REGIONAL SEDIMENTOLOGY AND ECONOMIC GEOLOGY OF A LOWER CRETACEOUS CLASTIC WEDGE (SPIRIT RIVER, MOOSEBAR-GATES IN ALBERTA AND BRITISH COLUMBIA

D. CANT
Alberta Research Council
4445 Calgary Trail South, Edmonton, Alberta T6H 5R7
and
D. LECKIE
Petro-Canada
P.O. Box 2844, Calgary, Alberta T2P 3E3

During Albian time a major clastic wedge (Spirit River Formation in subsurface, Moosebar-Gates Formation in outcrop) prograded northward into an epeiric seaway. The lower part of the clastic wedge consists of marine coarsening-upward sequences which grade from shales at the base, to shales with interbedded turbidites, to sandstone with hummocky and swaley cross stratification. South of latitude 54°30′ N, the upper part of the clastic wedge is totally non-marine. In a 70 km-wide zone north of this, it consists of 6 transgressive-regressive sequences, each with shoreface sandstones and conglomerates overlain by lagoon-backswamp mudstones and coals. Farther north, only marine coarsening-upward sequences are present. The marine sheet sandstones are shoreline attached and taper northwards. Each transgressive-regressive sequence can be traced eastward from the outcrop to the 6th Meridian, a distance of 250 km. East of the 6th Meridian, the individual sequences cannot be delineated, but the facies belts swing northeast towards the Wabasca Oil Sands deposits of the same age.

Where the clastic wedge outcrops in British Columbia, considerable development of low sulfur, medium volatile bituminous coals of the Gates Formation. is taking place. Much current development is concentrated on the coals in the transgressive-regressive coastal sequences and in the southern, predominantly non-marine zone. Coal seams may be up to 6 to 8 m thick and are laterally continuous for tens of kilometres.

In Alberta's Deep Basin, major gas reserves are present in the Spirit River Formation (3 Tcf proved). The most important reservoirs are beach and fluvial conglomerates with porosities up to 15 per cent and permeabilities up to one darcy. Diagenetically altered shoreface and shallow marine sandstones form the seal to the trap, with porosities up to 6 per cent and permeabilities of .001 to 0.5 md. The abundant coal in the clastic wedge is the source of the gas.

Memoir 9 (1984)