

GENERAL GEOLOGY

All of the strata reported to be oil shale-bearing occur within an Upper Paleozoic sequence that was deposited within the regional Maritimes Basin (Figs. 1, 2). The basin developed as a depocentre due to strike-slip movement along major fault systems associated with the Devonian Acadian Orogeny. The Upper Paleozoic basin-fill was derived from adjacent upland areas (Caledonia, Cobequid, Antigonish and Cape Breton Highlands)

and includes pre-Horton Group rocks and the Horton, Windsor, Canso, Riversdale, Cumberland and Pictou Groups. Except for the predominantly marine Windsor Group, the sequence is entirely of continental origin.

The localized pre-Horton (including the McAdam Lake Formation of southeast Cape Breton Island and the Knoydart Formation of Cape

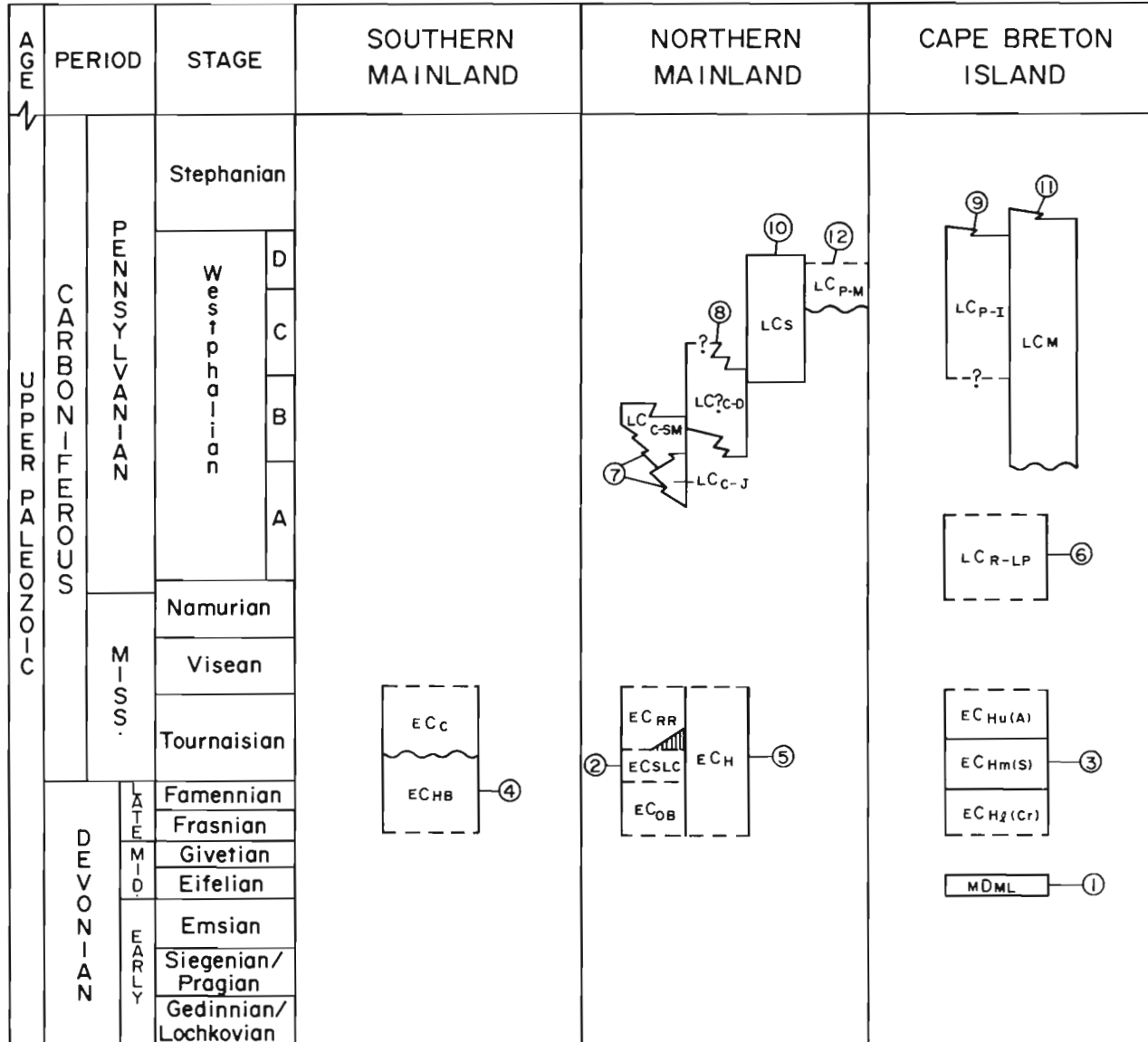


Figure 2. Age relationships of reported oil shale-bearing strata in the areas of Nova Scotia shown in Figure 1. MDML = McAdam Lake Formation, ECOB = Ogden Brook Formation, ECSLC = South Lake Creek Formation, ECRR = Rights River Formation, ECHI(Cr) = Lower Horton (Craignish) formation, ECHm(S) = Middle Horton (Strathlome) formation, ECHu(A) = Upper Horton (Ainslie) formation, ECHB = Horton Bluff Formation, ECc = Cheverie Formation, ECH = Horton Group (undivided), LCR-LP = Lennox Passage formation, LCC-SM = Springhill Mines Formation, LCC-J = Joggins Formation, LC?C-D = Delaney Formation, LCP-I = Inverness Formation, LCS = Stellarton Formation, LCM = Morien Group, LCP-M = Merigomish Formation.

George) and regionally extensive Horton Group rocks represent the earliest period of sedimentation (mid to late Devonian) following the Acadian Orogeny (Murray, 1960; Boehner *et al.*, 1986). The strata comprise about 3000 m of complexly intertonguing alluvial fan, lacustrine and minor coal swamp deposits (Murray, 1960; Boehner *et al.*, 1986; Martel and Gibling, 1987, 1988; Hamblin, 1989).

Deposition of Horton Group strata was terminated by the expansion of the Atlantic Ocean into much of the Maritimes Basin during Viséan time. The incursion resulted in deposition of the Windsor Group, which comprises regionally extensive marine carbonate and evaporite units, up to 1000 m thick in central basin areas, and local alluvial fan and redbed sequences along margins (Howie and Barss, 1975; Boehner *et al.* 1986).

