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Wellbore Stability Evaluation of Ratawi Shale Formation

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Abstract : Wellbore instability problems are considered the majority challenge for several wells in the Ratawi shale formation. However, it results in non-productive (NPT) time and increased well-drilling expenditures. This work aims to construct an integrated mechanical earth model (MEM) to predict the wellbore failure and design optimum mud weight to improve the drilling efficiency of future wells. The MEM was based on field data, including open-hole wireline logging and measurement data. Several failure criteria were applied in this work, including Modified Lade, Mogi-Coulomb, and Mohr-Coulomb that utilized to calculate the proper mud weight and practical drilling paths and orientations. Results showed that the leading cause of wellbore instability problems was inadequate mud weight. Moreover, some improper drilling practices and heterogeneity of Ratawi formation were additional causes of the increased risk of wellbore instability. Therefore, the suitable mud weight for safe drilling in the Ratawi shale formation should be 11.5-13.5 ppg. Furthermore, the mud weight should be increased as required depending on the trajectory of the planned well. The outcome of this study is as practical tools to reduce non-productive time and well costs and design future neighboring deviated wells to get high drilling efficiency. In addition, the current results serve as a reference for similar fields in that region because of the lacking of published studies regarding wellbore instability problems of the Ratawi Formation in southern Iraqi oilfields.

Keywords : wellbore stability, hole collapse, horizontal stress, MEM, mud window
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