Understanding the Petrophysics of Horn River Shales

Salman Khalid*
Schlumberger Canada, Calgary, AB
khalid2@slb.com

D. Tivey and V. Biersteker
Encana Corp, Calgary, AB, Canada

and

K. Faurschou and X. Zhao
Schlumberger Canada, Calgary, AB, Canada

Summary

Horn River Basin has opened up new opportunities for exploration of shale gas reservoirs in Canada. Understanding the petrophysics is key to successfully developing this reservoir. In this paper, we will discuss the techniques available to determine reservoir parameters ranging from simple to sophisticated, through the interpretation and understanding of core and log data.

Introduction

Horn River has opened up a number of shale gas exploration opportunites. The shale package comprising of the Keg River, Evie, Otter Park, Muskwa and Fort simpson formations has been of great interest because of certain similarities with the Barnett shale. In addition. Core and log data has been made available to the public, by the Government of British Columbia. This paper discusses how some of this data along with advanced logging and core analysis techniques can help us understand the key production parameters.

Method

Integration of core and log data is a technique well known in the industry with the known advantage of controlling the uncertainty in interpretation. This is specially applicable when the log measurements available are of a basic nature. When public domain data is used to prospect and understand an area, we are usually left with these basic logs. At this point it becomes critical to incorporate core information in the process to encahnce the quality of the product. However, this process can only go so far. At some point it becomes incumbent to use modern logging technology and sophisticated core techniques to determine the critical stuff. This presentation looks at both the simple and the advanced. It makes use of the public data from both core and logs and focuses on the answer.

The key items to be determined when establishing the producibility of such reservoirs, can be listed as detailed lithological analysis, estimation and characterization of organic content, determination of porosities in the system and last but not the least a thorough understanding the geomechanics of the rock. So the objective of any interpreation exercise should be to look at these items as much as possible.

In this paper our attempt is to show the merits and demerits of various basic techniques, and certainly the demonstration of advanced interpretation and data acquisition techniques which will get us the required information
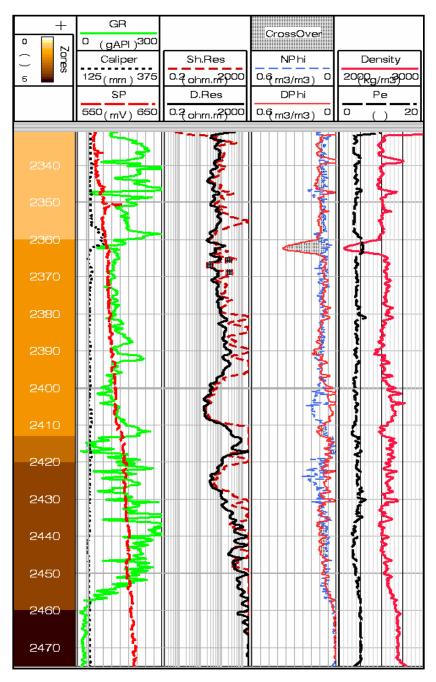

Figure 1: Public Domain Data from a well in the Horn River Basin

XRD DATA				
Depth	illite	quartz	pyrite	calcite
2337	0.07	0.9	0.01	0.01
2343	0.09	0.9	0	0.01
2350	0.11	0.88	0	0
2355	0.04	0.93	0.01	0.01
2357	0.1	0.87	0	0

Figure 2: XRD data from core analysis of the Muskwa Formation
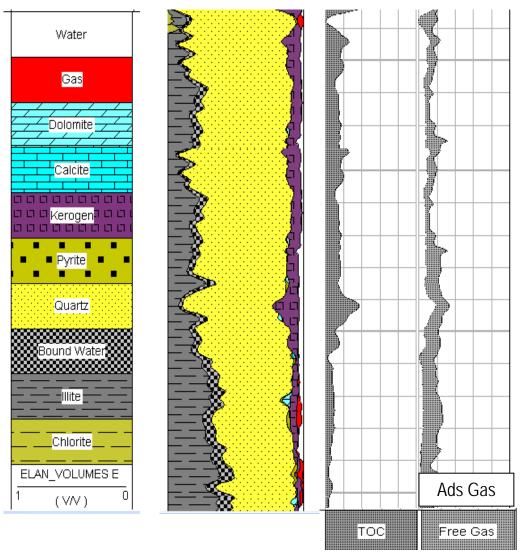
Figure 3: Advanced interpretation techniques applied on a simulated data set representing the Muskwa formation