Predicting, Preventing, and Mitigating Shallow Dammam Formation Losses on the Rumaila Field, Southern Iraq

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ABSTRACT

Over one thousand wells have been drilled on the super-giant Rumaila oil field in southern Iraq. These wells produce from multiple stacked clastic and carbonate reservoirs, and all drill through the shallow carbonate Dammam Formation. The Dammam Formation is infamously known locally for its high risk of severe to complete mud losses while drilling, sulphurous water flows, and associated well control events. Rumaila Field drilling teams have encountered significant non-productive time (NPT) in the form of partial and total losses whilst drilling through the Dammam Formation. The objective of the study was to understand the loss mechanism, and to build a suitable tool such that drilling teams could predict where losses might occur and plan for their remediation. Seismic products derived from careful seismic character interpretation have been integrated with a detailed analysis of log data, an NPT database and drilling expertise. Data shows that losses occur within specific stratigraphic zones where parts of the Dammam Formation are karstified, containing extensive networks of large vugs. When drilling through these zones partial or total losses occur, depending on the extensiveness and interconnectivity of the vug networks. A risk map for likely presence of karstification has been developed, based on input from seismic data, log data and an NPT database. This map is effective at predicting likely locations for severe losses in the Dammam and improves our understanding of Dammam drilling risks. Drilling teams are now better able to predict, prevent and mitigate their effects.