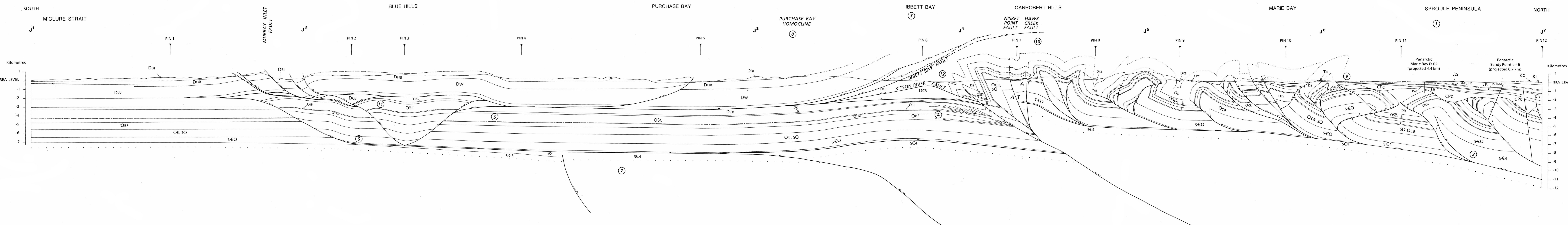
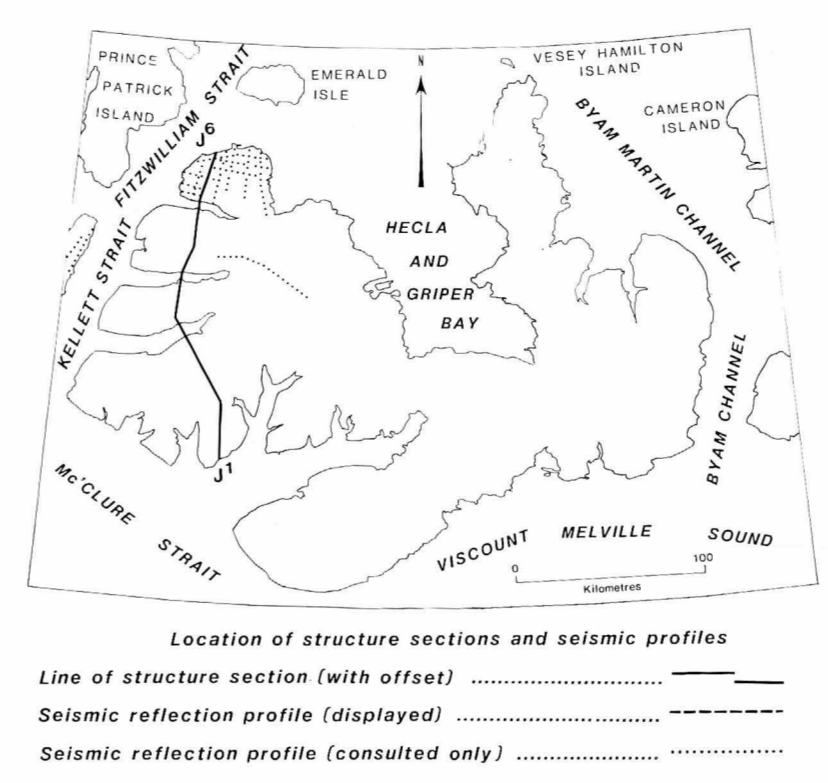
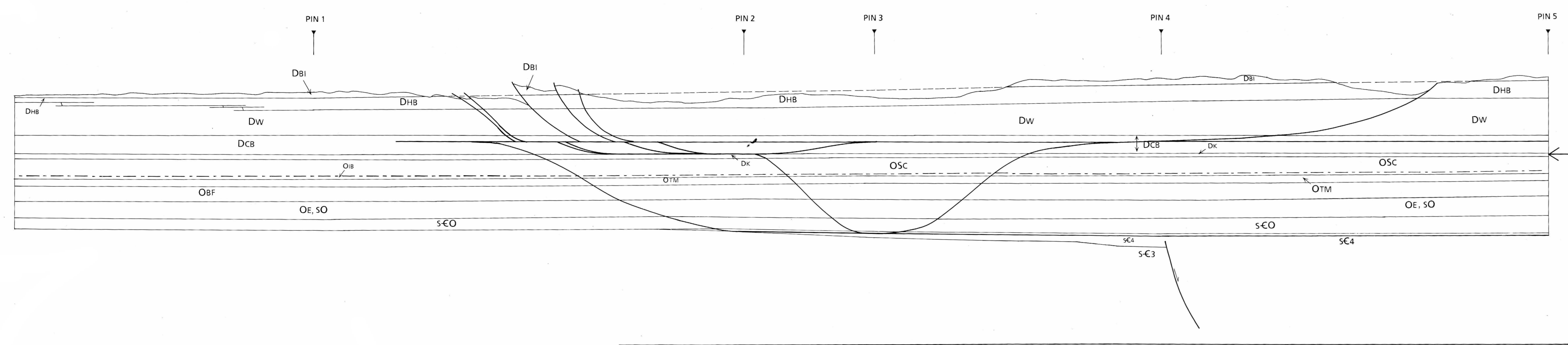


