# Development of Novel Drilling-Fluids Nanoparticles for Enhanced Drilling Operations

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**Abstract**

This article, written by JPT Technology Editor Chris Carpenter, contains highlights of paper IPTC 18381, ñDevelopment and Testing of Novel Drilling Fluids Using Fe2O3 and SiO2 Nanoparticles for Enhanced-Drilling Operations,ò by Zisis Vryzas, Texas A&M University at Qatar; Omar Mahmoud and Hisham A. Nasr-El-Din, Texas A&M University; and Vassilios C. Kelessidis, Texas A&M University at Qatar, prepared for the 2015 International Petroleum Technology Conference, Doha, Qatar, 7ï9 December. The paper has not been peer reviewed. Copyright 2015 International Petroleum Technology Conference. Reproduced by permission.

This work focuses on the laboratory techniques for developing, assessing, and analyzing innovative water-based drilling fluids containing iron oxide (Fe2O3) and silica (SiO2) nanoparticles. The examined nanoparticles have the potential to significantly improve the characteristics of the filter cakes at both low-pressure/low-temperature (LP/LT) and high-pressure/high-temperature (HP/HT) conditions. They also have the ability to maintain optimal rheological properties so that many drilling problems can be mitigated efficiently.

Introduction

Drilling-fluid loss is considered the major source of capital expenditure during drilling operations. Nanoparticles have proved to be more effective in reducing the filtrate losses than conventional fluid-loss reducers. Because they exhibit different adsorption and transportation behavior in different porous media, nanoparticles have been used successfully as stabilizers in emulsions and foams, as rheology modifiers, and as fluid-loss additives in surfactant/polymer or water-based drilling fluids. Addition of Fe2O3 and SiO2 nanoparticles can improve or at least maintain fluid properties even at high temperatures. This work aims to find the optimal concentration of such nanoparticles.

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