

## Geological Controls on Well Productivity and Reservoir Performance in Select North American Shale Gas Plays

P. A. L. Winder\* (Talisman Malaysia Limited), R. Herbert (Talisman Energy), G. Schmidt (Talisman Energy), M. Lawford (Talisman Energy) & B. Faraj (Talisman Energy)

North American shales typically exhibit geological variability on a macro and micro scale that results in marked variability in well performance. In the era of unconventional development, technology is driving well performance, but geology still underpins the potential for commercial development. Three North American shale gas plays, the Marcellus Shale in Pennsylvania, USA, the Montney Shale in Western Canada and the Eagle Ford shale in Texas, USA are the current focus of active piloting activity and in the case of the first two of these shales, development (figure 1).

To date, approximately 500 wells have been drilled by Talisman in the Marcellus, Montney (figure 2), and Eagle Ford Shales. The pace of evolution of shale plays is growing exponentially.

Therefore, it is critical to acquire data early and develop geological models to establish a clear understanding of the

technical controls on commercial development.

The results described will include the data obtained from 23 cored wells, which recovered over 1,000m of full-diameter core. Extensive analysis of samples, including XRD, SEM, geochemical analysis, as well as porosity, permeability and saturation measurements that are designed specifically for shales were conducted early in the life of the play. These data are integrated into basin-wide depositional and maturity models to establish a prospective fairway.

The complex interplay between shale mineralogy, tectonics, and reservoir fluid composition determines the response of the shale to hydraulic fracturing (figure 3), and subsequent reservoir performance (figure 4).

The combination of these characteristics and their effect on well productivity and reservoir performance will be discussed and contrasted for each of the shales.

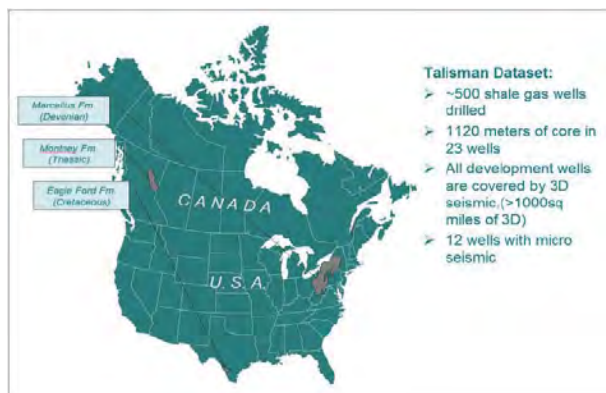


Figure 1: Location map of 3 North American shale gas plays.

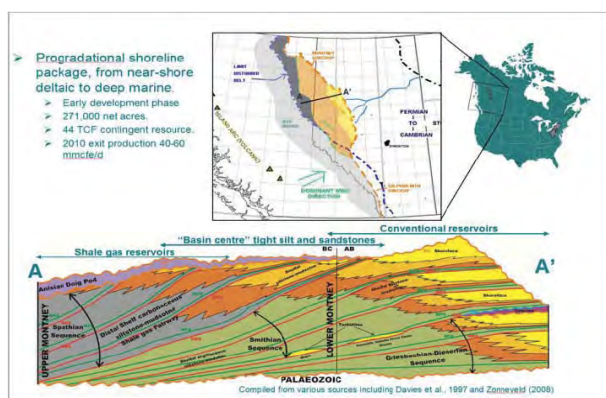


Figure 2: Montney Formation, Western Canada.

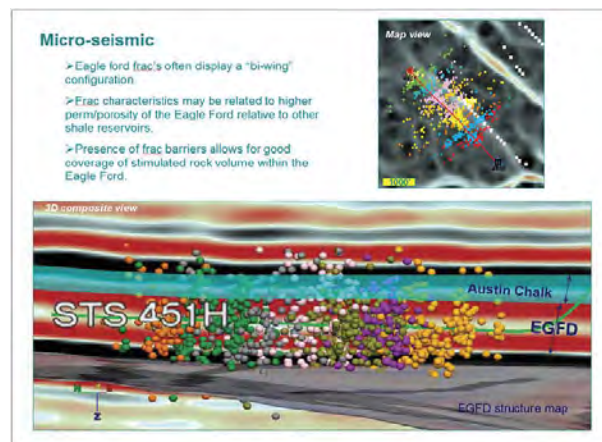


Figure 3: Micro-seismic example from the Eagle Ford Formation, USA.

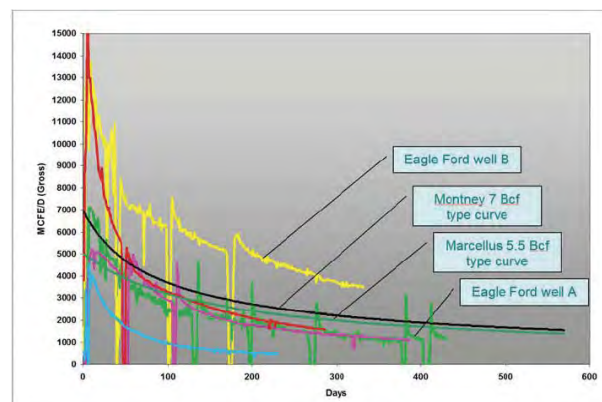


Figure 4: Comparison of Eagle Ford, Marcellus and Montney gas production.