

The Effects of Steam Commingled Injection in Heavy Oil Production from FNE and Bamboo Sudanese Fields (Steam Adsorption and Distribution Challenges)

Husham A. Elbaloula

Sudan University of Science and Technology, Petro-Energy-E&P
PDOC & PE Tower, Khartoum, Sudan
hushamali66@gmail.com, hushamali@petroenergy-ep.com

Dr. Tagwa A. Musa

College of Petroleum Engineering & Technology
Sudan University of Science and Technology
Khartoum, Sudan
tagwam@gmail.com

Abstract

Thermal Enhanced Oil Recovery (TEOR) is a family of tertiary processes defined as “any process in which heat is introduced intentionally into a subsurface accumulation of organic compounds for the purpose of recovering fuels through wells”. After hot water and heated gasses have been tried, the most common and effective vehicle used to inject heat is saturated steam. Most of commingle thermal wells has a problem in steam intensity distribution among the layers, which will lead to inconsistency in steam adsorption and some layers would adsorb more than double of the designed steam injected volume. This phenomenon will lead to low productivity and negatively impact the distribution of water cut in the different layers. Steam adsorption and distribution represent one of the main challenges of heavy oil production from Sudanese oil fields. very limited studies have been conducted in this field in Sudan oil fields, and this study is focused on addressing this challenge to maximize recover factor from each well and each field. In this paper we will highlight the challenge facing Bentiu reservoir in Fula North East (FNE) and the Bamboo fields that are located in heavy oil zone with target of production around 85% of the total reserves. These fields are of shallow depth ranging between 520m and 13m and rather low pressure gradient 1.09 psi/m, and with reservoir temperature around 44 °C and 65 °C respectively.

The study report our investigation on the benefits of steam adsorption to enhance the oil recovery focusing on the distribution of the steam inside the layers. Our ultimate goal is to design an optimum steam injection protocol that will maximize the recovery factor from these oil zones.

The study covers analyzing and reviewing the actual steam intensity distribution among each layer in the two fields that are later compared with the designed ones. In a later stage, we designed a pilot model that has been designed using advanced thermal EOR Simulator to understand the effect of commingle injection and production (Steam adsorption and distribution) using data from single layers.

The results show that the production performance of wells has been improved and the cumulative oil production increased almost five times compared to last cycle and the cycle duration been extended for more than two years..

Keywords

EOR, CSS, Steam Adsorption, Distribution Challenges, Sudanese Oil Field.

Biography

Husham A. Elbaloula is a Simulation Engineer at Petro-Energy-E&P and Lecturer & Researcher in Sudan University of Science and Technology, He has Nine (9+) years of diverse experience in oil and gas field development planning, Performance review, Reservoir Simulation, Reservoir Management and IOR/EOR, He earned BSc and Msc. In Petroleum Engineering from Sudan University of Science and Technology College of Petroleum Engineering & Technology and currently he is Petroleum Engineering PHD candidate in the same College.

He has participated in more than 15 local and international Technical workshops, Conferences and symposium in (Sudan, KSA, UAE, India, Bahrain, Morocco and Canada), He has published eight (8) journals and conference papers, and participated in five (5) Enhanced Oil Recovery projects in Sudanese Oil fields, and Conduct more than 15 training courses in the area of IOR/EOR for different training centers and companies.

Dr. Tagwa A. Musa is an Associate Professor, and Dean of College of Petroleum Engineering & Technology- Sudan University of Science and Technology, She earned BSc in Petroleum Engineering from Sudan University of Science and Technology, Masters and PHD in Petroleum Engineering from China University of Geosciences, Wuhan, China, she has more than 10 published journal and conference papers. She supervised many Postgraduate Students (Bsc. 20 groups, Msc. 16 Students and 3 PHD Students). She is member of SPE, SAPEG, SES, and SWPI.