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Application of Membrane Filtration Technologies to Drilling Wastes

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Abstract

The Environmentally Friendly Drilling (EFD) program is taking a renewed look at dealing with the issue of waste management and re-use particularly with regards to produced water and water based drilling wastes, developing solutions that would possibly reduce the size of reserve pits needed in drilling operations and achieve significant waste volume reduction through the extraction of water from drilling wastes encouraging reuse of the extracted water in drilling operations and the concentration of suspended solids.

The EFD is investigating the use of membrane-filtration technologies in the aforementioned aim of waste volume reduction and water extraction from drilling wastes. The investigation involves processing actual drilling wastes using various membrane types and configurations in developing solutions to challenges facing membranes particularly fouling. We are investigating the ability of these membranes to effectively remove the suspended solids from waste streams and refine the waste to levels where they could be used in drilling operations or sent for further treatment such as desalination. Our aim is to develop a mobile treatment unit made of a suitable membrane system that could be deployed to drilling sites to be used as an onsite option aimed at recycle or re-use of water resources.

We are currently investigating in our laboratories various membrane-filtration technologies with water based oilfield wastes and coupling this with our prior development of field deployed technologies in developing a cost efficient membrane filtration system for field application. We show in this report how membranes have been used in the filtration of actual solids laden field supplied water based muds and a solids simulated laboratory water based mud, highlighting the compatibility of membrane systems with water based muds.

In light of the evolving stringent regulatory standards and in demonstrating good stewardship of the environment, the Oil and Gas industry is expected to be active in reducing the footprint of its various activities on the environment and in showing optimal use of resources. This approach to dealing with drilling wastes confers the two-fold advantage of optimal use of water resources through re-cycle and the reduction of the footprint of drilling operations well within reasonable economic costs by saving significant waste treatment, hauling and freshwater costs.

Introduction

The energy question is increasingly becoming the most important question of this present age, with growing populations especially those of South East Asia and the attendant energy demand of these teeming population the issue of energy has become a pressing issue globally. The search for energy to meet present demands and future forecasts is becoming more intense and more diversified than ever, despite this diversification of sources to meet the energy demand globally, crude oil remains the prime energy source today and probably in the foreseeable future. This increased demand for energy and rising energy prices have renewed interest in unconventional oil resources as unconventional resources are estimated to play a major role in providing energy for the future(1).

Parallel to increasing energy demand is the increasing awareness about environmental issues especially as they pertain to E&P operations. The last decade has witnessed increasing environmental regulation imposed by federal, state and municipal authorities on the industry in other to protect environments where exploration activities occur particularly during drilling.