

LEGEND

QUATERNARY
Q Drift and unconsolidated sediments

SILURIAN
Middle Silurian
SCc CAPE CRAUFORD FORMATION: dolomitic limestone, calcareous dolomite, thin partly brecciated and sandy shaly

ORDOVICIAN AND SILURIAN
Late Middle Ordovician to Middle Silurian
OSba BALLARGE FORMATION: dolomitic limestone, partly shaly, minor shales, calcareous and dolomitic, dolomite: a little brecciated limestone

ORDOVICIAN
Middle and (?) Lower Ordovician
Osp SHIP POINT FORMATION: dolomite, in part silty, shaly, dolomitic interfacional conglomerate

CAMBRIAN AND/OR ORDOVICIAN
Cambrian and/or early Lower Ordovician
COtc TURNER CLIFFS FORMATION: dolomite, shaly, silty, sandy, part: quartzite sandstone, in part: dolomitic, dolomitic interfacional conglomerate, minor siltstone, shale, mossy dolomite

HELVETIC
Hg Gabbro dykes

ULUKSAN GROUP (Hsb to Hsl)
Hsl ELWIN FORMATION: sandstone, siltstone, shale

STRATHCONA SOUND FORMATION
Hssu (upper part): grey siltstone and sandstone, mainly in the Society Cliffs Formation

STRATHCONA SOUND FORMATION
Hssi (lower part): reddish mudstone and siltstone, minor dolomite and interfacional conglomerate

VICTOR BAY FORMATION: dark to pale grey dolomite, minor dark grey limestone and black mudstone and edgewise conglomerate

SOCIETY CLIFFS FORMATION: grey dolomite

ARCTIC BAY FORMATION: black argillaceous limestone, calcareous dolomite

EQALLUK GROUP
EQall ADAMS SOUND FORMATION: silica-cemented quartzite

Geological boundary (defined, approximate, assumed)
Geological boundary (gradational)
Bedding, top known (indicated)
Fault (defined)
Anticline
Syncline
Fossil locality
Mineral occurrence (lead, Pb; zinc, Zn)

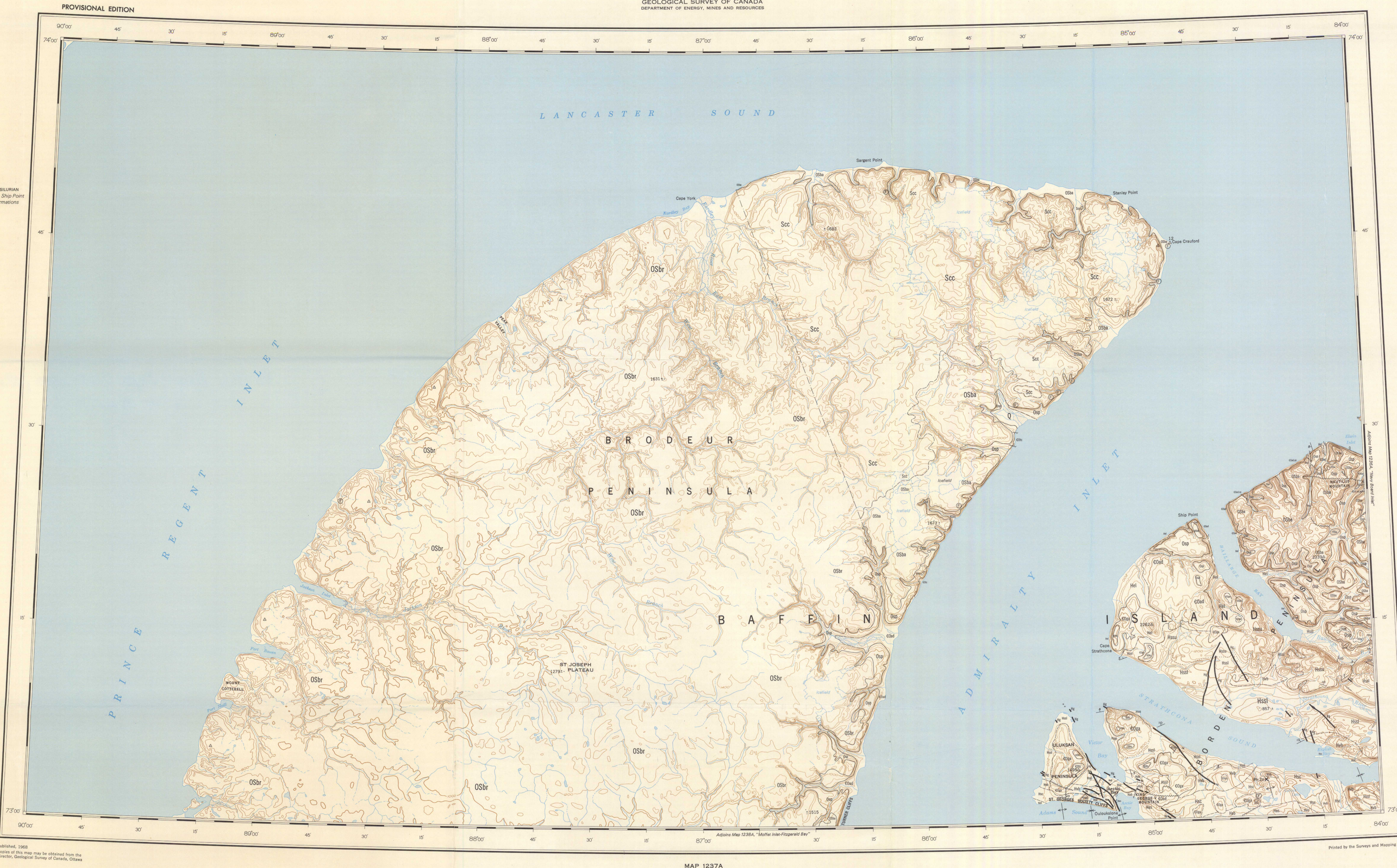
Geology of Precambrian rocks by R. G. Blackadar and W. L. Davison, 1963
Geology of Palaeozoic rocks by H. P. Trettin, 1963
Geological cartography by the Geological Survey of Canada, 1967