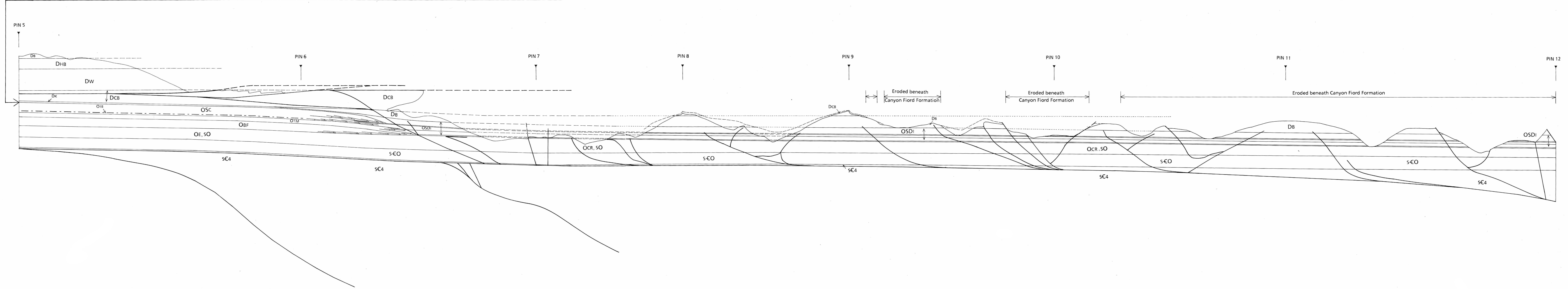
DEFORMED STATE CROSS-SECTION



RESTORED STATE CROSS-SECTION



SECTION J
BAILEY POINT ON M'CLURE STRAIT TO
FITZWILLIAM STRAIT NEAR SANDY POINT,
MELVILLE ISLAND
Scale 1:125,000



NOTES TO ACCOMPANY SECTION J
(No reproduced seismic data available)

Seismic Profiles

1. Unmigrated seismic profiles some parallel to the line of section were available for structural interpretation of Sproule Peninsula area (see inset location map). On many of these lines it is possible to map the unconformity at the base of the upper Paleozoic succession and to determine regional variations in dip in the underlying lower Paleozoic down to 3 or 4 seconds. It is also possible to map the subsurface distribution of folds, vergence of some major thrusts, and to calculate a local depth to detachment by the divergence of primary reflections.

Stratigraphic Features

- Seismic stratigraphic units of subsurface Sproule Peninsula (below the Trold Fiord Formation) include: 1) the Canyon Fiord Formation, 2) Blackley and Cape De Bray Formations and the upper shale member of the Ibbett Bay Formation (undivided), 3) the lower four members of the Ibbett Bay Formation (undivided), 4) the Canrobett Formation and seismic unit 10 (undivided, reflection-free unit), and 5) a reflective unit below the Canrobett tentatively assigned to seismic units 10C and 10D (undivided, base not imaged).
- The basin facies lower Paleozoic stratigraphy of subsurface Eglinton Island is far better imaged. In this area (located 40 km along tectonic strike west of Ibbett Bay), it is possible to separately distinguish the Weatherall, Cape De Bray and Blackley Formations of the Devonian clastic wedge, to distinguish the upper shale member of the Ibbett Bay Formation, and to identify the base of the reflective unit below the (undivided) Canrobett Formation and seismic unit 10.
- The location of various Lower Ordovician through Upper Silurian carbonate to shale facies transitions are constrained as follows:
1) basin facies rocks occur in all lower Paleozoic exposures north of Ibbett Bay, and are suspected from reflection profiles to also underlie Mesozoic cover of Eglinton Island; 2) age-equivalent shelf carbonates are exposed in the Kitson River Inlier and in the Zeus F-11 and Kitson R. C-71 wells located approximately 58 to 84 km east of the line of section; 3) the platform carbonate seismic stratigraphy appears to extend east from the Zeus F-11 well to the footwall of the Kitson River Fault at a point located 12 km east of the head of Ibbett Bay and 34 km east of the line of section; 4) an Ordovician and/or Silurian carbonate to shale transition is seismically mappable in the subsurface of northern Banks Island. This northeasterly-trending facies front (carbonates to southward) extrapolated across M'Clure Strait would cross to subsurface Melville Island beneath Cape Victoria on Warrington Bay. This point is located 43 km west of the south end of the line of section.
- Thickness variations in Ordovician through Lower Devonian carbonates and mudrocks of subsurface areas south of the Kitson River Fault are based on a linear interpolation of unit thicknesses between the shelf rim stratigraphy of Kitson River Inlier area and the midshelf succession of subsurface western Dundas Peninsula.
- Location of the dip limits of seismic unit 10C4 is based on a presumed westerly trend of the depositional limit from its known locations on sections E and I.

