MIDDLE DEVONIAN ELK POINT GROUP AND DAWSON BAY FORMATION, CENTRAL SASKATCHEWAN

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Abstract

The Elk Point group (60 to 750 feet thick), comprising in ascending order the Ashern, Winnipegosis and Prairie Evaporite formations, is overlain by the Dawson Bay formation (100 to 200 feet thick).

The Ashern, a 20-foot brick red shale unit, rests uncomformably on the Silurian Interlake group. The Winnipegosis includes reef and inter-reef deposits.

On the basis of relict textures and fossils and comparison with data on the geologic framework of other reefs, four depositional environments are interpreted:

(1) Open marine to slightly restricted agitated water (reef front).

(2) Open marine quiet water (shelf environment).

(3) Slightly restricted relatively quiet water.

(4) Highly restricted relatively quiet water.

The distribution of these interpreted environments suggests that atoll-like reefs existed in the middle Devonian sea. Anhydrite is believed to have been deposited in the central parts of the atoll lagoons during late stages as well as after cessation of reef growth. The reef masses were buried by a widespread salt unit (Prairie Evaporite). Although much of this salt has been removed by post-depositional subsurface leaching, some of the reefs remain covered.

During the final phases of Prairie Evaporite sedimentation, red and green dolomitic shales were deposited to form the "Second Red" (lowermost Dawson Bay). Thence open marine limestones accumulated. This sequence culminated in deposition of salt and anhydrite (uppermost member of the Dawson Bay) followed by red dolomitic shale ("First Red").

Porosity and permeability within the Winnipegosis and Dawson Bay formations depend largely on:

(1) the original lithofacies and biofacies,

(2) the amount of infilling of pores by secondary anhydrite and salt.

Oil accumulations may be expected at the up-dip limits of those reefs that are presently buried and sealed by salt. Petroleum traps in the Dawson Bay formation may be caused by the possible irregular infilling of pores with salt and anhydrite. The most promising method of oil exploration in these units involves detailed lithofacies and biofacies analyses before and in conjunction with stratigraphic test drilling.