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A Seismic Stratigraphic Study of the Muddy Formation, Bell Creek Field, Montana

by

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ABSTRACT

Core studies indicate the presence of two distinct genetic facies of the Lower Cretaceous Muddy Formation in the Bell Creek/Ranch Creek area. The reservoir facies, referred to as the Bell Creek Sandstone, was deposited in nearshore marine and shoreline environments, and lies conformably on top of the Skull Creek Shale. The second facies present at Bell Creek is a valley fill deposit, of fluvial and estuarine environments, which lies unconformably on top of the Bell Creek Sandstone. The deposition and distribution of these two genetic units was controlled by sea level changes and syndepositional tectonics which took place during the Cretaceous Albian Stage.

Seismic modeling indicates that it may be possible to recognize seismically the facies changes that occur in the study area. The amplitude response of the Muddy reflector dims over the Bell Creek field, where the Bell Creek Sandstone is present. The Muddy amplitude of a thick valley fill facies, non-productive in the area, is stronger than that of a thick Bell Creek Sandstone, however, the amplitude of the valley fill is sensitive to the amount of sand in the fill. Where the valley fill has a high sandstone content the amplitude of the Muddy is moderate. The strongest Muddy

event is noted when the valley fill facies has a low sand-shale ratio.

Seismic modeling results compare well to actual seismic data which crosses over a portion of the field. The amplitude changes noted in the Muddy reflector may help explorationists in the future distinguish between nonprospective and reservoir quality Muddy Sandstone.

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