

# An Experimental Investigation of Formation Damage Caused by Commonly Used Water Based Drilling Mud Onshore Trinidad

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**Abstract:** Formation damage occurs within the vicinity of the well bore during drilling operations. Unless appropriate steps are taken, well productivity can be drastically affected. The severity of this damage depends on the degree of underbalanced or overbalanced pressures between the drilling mud and formation fluids during drilling operations, the compositions of the commonly used drilling mud, the amount and types of clay present in the reservoir, fluids compatibility and the amount of fines migration that occurs during the drilling and well clean-up operations. The end result is a decrease in permeability which is usually expressed by a dimensionless parameter referred to as “skin”. In this study, rock samples from four of the main oil producing reservoirs onshore Trinidad (Cruse, Forest, Morne L’Enfer and Herrera) were treated with six commonly used drilling mud samples. Permeability measurements before and after treatment of the reservoir samples were conducted to determine the extent of formation damage. X-Ray Diffraction tests were performed to determine the type and percentage of clay present and Scanning Electron Microscope images were obtained to show how the clays were distributed in the formations. The results from these tests gave valuable information in the selection of suitable drilling mud for the onshore oil reservoirs in Trinidad. This information can benefit other regions as well that have similar shaly sandstone oil and gas reservoirs.

**Keywords:** Drilling mud, clay, formation damage, reservoir, permeability, experimental