Structural Observations

- Growth faults may displace seismic unit 10C4 and older units at depth below Blue Hills and Purchase Bay areas. This belief is based on the observed distribution of such faults beneath Blue Hills Syncline on Section I and a tectonic trend that is thought to parallel 70 Upper Cambrian and Lower Ordovician isopachs of central Melville Island.
- Regional uplift of Cambrian and younger units below Purchase Bay Homocline is a feature also observed on reflection profiles of Eglinton Island (located 40 km to the west). Depth to detachment below the subsurface homocline of Eglinton Island is 4000 ms below surface, and 1000 ms (estimated 2.75 km) below the top of the reflection-free seismic unit assumed to be Canrobett Formation. This is similar to the depth to detachment below the top of the age-equivalent Eleanor River Formation below and north of Apollo Anticline (2.1-2.4 km below top of O1; see Section I).
- Seismic profiles of northern Sproule Peninsula indicate the existence of an angular unconformity between the Trold Fiord and Canyon Fiord Formations. The extent of folding of the sub-Carboniferous unconformity remains uncertain in all subsurface areas of Sproule Peninsula. Some paleogeography on the sub-Canyon Fiord surface is also possible.
- The Hawk Creek and Nisbet Point faults each display 2.5 km of right-lateral displacement near the line of cross-section. These faults also offset and die out within the Canyon Fiord Formation along strike to the east.
- Minimum displacement on subsurface thrusts assumed to exist beneath the Blue Hills, can be determined by removing later extensional displacements on Murray Inlet Fault and associated isopachs.
- Southerly-directed slip on faults located above and below the detachment within unit 10C4 is matched by northerly-directed slip on a through-going upper detachment (Ibbett Bay Fault) in the Cape De Bray Formation. The upper detachment exits the line of section through the Triangle zone exposed at the surface around Ibbett Bay.

Depth Conversion (Sproule Peninsula only)

CP: 3.6-4.2 km s⁻¹
DC: 3.7 km s⁻¹
OSD: est. 5.0 km s⁻¹
OC: est. 5.5 km s⁻¹
SC: est. 5.5 km s⁻¹

Method of Cross-section Construction and Restoration

Bed length measurement and balancing of the contacts above 10C4, 10C, Ocr, OSD3, OSD5, and Dc between pairs of adjacent pin lines. Slip on a basal detachment within 10C4 and on an upper detachment within Dcb is assumed to be negligible south of the Blue Hills structure and pin line 1. Independent bed length measurement and balancing of the contacts above Dcs, Div, and Dns between pairs of adjacent pin lines. Area measurement and restoration of 10C4, Dc, Dns and the lower part of Dc (within Purchase Bay Homocline) between pairs of adjacent pin lines. This method assumes that southerly-directed slip on the lower detachment within unit 10C4 increases progressively to the north beneath the fold belt, and is matched by northerly-directed slip on the upper detachment (in Dns and lower Dns) which exits the section through Purchase Bay Homocline.

Results

Section length (pin 1 through pin 12): 154.7 km
Minimum post-orogenic extension: 1.7 km
Pre-extension section length (pin 1-12): 154.7 - 1.7 = 153.0 km
Bed length of Ocr, OSD 3 (pin 1-12): 201.6 km
Shortening of Ocr, OSD 3: 201.6 - 153.0 = 48.6 km
Estimated shortening in foreland*: 0.0 km
Total minimum shortening of Ocr, OSD 3 from foreland: 48.6 km (24.1%)
Bed length of 10C3 and 10C4 (below detachment): 163.4 km
Minimum shortening of 10C3 and 10C4 (below detachment): 163.4 - 153.0 = 10.4 km
Estimated shortening in foreland*: 0.0 km
Total minimum shortening of 10C3 and 10C4 (below detachment): 10.4 km (6.3%)
Section length (pin 1 through pin 6): 84.8 km
Minimum post-orogenic extension (pin 1-6): 1.4 km
Pre-extension section length (pin 1-6): 84.8 - 1.4 = 83.4 km
Bed length of Dns (pin 1-6): 84.7 km
Minimum shortening of Dns (pin 1-6): 84.7 - 83.4 = 1.3 km
Estimated shortening in foreland*: 0.0 km
Total minimum shortening of Dns (pin 1-6): 1.3 km (1.5%)
Bed length of Dns (pin 1-6): 89.6 km
Minimum shortening of Dns (pin 1-6): 89.6 - 83.4 = 6.2 km
Estimated shortening in foreland*: 0.0 km
Total minimum shortening of Dns (pin 1-6): 6.2 km (6.9%)
Section length (pin 7 through pin 12): 69.9 km
Minimum post-orogenic extension (pin 7-12): 0.3 km
Pre-extension section length (pin 7-12): 69.9 - 0.3 = 69.6 km
Bed length of Ocr, OSD (pin 7-12): 112.0 km
Minimum shortening of Ocr, OSD (pin 7-12): 112.0 - 69.6 = 42.4 km (37.8%)
Estimated shortening in foreland (pin 1-6): 6.2 km
Total minimum shortening of Ocr, OSD (pin 1-12): 6.2 + 42.4 = 48.6 km (24.1%)
* All strata are assumed to be undeformed south of pin line 1 near the south end of the line of section.

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