

Geology's Influence on Geomechanics and How It Relates to Borehole Stability Analysis

Jordan Gao and Queena Chou

Weatherford Petroleum Consulting Services

Abstract

When we don't have a lot of geomechanical information in a study location, and we want to solve a borehole instability problem, what can we do? If we dismiss earth's propensity for heterogeneity, what would happen? Lastly, if we overlook what is happening with geology in this setting, what would be the consequences? When there are an abundance of rock elastic and mechanical data, current in-situ stress information, structural and sedimentary data sources, conducting a borehole stability analysis is vastly easier than when there is scant information, which is most often the case. Each situation is different. In this presentation we dissect a case study of a rock formation in a producing field with varied structural and sedimentary geological characteristics. We provide thoughts on ways to conduct a borehole stability analysis when key geomechanical input variables are missing. In the end, we weighted higher core observations than observations from some other data sources. Our determination of the validity of conclusion went through a thorough process of elimination, during which we studied evidence from drilling operations and geology. Finally, we recommend maintenance of constant bottom-hole equivalent circulating density (ECD) above collapse pressure and wellbore orientation optimization as two solutions for avoiding borehole instability.