

Late Quaternary Depositional Environments of the Canadian Beaufort Shelf

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Seismic and borehole data have been studied from the Beaufort Shelf, east of Mackenzie Trough. Three acoustic sequences, separated by unconformities can be recognised from high resolution seismic records. Sequence 1 consists of complex horizontal and progradational reflectors, with variable acoustic penetration. It is bounded above by an unconformity on which two broad valleys are incised to a depth of 30 m. Sequence 2 has a wedge-like geometry at the margins of these valleys and consists predominantly of oblique progradational reflectors which become sigmoidal towards the centres of the valleys. A second unconformity marks the top of this sequence, although in intervalley areas, it is often impossible to distinguish from the lower unconformity.

Five lithostratigraphic units can be defined; the names presented here are used informally. In the west of the shelf area, only one unconformity can be recognised and the Tarsuit Silt Unit extends from this unconformity to approximately 140 m below seabed. It consists predominantly of marine and marginal-marine laminated silt and clay, with intervals of sand and a freshwater peat bed near the base. The Sauvrak Clay Unit overlies the unconformity and extends across the whole shelf, thinning markedly to the east. This unit consists of bioturbated marine clay. The Kaslutut

Sand is sampled in only one borehole and occurs between the Tarsuit Silt and the Sauvrak Clay, separated by unconformities as recognised in the seismic data. In the east, two sand units are present, separated by the Tarsuit Silt Unit, which thins to approximately 40 m. The Uviluk Sand unit underlies the Tarsuit Silt and consists of massive well-sorted sand. Grain surface textures of the sand show the characteristics of glacial, aeolian and beach environments. The Tingmiark Sand Unit overlies the Tarsuit Silt and consists of 40 m of well-sorted sand with similar characteristics to the Uviluk Sand. Two intervals of shell-bearing sand, at 19-21 m and 0-5 m from the top are interbedded with barren sand.

The Tarsuit Silt Unit is interpreted to have been deposited in a delta-influenced marine environment. Delta distributaries prograded onto the shelf and the sand bodies within the unit may represent channels. The Uviluk Sand and Tingmiark Sand Units represent alluvial and aeolian deposits from glacial outwash which subsequently underwent marine transgression. Subaerial conditions were also present on the western shelf when incision of the valleys took place as a result of lowered sea level. The valleys were partly infilled by sand of the Kaslutut Unit before the most recent marine transgression and deposition of the Sauvrak Clay.