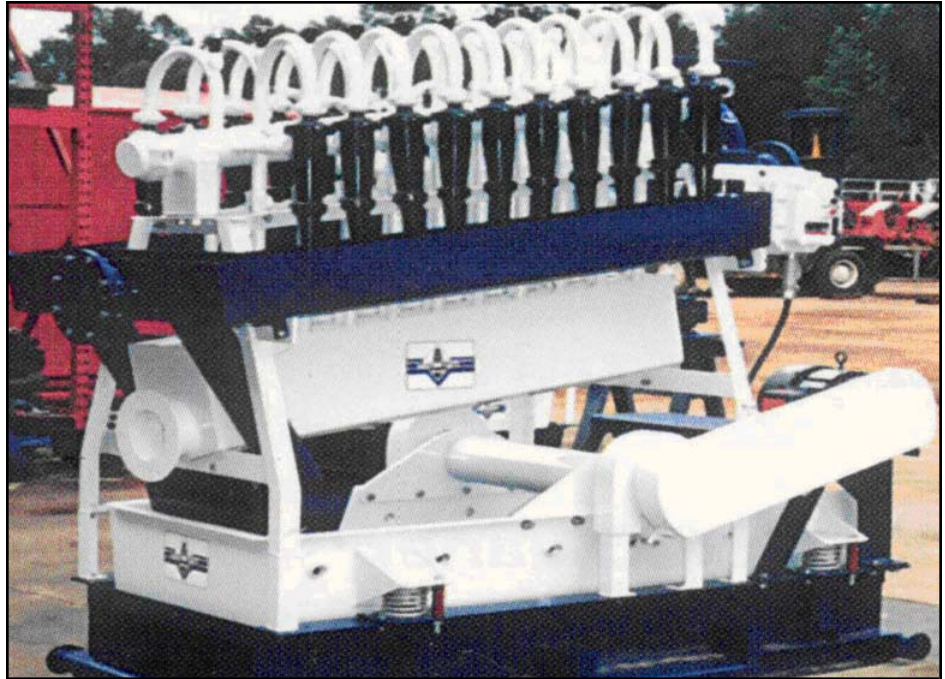
Benefits

Advances in technology that create more efficient development of hydrocarbon resources help the United States to become more energy self-sufficient, create activity and jobs in oil and gas basins, and generate royalty revenue.

More-efficient hydrocarbon development through microhole drilling can be measured in lower finding and production costs and in lower environmental impact when compared with existing conventional technology.

Background

Microhole drilling offers numerous advantages to develop reserves that are currently being bypassed. However, it also presents a new set of equipment and operational hurdles that will have to be solved before CTD systems can be commercialized.



A small-capacity mud processing system for microhole drilling.

One isolated piece of the puzzle is the mud system, which will have to be a departure from currently available and applied pumps and mud processing equipment used on conventional rigs. Proper sizing for a coiled tubing application is a key element for the mud system. The ability to drill holes in rock with abrasive-laden fluids has been of interest to the industry since the 1950s, but there have been equipment or technical limits that prevented its application. The concepts of microhole and coiled tubing drilling make abrasive jet drilling a promising adjunct, and the logical place to develop the ASJ is within the advanced mud system.

Summary

Project researchers have:

- Validated drilling synergies for microhole CTD. The requisite hydraulics, mud types, pump types, and mud processing equipment applicable to microhole CTD was confirmed through computer modeling and investigation of industry standards.

- Investigated ASJ drilling. After a literature review of previous work and consideration of microhole CTD parameters, a laboratory demonstration was able to cut a hole in rock larger than the nozzle diameter while continuously delivering abrasives to the downhole tools.
- Set pump specifications and identified available pumps. After defining true operating parameters for mud pumps in microhole CTD, specific manufacturer and models were identified for viable applications.
- Set mud processing parameters and identified mud processing equipment. Mud processing equipment was identified based on drilling fluids and flow rates applicable to microhole CTD and the resulting desired fluid properties.

Current Status (January 2006)

Budget Phase I has been completed, and a final report was submitted. DOE approval will allow the project to proceed to Budget Phase II, which will entail manufacturing or purchasing and testing prototypes of the designs and concepts from Budget Phase I.

Project Start / End: 8-2-04 / 2-1-07

DOE / Performer Cost: \$473,600 / \$118,400

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