ABSTRACT

The Meruap Oilfield has an average daily oil production between 3,000–3,500 BOPD (Barrel of Oil Per Day). To improve oil production in this field, Chemical Enhanced Oil Recovery (CEOR) technology was utilized, where a pre-pilot project (field test), with injection of surfactant kind Alkyl Benzene Sulfonic (ABS) petroleum base treatment was implemented. It was chosen based on the laboratory study (reference Table 1) conducted in the Meruap Oilfield.

Surfactant injection is used to reduce the interfacial tension (IFT) of oil-fluids, where the oil is trapped due to capillary pressure and is unmoving, hence this trapped oil could be displaced by the surfactant injection. The miscibility of the surfactant with oil-performed emulsion will reduce the capillary pressure. Based on the compatibility test, the Meruap reservoir fluid (formation water) and oil sample, IFT test, and core analysis, Surfactant ABS was used in the implementation of injection Huff and Puff surfactant in Well-1 and Well-2. It has a concentration of 0.3% weight, with a total volume of surfactant solution about 3,000 bbl per well candidate.

Implementing chemical EOR in this case is the best way to increase oil production. Monitoring results during the two-month period in the field indicated interfacial tension between oil and fluids (middle phase in sample fluids) and a wellbore cleaning effect on the formation. Oil recovery after the surfactant injection was conducted at the Well-1 was 23–28 BOPD (93%), while before the surfactant injection, it was 14 BOPD. In Well-2, the oil recovery after surfactant injection was 40–46 BOPD (59%), while before the injection, it was 29 BOPD. These phenomena need to be evaluated for further steps in the Meruap full field chemical EOR implementation.

INTRODUCTION

Technology Enhanced Oil Recovery (EOR) has been developed using chemicals, including alkalines and surfactants, and in some cases, enhanced displacement using polymers. Certain constraints in chemical injection are different and require special formula composition on each field because the performance of the injected chemicals does not give the same results in every field. The results of laboratory tests are indispensable and are becoming a key success in improving oil recovery at the time of injection in the field. The results of the laboratory tests are devoted to assessing the reduction of interfacial tension (IFT), which is related directly to oil recovery (reference Figure 1). The laboratory tests were also conducted with different surfactant compositions as surfactant ratios to find the most suitable with rock type, oil, and formation water (reference Table 1). Before we do full field chemical injection, we have to field test to realize the proper chemicals based on the characteristics of the target reservoir for EOR. A surfactant injection wells immersion mechanism (Surfactant Soaking Test) is crucial in the performance assessment of chemicals used after the screening stage.

Surfactant injection in the Meruap field is the Huff and Puff method, applying only surfactant without an alkaline or polymer. Chemicals used are surfactants Alkyl Benzene Sulfonic (ABS), petroleum base. The soaking surfactant test is conducted with the assumption of a fluid movement approach in displacement and production wells, with a soaking process. The return was expected to equal the fluid movement of displacement; in other words, the resulting data could be used as a basic reference in a pilot project with a displacement system between injection wells and production wells. The success of the soaking surfactant test is determined by the production of wells, namely Huff and Puff, to increase oil production and observation of the total oil production as a reference, in addition...