GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

LEGEND

SEDIMENTARY AND VOLCANIC ROCKS

CENOZOIC

QUATERNARY
- Q — *Stream, deltaic, glacial and marine beach sediments (mapped only where underlying bedrock geology cannot be inferred with reasonable certainty)*

TERTIARY
- Te — *EUREKA SOUND FORMATION: sandstone, shale, conglomerate and siltstone*

MESOZOIC

CRETACEOUS
LOWER CRETACEOUS
- Kc — *CHRISTOPHER FORMATION: dark coloured shale; minor siltstone, sandstone and mudstone*
- Ki — *ISACHSEN FORMATION: sandstone; minor shale, siltstone and conglomerate*

JURASSIC AND CRETACEOUS
UPPER JURASSIC AND LOWER CRETACEOUS
- JKd — *DEER BAY FORMATION: dark coloured shale; minor siltstone, sandstone and mudstone*

JURASSIC *(Undivided)*
- J — *AWINGAK FORMATION (Upper Jurassic): sandstone, siltstone; minor shale; SAVIK FORMATION (Lower, Middle and Upper Jurassic): dark coloured shale, sandstone and siltstone; BORDEN ISLAND FORMATION (Lower Jurassic): sandstone*

TRIASSIC
UPPER TRIASSIC
- Trh — *HEIBERG FORMATION: sandstone, siltstone; minor shale*

MIDDLE AND UPPER TRIASSIC
- Trba — *BLAA MOUNTAIN FORMATION: dark coloured shale, siltstone, light grey calcareous siltstone; minor sandstone (see note 1)*

LOWER TRIASSIC
- Trbl — *BLIND FIORD FORMATION: siltstone; minor shale, sandstone and conglomerate*

MIDDLE AND UPPER TRIASSIC
- Trs — *SCHEI POINT FORMATION: calcareous siltstone, sandstone and shale*

LOWER TRIASSIC
- Trb — *BJORNE FORMATION: sandstone (mainly red); minor siltstone, shale and conglomerate*

PERMIAN
UPPER PERMIAN
- Pd — *DEGERBOLS FORMATION: light coloured limestone and chert*

LOWER PERMIAN
- Pv — *VAN HAUEN FORMATION: dark coloured shale, chert and siltstone*

UPPER PERMIAN
- Ptf — *TROLD FIORD FORMATION: siltstone, sandstone, minor bioclastic limestone, conglomerate and chert (Ptf1, see note 2)*

LOWER PERMIAN
- Pe — *ESAYOO FORMATION: basalt flows, and pyroclastic rocks*

CARBONIFEROUS AND PERMIAN
UPPER CARBONIFEROUS AND LOWER PERMIAN
- CPh — *HARE FIORD FORMATION: dark coloured siltstone, shale, limestone (see note 3)*

UPPER CARBONIFEROUS AND LOWER PERMIAN
- CPn — *NANSEN FORMATION: light coloured limestone, minor sandstone, siltstone and shale (CPn1, see note 4)*

CARBONIFEROUS
UPPER CARBONIFEROUS
- Co — *OTTO FIORD FORMATION: anhydrite, gypsum; minor limestone and shale*
- Cb — *BORUP FIORD FORMATION: red sandstone and conglomerate; minor siltstone, shale and limestone*

PALEOZOIC

SILURIAN
UPPER SILURIAN
- Slc — *LANDS LOKK FORMATION, Member C: slaty siltstone, quartzose, partly calcareous sandstone, slaty shale; minor conglomerate*
- Sc — *Limestone, dolomite (may be equivalent to Members B and/or C of the Lands Lokk Formation)*
- Slb — *LANDS LOKK FORMATION, Member B: tuff, slaty siltstone and shale, lithic and volcanic sandstone; minor volcanic flows (including keratophyre), agglomerate and/or volcanic conglomerate*

MIDDLE AND UPPER SILURIAN
- Sla — *LANDS LOKK FORMATION, Member A: slaty siltstone and shale; minor lithic and tuffaceous sandstone,tuff and conglomerate*

ORDOVICIAN (?) AND SILURIAN
UPPER ORDOVICIAN (?) AND LOWER SILURIAN
- OSi — *IMINA FORMATION: calcareous greywacke, calcareous siltstone, calcareous shale; minor conglomerate; OSi1, may include strata of Members A and C of the Lands Lokk Formation, locally metamorphosed; OSi2, may include strata of Members A and C of the Lands Lokk Formation, metamorphosed to greenschist facies*

CAMBRIAN AND/OR ORDOVICIAN
CAMBRIAN AND/OR LOWER ORDOVICIAN
- Cg — *GRANT LAND FORMATION: quartzose sandstone; minor siltstone, slate, phyllite and conglomerate*

PALEOZOIC AND/OR PROTEROZOIC

LOWER PALEOZOIC AND/OR OLDER
- IPm — *Mica-schist, mica-garnet schist, quartzite, marble, amphibolite, hornfels, etc.*
- IP — *Undivided Lower Paleozoic rocks*

INTRUSIVE ROCKS

TERTIARY
- Col — *OTTO FIORD FORMATION: anhydrite, gypsum; minor limestone and shale (see note 6)*

