

Incised Valley Fills in the Oil Sands and Elsewhere in Alberta

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The Lower Cretaceous Mannville Group, and other Cretaceous formations of Alberta, host an extraordinary number of incised valleys. Selected seismic amplitude slices show a spaghetti-like mass of channels cutting into the stratigraphy. These valleys were incised during periods of relative sea level fall and can erode up to 60 m or more into the underlying strata. The fills of these features are surprisingly varied, ranging from fluvial to estuarine to marine, and from thinly interbedded to massive in character.

Some of the valley fills host oil or gas, and indeed incised valley fills are considered to be the main reservoir of the Upper Mannville Group. The presence of hydrocarbons is dependent, at least in part, on the presence of a working seal overlying the incised valley. The type of hydrocarbon fill can usually be deduced from the associated well logs. The incised valleys and their associated sequence boundaries are relatively easy to identify on logs, but more difficult to correlate in the intervening highs, requiring careful attention.

This presentation will examine a variety of these features, and demonstrate how to recognize them from core, logs and seismic data. We will discuss the variety of valley fills in terms of their thickness and character, the interpreted range of associated channel dimensions, and how to differentiate between channel fills and valley fills. Selected case studies will be used to show how to identify relative lowstands on logs, and hence correlate between valleys. We will also look at how to map incised valleys, which obviously has implications for hydrocarbon exploration, and finally examine the burning question of why Alberta has such a uniquely high density of these features.