

The application of high resolution chemostratigraphy to improve reservoir characterization – an example from the Shu'aiba Formation Saudi Arabia

FENG LU*¹, CHRIS REID¹, DAVID TAYLOR¹ AND SHOUWEN SHEN¹

¹Saudi Aramco, Dhahran, Saudi Arabia 31311

(*correspondence: feng.lu@aramco.com)

The heterogeneity of the Lower Cretaceous Aptian carbonates, Shu'aiba Formation, in the Rub Al Khali of Saudi Arabia is challenging to extrapolate for reservoir quality laterally, due to dramatic changes in deposition. A comprehensive set of low-cost chemostratigraphic techniques, including: stable carbon and oxygen isotopes, carbon isotopes of organic matter, strontium isotopes, and major and trace elements, have been utilized to identify depositional cyclicity. These techniques, complemented by well log, core description, x-ray diffraction, petrography and diagenetic studies are very helpful to correlate strata, to delineate reservoir quality distribution, and to establish a reservoir model for production planning. The Aptian chemostratigraphy, $\delta^{13}\text{C}$ in particular, in the Rub Al Khali can be correlated to the adjacent Shaybah field, UAE and Oman fields, and also Tethyan deep sea sections. In addition, these isotopic excursions reveal one major, and probably two minor, OAEs during the Aptian. Furthermore, a dramatic isotope shift indicates subaerial exposure occurred between the early and late Aptian, facilitating diagenesis and secondary porosity development in the underlying reservoir section.