



The Evaluation and Three-Dimensional Modeling of the Zubair Reservoir in Luhais Oilfield, Southern Iraq

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Abstract

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The Luhais Oil Field in Southeast Iraq produces oil and gas from clastic reservoirs, the Barremian-Aptian Zubair Formation. Zubair Reservoir is primarily made up of layered sandstone, shale, and shaley sandstone. The Zubair Formation is approximately 450 m in thickness. This study aims to build a three-dimensional (3D) reservoir model of the Zubair Formation employing digital logs and drilling data. The model identifies reservoir characteristics such as porosity, water saturation, and petrophysical property models. The 3D geological modeling scheme depicted the spatial distribution of petroleum physical characteristics. The Zubair Formation is divided into four petro-physical units: A, B, C, and D. Each division has distinct petro-physical characteristics that vary between and within the studied wells. The model determined a critical reservoir zone as having effective porosity, such as in the well Lu-22, which ranges from 13.6 to 17%, the water saturation ranges from 27.5 to 47.1%, and the hydrocarbon saturation ranges from 52.9 to 72.5%. Units C and D in this well have poor reservoir properties, with fully water-saturated reaching 100%. The Zubair reservoir units A, B, and C in the wells Lu-33, Lu-27, Lu-22, and Lu-8, all have medium to good reservoir properties and high hydrocarbon saturation. However, all other reservoir units exhibit poor reservoir characteristics and are nearly saturated with reservoir water, suggesting they are virtually water-saturated.

Keywords: Zubair Reservoir; Reservoir units; 3-D Modeling; Luhais Oilfield; South Iraq

1. Introduction

The Luhais Oil Field was first identified in 1961. It is located in Southeast Iraq, roughly 105 km west of Basra (Fig. 1). This field produces oil and gas from the Barremian-Aptian Zubair Formations, which are clastic reservoirs (Fig. 2). The Luhais discovery well, drilled by the Basrah Petroleum Company in 1961, produced oil from Zubair Formation with a capacity of 50,000 BOPD in 1999, (15) wells in the Luhais oil field Yield approximately 80 million barrels of hydrocarbons (Al-Shahwan et al., 2018). The Zubair produced about one-third of the recoverable oil reserves in the Luhais oil field, in south Iraq (Al-Yasi and Al-Baldawi, 2015; Al-Noor et al., 2024).