Horizontal control point
Intermittent stream
Dry river bed with channel
Foreshore flats
Head rock or small island
Contour (interval 200 feet)
Height in feet above mean sea-level

Basson's "Arctic Bay" sheet compiled and drawn by the Survey and Mapping Branch, 1964, portion of "Cape Clarence" sheet compiled and drawn by the Army Survey Establishment, 1958, with modifications to the contours by the Geological Survey of Canada, 1967

Geographical names subject to revision

Magnetic declination 1967 varies from 71°00' westerly at centre of west edge to 76°10' westerly at centre of east edge. Mean annual change, decreasing 5.0"



The settlement of Arctic Bay, near the southeast corner of the map-area, is 200 miles southeast of Resolute, N. W. T., and 315 miles north of Hall Beach, N. W. T. Both places are served by commercial aircraft from Montreal. Arctic Bay comprises a Hudson's Bay Company store and dwellings, and a Federal Day School, but other services will likely be provided in the near future. Although there is no prepared landing strip at the settlement, a sandy beach near Marcell Lake was used by an Otter aircraft during the Geological Survey's program in 1963 and should be satisfactory for similar-sized aircraft. From December until mid-June low-lying landings are possible. Use of float-equipped aircraft is limited to the period late July to early September and even then drifting ice may prove hazardous. At present the Eskimo population of this region still spends most of the time away from the settlement and small camps are found on both sides of Admiralty Inlet and on Strathcona Sound. The area forms part of Lancaster Division and is characterized by steep, in places nearly vertical cliffs that rise 1,000 feet or more above the sea. Above these the elevation increases more gradually and here there exceeds 1,500 feet on Brodeur Peninsula and 2,000 feet on Borden Peninsula. The plateau surface presents a gently undulating appearance. On Brodeur Peninsula the height of the surface decreases towards the southwest, but on Borden Peninsula the elevation of the surface is, with the exception of a broad valley north of English Bay, relatively constant. Valleys are deeply incised in the plateau surface and reflect a well-developed dendritic drainage pattern. Rivers that drain west across Brodeur Peninsula reach within 15 miles of the east coast of the peninsula. Carbonate rocks predominate on Brodeur Peninsula, resulting in a remarkably barren, vegetation-free and desolate-looking surface. The diverse lithologies of Borden Peninsula support more varied vegetation. Areas underlain by reddish mudstones and siltstones of the Strathcona Sound Formation support a particularly luxuriant growth of Arctic heather, saxifrage, and grasses. Small moraines or icefields cap the higher parts of Brodeur Peninsula. None is of any great size and none exceeds a few hundred feet in thickness. The formal divisions used in this area were established by Lemon and Blackadar in 1954.

