

URTeC: 2178246

A Regional Review of Geomechanical Drilling Experience and Problems in the Duvernay Formation in Alberta

Mehrdad Soltanzadeh¹, Amy Fox¹, Sarah Hawkes¹, David Hume²

¹Canadian Discovery Ltd., Calgary, AB, Canada

²Core Laboratories LP, Houston, TX, USA

Abstract

The Duvernay Formation has been an attractive unconventional play for several producers during the last few years, and the number of drilled wells in this play has been increasing rapidly. Nevertheless, drilling in this formation is usually considered a challenging practice due to the extremely high stresses and pore pressures that can be encountered. Drilling in the Duvernay and its overlying formation, the Ireton, has shown a wide variety of drilling incidents such as sloughing, tight spots, bridges and lost circulation. This paper summarizes the results of a comprehensive regional review of drilling experience for 43 Duvernay wells. In this review, the details of drilling experience for these wells were documented using a graphical approach that captures important information on the details of drilling incidents including depths and dates, along with information on mud weights and well trajectory. As an initial part of a broader regional geomechanical study of the Duvernay, these data were statistically analyzed to identify the stratigraphic and spatial variation of drilling patterns throughout the study area. The results revealed significant differences between drilling patterns in the three major active areas of the play including south (Willesden Green and Edson), central (Kaybob), and the northwest regions. In general, wells in the central region can be drilled with lower mud weights than other regions, and experience fewer drilling problems. Because pore pressure in the Duvernay Formation in this area is as high as in the other two regions, the difference in drilling experience was attributed to considerable differences in *in situ* stress, which appears to be related to the presence of Leduc reefs.