

ABSTRACT

A LABORATORY STUDY OF THE QUANTITATIVE EFFECTS OF STEAM DISTILLATION AND VISCOSITY REDUCTION ON THE STEAMFLOODING PROCESS

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The mechanisms of enhanced oil recovery during the steam injection process were investigated by conducting steamflood and waterflood tests on four crude oils at three steamflood injection pressures of 200, 500 and 800 psig. These crude oils were especially chosen to have one (1) heavy (12.5°API), two (2) intermediate (22.5° and 23.6°API) and one (1) light oil 29.2°API.

The laboratory tests were conducted by using a specially designed steamflooding/waterflooding assembly. This assembly comprised a longitudinal flow sand-packed cell, steam generation system, water injection system, fluid collection/metering system and a steam quality measuring device.

The effects of the viscosity reduction and steam distillation mechanisms on the steamflooding process were quantified (first approximation) by the development of a three-curve model. This model consists of a composite graph representing the steamflood oil recovery curve, the waterflood oil recovery curve and the specific gravity curve. The model developed in this study requires indepth analysis of these three curves to determine the relative contribution of viscosity

reduction and steam distillation effects to the total steamflood oil recovery.

Results reveal that both viscosity reduction and the steam distillation effects occur for all crude oils during steamflooding but to varying extents depending on the crude oil API gravity. Also, this study shows that steam distillation is as important to oil recovery for light oil reservoirs as viscosity reduction is to that for heavy oil reservoirs. The author wishes to thank Professor P.N. Bruce, former Head of the Petroleum Engineering Unit of the University of the West Indies.

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