Two groups of sedimentary rocks of presumed Helikian age occur on Borden Peninsula. The Epilakik Group is represented by the Adams Sound Formation and five of the seven formations of the Uluksan Group are present. Conformable contacts mark the transition from one formation to another. The Adams Sound Formation (Qas) within this map-area comprises an assemblage of very pale orange to moderate reddish brown, medium- to thick-bedded quartzite. A gradational contact separates this unit from the lowest unit of the Uluksan Group. The type section of the Arctic Bay Formation (Qab) at Arctic Bay consists of 350 feet of black fissile, medium- to fine-grained argillaceous limestone and calcareous dolomite. Similar lithologies are found east of King George V Mountain. The relatively soft rocks of this formation weather readily, resulting in subdued topography. The type section for the Society Cliffs Formation (Qsc) measured near Arctic Bay comprises 900 to 1,000 feet of vaguely bedded to massive grey to light grey dolomite. Eastward from the type section the formation becomes more argillaceous. Conformable contacts separate this formation from underlying and overlying units. The Victor Bay Formation (Qvb) consists of a varied series of dark to pale grey, medium- to coarse-grained dolomite, chert, edgewise conglomerate, and interbedded dark grey limestone and mudstone. The weathered surface of this unit is often chalky white. The formation thickens rapidly north and east from the type section, where the Victor Bay Formation is exposed. The Strathcona Sound Formation (Qst), a monotonous succession of dark red mudstones, shales, grey siltstones, and sandstones, has a thickness in excess of 4,000 feet in this area. It is separated from the Victor Bay Formation by a conformable contact. Two broad divisions are found within this formation, firstly dark red mudstones and shales (Qst1), and secondly grey sandstones and siltstones (Qst2). Although the former is generally lower in the succession, here and there the two intertongue. A gradational contact separates the Strathcona Sound Formation from the conformably overlying Elwin Formation (Qel). The contact is drawn where the relatively monotonous siltstones and sandstones of the Strathcona Sound Formation are replaced by a more colourful and varied clastic succession. This comprises an assemblage of alternating reddish or bright orange-weathering quartitic sandstones, reddish silty sandstones, and micaceous shales. The maximum thickness of the formation is thought to exceed 5,000 feet. An erosional unconformity separates this, the uppermost formation of the Uluksan Group, from overlying Palaeozoic strata. Basic dykes, similar to those found elsewhere in northern Baffin Island, intrude all strata older than the Palaeozoic. Contact effects are limited mainly to chilled margins, but here and there are patches of "red-rock", a phase rich in quartz and micropegmatite. Minor amounts of magnetite, hematite, and chalcopyrite and small trace amounts of pyrrhotite are associated with these intrusive rocks. Texas Gulf Sulphur Company holds 23 claims along a 3-mile zone some 12 miles east of Arctic Bay settlement. The ore, reported to average 29 per cent zinc or equivalent with lead and silver occurs mainly in the Society Cliffs Formation. The main deposit is a single, sinuous body 15,000 feet long, 300 to 500 feet wide and 30 to 50 feet thick. More than 55,000 feet of diamond drilling has been completed by the end of 1963. Broad, gentle folds characterize the Helikian strata. Dips in excess of 25 degrees are rare in Epilakik Group rocks, and they rarely exceed 10 degrees in Uluksan Group strata. At least two periods of faulting are recognized, one preceding and one following the intrusion of gabbro dykes. The Palaeozoic rocks are folded by the late Lower Cambrian Rabbit Point Formation. The Admiralty Group^{1,2}, comprising the predominantly fluvialite Gallery Formation³, and the predominantly intertidal Turner Cliffs Formation⁴, is Cambrian and/or early Lower Ordovician. The Gallery Formation is possibly correlative with the late Lower Cambrian Rabbit Point Formation, and the Turner Cliffs Formation with the Middle Cambrian Bear Point and Ouyagh Formations of Dundas Harbour, Devon Island⁵, and with Middle Cambrian strata on Boothia Peninsula and Somerset Island⁶, but diagnostic fossils are lacking. The Gallery Formation consists mainly of quartzose sandstone showing trough- and high-angle planar cross-lamination with lesser siltstone, conglomerate, shale, etc. The lower part of the formation is predominantly red, and the upper part predominantly light grey. The Turner Cliffs Formation is composed of two alternating assemblages of rock types: 1) finely microcrystalline dolomite, which is mostly shaly, silty, or sandy, and commonly forms ripple-marks and flat-pebbly conglomerates, and associated dolomitic siltstone and shale; 2) pure and dolomitic quartz sandstones commonly showing cross-lamination, as in the Gallery Formation. The formation weathers generally in light hues of grey, green, and orange, but some sandstones in the lower part are bright red. The only fossils known, besides abundant worm markings and some stromatolites, are limpid brachiopods, mainly Lingulidella, s.p. The Admiralty Group was deposited in