EAGE

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Dry Heat Recovery Enhancement of Wafra Eocene Using Conventional Temperatures

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SUMMARY

.

Abstract

Eocene-Wafra is a heavy oil reservoir that is producing 17-21˚API oil. This carbonate-dolomite reservoir has substantial amounts of this heavy oil and has low primary recovery, which is a candidate for steam recovery. However, current high quality steam recovery campaign is facing serious technical challenges such as expensive, inefficient and limited supply of fresh water for the injection, which make other unconventional recovery plans more attractive to increase the recovery. This study will address a dry heat recovery mechanism of a synthetic reservoir media with real Eocene dead oil samples collected from the Eocene-Wafra reservoir. After mimicking the reservoir with the oil and water samples, an investigation study of subjecting the synthetic physical heavy oil reservoir into several designed conventional field temperatures to find the optimum recovery rate. The main objective of this study is finding the optimum recovery rate using dry heat instead of expensive, inefficient and limited supply water of wet steam recovery.

An experimental investigation of the heavy oil method utilizes retorting method. The apparatus and operating conditions presented are designed specifically to simulate the retorting process by a retort apparatus which offers a maximum sample capacity up to 70%. Twenty experiments with two individual compartments and as selected samples are heated in order oil and water are extracted simultaneously. The fractionated liquids are collected in volumetrically calibrated glasswares. The retort method is a dry heat that subjects the reservoir to zero water injection. Several designed conventional temperatures are as follows: 25℃, Reservoir temperature, 100℃, 200℃ and 300℃. There are also several dependent retorting variables (Temperature, temperature enhancing metal rods, metal rods diameter, Retort time, and Heavy oil density upgrading), of which will be investigated in terms of quantity and quality of oil recovery. New correlation will be proposed based on these variables that can serve as an analytical tool to study operating procedures for future Eocene-Wafra 17-21 API heavy oil recovery enhancement.

The optimum recovery yields are obtained from experimental results based on multiple linear regression analysis. In addition, conclusions of recovery profiles will be discussed in regards to time and temperature.