Subsequent retreat of the Windsor Sea effected deposition of 2000 m of fine grained, red and grey, fluvial-lacustrine deposits of the Canso Group (Late Viséan-Early Namurian). In central basin areas, the transition from marine (Windsor) to continental (Canso) deposition was gradational, whereas at sites near active sediment source areas fan conglomerate facies dominated (Howie and Barss, 1975; Boehner *et al.*, 1986). The record of sedimentation within the basin following deposition of the Canso sequence is markedly different as it was a period of major coal formation associated with fluvial and local lacustrine deposition. The post-Canso sequence includes the Riversdale, Cumberland and Pictou Groups.

The Riversdale Group (Late Namurian - Westphalian A) is, in part, diachronous with the underlying Canso strata (Howie and Barss, 1975; Boehner *et al.*, 1986) and comprises a local basal conglomerate and grey fluvial sandstone and minor fine grained redbeds with thin coal seams (Gersib and McCabe, 1981). Coal of economic significance occurs at St. Rose and Port Hood (Hacquebard *et al.*, 1989; Calder and Naylor, 1989).

The Cumberland Group (Westphalian A-B) unconformably or disconformably overlies the Riversdale Group and comprises 3355 m (Howie and Barss, 1975) of alluvial fan, alluvial plain, lacustrine, coal-swamp and perhaps estuarine deposits (Calder, 1985a; Calder and Naylor, 1989). Coal belonging to the Cumberland Group is known to occur in the Joggins-Chignecto and Springhill coalfields. The coal-bearing strata of the Debert-Kemptown Basin are age equivalent (Howie and Barss, 1975; Donohoe and Wallace, 1982c, 1982d) and are provisionally included within the Cumberland Group (Calder and Naylor, 1989).

The Pictou Group (Westphalian B- ?Permian) is a regionally extensive unit, in part contemporaneous with the Cumberland Group, which comprises 1525 to <3600 m of red and grey non-marine fluvial and fluvial-lacustrine sediments (Howie and Barss, 1975; Gibling, 1985c; Boehner *et al.*, 1986). The coal-bearing Morien Group and Inverness and Stellarton Formations are stratigraphic equivalents to the Pictou Group and they represent the most widespread period of abundant coal formation and fluvial deposition within the Maritimes Basin (Hacquebard, 1986).