an embayment known as the Admiralty Basin, the axis of which plunges across central Borden Peninsula in an easterly or southeasterly direction. Arctic Bay map-area lies on the north-west side of this basin, and the thickness of both formations decreases to the northwest. The thickness of the Gallery Formation ranges from a maximum of about 1,100 feet near Victor Bay to locally less than 20 feet near the mouth of Elwin Inlet; measured thicknesses of the Turner Cliffs Formation range from 300 and 400 feet. Crossbedding attitudes indicate that at Arctic Bay map-area the currents that deposited the Gallery sands came from the northwest. The Middle and (?) Lower Ordovician Ship Point Formation⁷ overlies the Turner Cliffs, the contact being a paraconformity that may represent a major hiatus involving the Upper Cambrian. The formation consists mainly of fine crystalline to predominantly microcrystalline dolomite. Vaguely stratified, thick-bedded units of nearly pure dolomite alternate with well stratified thin-bedded to laminated shaly, silty, and sandy dolomite, partly with worm borings, ripple marks, and flat-pebbly conglomerates. The formation weathers in hues of light grey. At the type section on Baillarge Bay, the formation is about 900 feet thick and has yielded early Middle Ordovician fossils⁸. Late Lower Ordovician (Arenigian) graptolites found by Blackadar⁹ on Jens Munk Island in northern Foxe Basin are believed to have come from the lower part of the formation. The Ship Point Formation is overlain by the Brodeur Group¹⁰, which comprises the Baillarge and Cape Crauford Formations. In adjacent Navy Board Inlet map-area, a disconformable relationship between the Ship Point and the Baillarge has been inferred from anomalous low thicknesses and a solution zone at the top of the Ship Point. In the present area the only evidence for disconformity is the abrupt lithological change at the contact. The contact is interpreted as a paraconformity. The only known complete composite section of the Baillarge Formation¹¹ is located 21 to 17 miles south-westward of Cape Crauford, on the west coast of Admiralty Inlet. These two members, A and B, are recognized. The lower member, A, is characterized by recessive slopes covered with dark grey talus, and consists mainly of thinly interstratified mudstones of shale, microcrystalline limestone, and microcrystalline pelecypodiferous dolomite, with a few resistant ledges of completely dolomitized fossiliferous limestone. At the reference section, A is 460 feet thick and increases in thickness to about 1,140 feet at the west. Member B, at the reference section is about 1,140 feet thick, and consists mainly of cryptocrystalline dark reddish brown limestone, which is partly replaced by microcrystalline to very fine crystalline light orange dolomite. Vaguely stratified, highly resistant units of pure carbonate rock are interbedded with thinly stratified, argillaceous units that form ledges and plateaux. The Arctic Ordovician fauna occurs in the lower 350 feet of member A, and is particularly abundant in the upper 60 feet of that interval. Silurian, mainly Niagara, faunas occur in the upper 500 feet. Within Arctic Bay map-area, Silurian beds are probably preserved only on Brodeur Peninsula. The Niagara (Middle Silurian) Cape Crauford Formation¹² at the composite type section near the cape is about 1,340 feet thick, and consists of numerous, irregular successions of three rock types: 1) sparsely fossiliferous, dark reddish brown cryptocrystalline limestone, which is mottled with dolomite, and is similar to the predominant rock type of the Baillarge; 2) thinly interstratified microcrystalline limestone, dolomitic limestone, and calcareous pelecypodiferous dolomite, lighter in colour, and less resistant than the first type; 3) strata of the second type, brecciated and deformed, apparently by solution of thinly interstratified evaporites, and associated stromatolitic beds. Some of the breccias are lodge-forming. At Cape Crauford three members can be distinguished, mainly by the degree of secondary dolomitization which is highest in member B (360 feet), intermediate in C (365 feet), and lowest in A (615 feet). The highly dolomitic rocks are light orange and are relatively recessive in cliff faces. Some beds of members B and C contain up to about 10% of silty impurities. Member C is confined to the upper levels of northeasternmost Brodeur Peninsula. The Baillarge and Cape Crauford Formations have been distinguished only in the northeastern part of the peninsula. Further southwest the contact which probably passes between 10 and 20 miles northwest of Admiralty Inlet through the interior of the peninsula, is poorly exposed. Southwest of Cape York outcrops along the northwest coast of the peninsula, are mainly of member A of the Cape Crauford Formation, with some exposures of the Baillarge Formation at the lower levels, and parts of member B of the Cape Crauford Formation at the top of the plateau. On northwestern Borden Peninsula the Palaeozoic rocks are nearly horizontal and are disturbed only by a few normal faults with less than a few hundred feet of dip-slip. On Brodeur Peninsula the Palaeozoic strata form part of an extensive, arcuate structure, the Brodeur homocline, which in the present area dips gently northward.

