AAPG
6th Edition
AAPG Siliciclastic Reservoirs of the Middle East GTW
1-3 December 2025 | Kuwait City, Kuwait

Decoding the Complexity of the Major Clastic Resevoir Systems in the Greater Burgan Field

Mona Rashad[1]

[1]KOC

Abstract

The greater Burgan field is considered to be the heart of Kuwait, with regards to the livelihood and economic prosperity it possesses for the country, with its discovery in 1938 followed by production of first oil eight years later. The clastic reservoir complex of Burgan and Wara reservoirs have dominated the production portfolio of the field. Thammama group clastics of the Zubair formation and the Burgan and Wara sands of the Wasia group represent the principal periods of siliciclastic sedimentation on the northeastern portion of the platform during the Cretaceous. At Greater Burgan the Burgan formation was initially subdivided into 2 units; the Third and Fourth sands but with continued drilling and additional well data the Third sand is subdivided into 3 units which are referred to as the upper, middle, and lower Third sand. The Wara clastic reservoir of late Albian to early Cenomanian Cretaceous age was deposited in a fluvial system exposed to bio clastic carbonates known as Wara shales. These shales were formed during the falling of the relative sea level and finished by fluvial valleys filled with tidal estuaries caused by transgressive and high stand of the relative sea level. The sandstone units of Wara have an average thickness of 200 ft.

As the field matured with time, many studies were undertaken to understand and describe the reservoir architecture, connectivity and production potential. Some notable projects from a list of many studies have been selected to be reviewed for this publication.

A 3D geological model of more than 900 million cells was built (Filak et al., 2013), based on the new structural and stratigraphic framework interpretations to capture the complexity of the Burgan Field reservoirs. Rock-types were defined, based on more than 900 well logs and core petrophysical properties measurements. The seismic reservoir characterization, focused on inversion techniques and calibrated with the newly defined rock-types provided crucial information on sandstone proportions distribution, especially in areas with lower well control. The first attempt to simulate, at high resolution, the largest siliciclastic oil field in the world provides a comprehensive way to understand the field heterogeneities and behavior. The updated geological model, based on new interpretations, allowed characterizing the major reservoir heterogeneities and has significant impact on the reservoir management of this giant field.

The sequence stratigraphic framework of the clastic sequences of Burgan and Wara formations were refined for improved reservoir characterization. A new Integrated Subsurface Description (ISD) of Burgan reservoirs in Greater Burgan Field has been generated based on these new data (Saucier et al., 2018), with an improved stratigraphic and depositional framework. Reservoir zonation scheme has been improved with the integration

of a huge quantity of pressure data available in the field to better define the sand bodies continuity within stratigraphic layers.

In order to streamline and standardize formation evaluation process and workflows in the Greater Burgan field, a study (Rashaid et al., 2017) was undertaken comprising four objectives. 1- to enable South and East Kuwait directorate in establishing a comprehensive well log database for the Greater Burgan clastic reservoirs of the Cretaceous age. 2- to establish standardized and auditable log processing and normalization procedures. 3- build a core calibrated formation evaluation model for the multiple stacked reservoirs from Ahmadi to Shuaiba. 4- propose a consistent process and workflows to extend the petrophysical evaluation on newly drilled wells in the field. A study was conducted to evaluate the hydrocarbon potential in the shaly sands thin beds of Burgan and Wara Formation. Acquisition of the triaxial induction tool enabled the study of resistivity anisotropy and the identification of thin pay zones through the distinct reading of the resistivity of the thin sand reservoir. The thin layers have been also further validated using high resolution advanced thin bed analysis from image logs. The newly identified thin pay zones were further validated using the fluid sampling confirming presence of hydrocarbons with greater understanding of its properties.

A special study covering the Northern Burgan Airport area which lies outside of the main Burgan field was conducted to evaluate the hydrocarbon migration with possible stratigraphic traps along the migration pathway (associated to minor structural highs). Advance logging including NMR, coring and sampling along with high resolution reservoir modeling was carried out to quantify the oil potential for reserves increment.