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SEISMIC DETECTION OF POROSITY,  
RED RIVER FORMATION, WILLISTON BASIN,  
SHERIDAN COUNTY, MONTANA

by

Claybon Mark Wallis

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Golden, Colorado

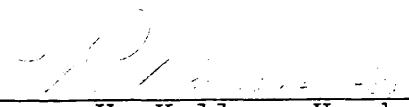
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ABSTRACT

Borehole data, seismic modeling, and reflection seismic data are used to detect and delineate porosity in the Red River Formation of western Williston Basin. One- and two-dimensional seismic modeling of porosity configurations in the Red River C-cycle shows the development of a trough in the corresponding zero phase, normal-polarity seismic signature. Amplitude increases on the order of 30 to 70 percent are present in this trough and in the lower Red River peak and Winnipeg reflector below corresponding to a porosity change from 6 to 18 percent in a Red River C-cycle porosity zone. Reflection seismic data show waveform characteristics similar to the modeling in that an interpeak trough develops and the amplitude of the Winnipeg reflector increases with the addition of a cumulative porosity thickness of 50-70 ft with a porosity value of at least 6 percent in the Red River C-cycle. Mapping of zones with stacked porosity from the reflection data shows a definite association of porosity with a structural nose. An increase in the porosity-foot value of 20 percent corresponds to an interpeak amplitude increase of 50 percent on the reflection seismic data. These results are best shown on 12 fold data

with processing designed to preserve amplitude and frequency. Pseudo-structures on the reflection data at the Winnipeg level can occur depending on the configuration of Red River porosity zones above.

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The original material for this dissertation includes a significant number of oversized pages. The full text can be viewed by accessing the supplement file.