¹Blackadar, R. G.: Additional notes to accompany Map 3-1958 (Fury and Hecla Strait map-area) and Map 4-1958 (Foxe Basin North map-area). Geol. Surv. Can., Paper 63-35 (1963).

²Blackadar, R. G., and Christie, R. L.: Geological reconnaissance, Boothia Peninsula, and Somerset, King William, and Prince of Wales Islands, District of Franklin. Geol. Surv. Can., Paper 63-19 (1963).

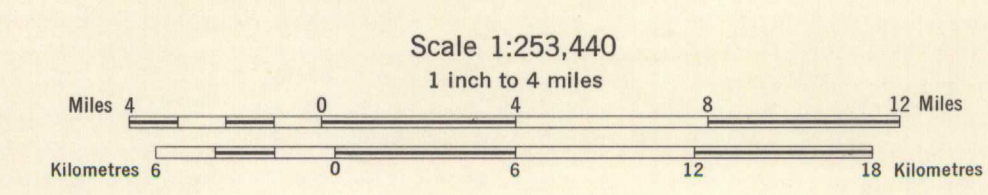
³Kurtz, V. E., McNeil, A. H., and Wales, D. B.: Stratigraphy of the Dundas Harbour area, Devon Island, Arctic Archipelago. Amer. Jour. Sci., vol. 259, pp. 636-655 (1952).

⁴Lemon, R. R. H., and Blackadar, R. G.: Admiralty Inlet area, Baffin Island, District of Franklin. Geol. Surv. Can., Mem. 328 (1963).

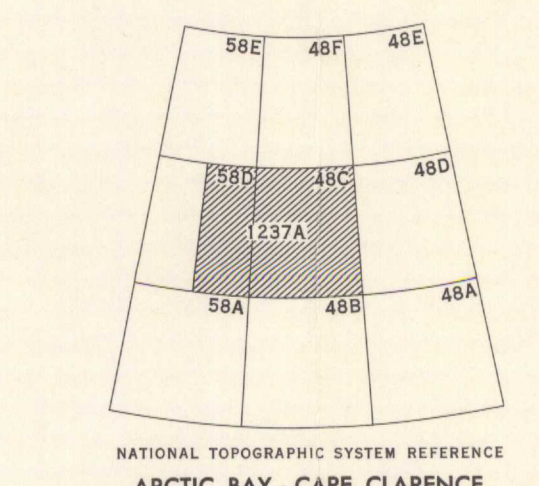
⁵Trettin, H. P.: Lower Ordovician sediments of northwestern Baffin Island, District of Franklin. Geol. Surv. Can., Paper 64-47 (1963a).

⁶ : Middle Ordovician to Middle Silurian carbonate cycle, Brodeur Peninsula, northwestern Baffin Island. Bull. Canadian Petrol. Geol., vol. 13, No. 1, pp. 150-180 (1965b).

MAP 1237A
GEOLOGY
ARCTIC BAY - CAPE CLARENCE
DISTRICT OF FRANKLIN



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N.W.T. Arctic Bay - Cape Clarence
1:253,440 or 1 inch to 4 miles
Map 1237A
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