

Sequence Stratigraphic Architecture of the Woodbend and Winterburn Groups, Rocky Mountains, west-central Alberta

John A.W. Weissenberger*

PanCanadian Petroleum Limited, 150- 9th Ave. SW, Calgary, Alberta, T2P 2S5
john_weissenberger@pcenergy.ca

and

Ken Potma

Imperial Oil Resources, 237- 4th Ave SW, Calgary, Alberta, T2P 3M9

Pak K. Wong,

ExxonMobil Production Company, 396 West Greens Road, Houston, TX 77067

Murray G. Gilhooly

PanCanadian Petroleum Limited, 150- 9th Ave. SW, Calgary, Alberta, T2P 2S5

Six third-order depositional sequences are described in the Woodbend and Winterburn Group equivalents of the Nordegg area of west-central Alberta. Data was collected from numerous, closely spaced outcrop sections exposed in the Rocky Mountain Front Ranges of the study area.

These strata form part of two large carbonate buildups, the Fairholme and Southesk Cairn carbonate complexes. The complexes are separated by the basinal Cline Channel and several platform margins are exposed in the area. The Woodbend Group sequences are characterised by reefal platform margins, while the Winterburn Group sequences display carbonate ramp-style margins. These different depositional styles also show differences in their response to sea level fluctuations.

Third-order sequence boundaries, in both reefal and ramp margin settings, show evidence for a drops in relative sea level. This evidence includes: abrupt juxtaposition of shallow over deeper lithofacies, with facies missing from the normal vertical (shallowing upward) succession; basinward shift in lithofacies belts below the previous shelf edge and; stratigraphic geometries such as onlap and offlap. The latter two can be traced laterally in the field. Also, an interpreted fourth-order sequence boundary is observed at Cripple Creek.

These outcrops are good analogues for time equivalent reservoirs in western Canada. They show that the observed significant surfaces and patterns of stratigraphic hierarchy, as well as the depositional style, affect reservoir heterogeneity.