CRETACEOUS AND OLDER
- *Gabbro, diabase, and basalt dykes (see note 7)*

DEVONIAN (?)
MIDDLE AND/OR UPPER DEVONIAN (?)
- Dgd — *Quartz diorite, quartz monzonite, and related rocks*

Geological boundary (defined, approximate, assumed)
Bedding, tops known (inclined) 45
Bedding (from airphotograph or observed from aircraft) 45
Bedding, tops unknown (inclined: m, dip moderate; s, steep). m,s
Trend of bedding (from airphotographs).
Fault (defined, approximate, solid circle indicates downthrow side)
Thrust fault (defined, approximate; teeth indicates upthrust side)
Anticline (defined, arrow indicates direction of plunge).
Syncline (defined, approximate; arrow indicates direction of plunge).
Measured section showing approximate line of traverse.
Fossil locality. 136
Boundary of Quaternary sediments
Line of facies change (approximate).
Geological boundary, or fold axis, or fault inferred beneath water, or glacier or Quaternary sediments
Type section of formation (see note 8). ★

Geology of Carboniferous and younger rocks by R. Thorsteinsson 1956, 1961, 1962, 1963, and E.T. Tozer 1961, 1962

Geology of Devonian and older rocks by H.P. Trettin 1961, 1962

Compilation by R. Thorsteinsson and H.P. Trettin 1969, 1970

NOTES

1. South of Hare Fiord the contact of the Blind Fiord and Blaa Mountain Formations coincides with the Lower and Middle Triassic boundary. In contrast, north of Hare Fiord the Blaa Mountain Formation includes shale of Early Triassic age as a result of a facies change in which upper siltstone beds of the Blind Fiord Formation grade westerly and northwesterly to shale that is inseparable from the lower shale member of the Blaa Mountain Formation.

2. Strata mapped as Ptf1 northeast of the head of Hare Fiord include the Trold Fiord Formation and a unit of basic volcanic flows and pyroclastic sediments. The volcanic rocks underlie Trold Fiord strata and overlie the Nansen Formation, and are assigned tentatively to the Esayoo Formation.

3. The Hare Fiord Formation invariably overlies the Otto Fiord evaporites and in such circumstances the two formations are correlative with the Nansen Formation. The Otto Fiord Formation has a somewhat greater areal extent than the Hare Fiord Formation, and in some places the Nansen Formation overlies full developments of the Otto Fiord and is correlative with only the Hare Fiord Formation. In this connection, and with regard to note 4, it is noteworthy that the Otto Fiord Formation does not crop out in areas northwest and northeast of Otto Fiord. Nevertheless, the presence of the Otto Fiord Formation in the subsurface of these regions is indicated by a diapir of anhydrite intruding Nansen Formation strata and apparently derived from this formation.

4. Extensive areas northwest and northeast of Otto Fiord are shown underlain by map-unit CPn1. Although commonly broken by high-angle faults, strata included in this map-unit are characterized generally by low to moderate dips. Four formations that are mapped separately in other parts of the map-area are included in map-unit CPn1. The formations are: Borup Fiord, Nansen, van Hauen and Degerbols.

   The van Hauen and Degerbols Formations are each bounded below and above by disconformities, and at any given locality one or both formations may be missing. Moreover, the van Hauen and Degerbols Formations and the Borup Fiord Formation are relatively thin rock-units with individual maximum thicknesses in the order of a few hundred feet or less. In marked contrast, the thickness of the Nansen Formation varies from about 4,000 to 8,000 feet. On the basis of circumstance outlined above an estimated ninety-five per cent of the area mapped as CPn1 exposes strata of the Nansen Formation.

5. Map-unit Sc has not yielded fossils and the Late Silurian age assignment of these rocks is tentative. The Silurian age is based mainly on regional stratigraphic relationships.

6. Intrusive bodies of the Otto Fiord Formation are especially common in central and southern Axel Heiberg Island where they cut various formations including in some instances the Tertiary Eureka Sound Formation. The intrusions are generally related to faults and folds formed by Tertiary earth movements and are accordingly dated as Tertiary.

7. Basic dykes and sills intrude upper Paleozoic and Mesozoic sediments of the Sverdrup Basin throughout much of Axel Heiberg Island and western Ellesmere Island. They intrude all formations older than, and including the Upper Cretaceous Strand Fiord Formation, a sequence of volcanic rocks that crop out in western Axel Heiberg Island. Dykes and sills have not been observed to intrude the Upper Cretaceous Kanguk Formation or the Tertiary Eureka Sound Formation. They are especially common in Mesozoic rocks that predate the Kanguk Formation, and while it is possible that more than one episode of intrusion is represented it is probable that the vast majority of dykes and sills cutting rocks of the Sverdrup Basin are Cretaceous in age.

   In the Otto Fiord map-area, dykes and sills are clearly more abundant in lower Paleozoic rocks than in Sverdrup Basin sediments, and although no dykes are known to be unconformably overlain by rocks of the Sverdrup Basin there is a good possibility that some dykes and sills predate the development of the Sverdrup Basin.

   The larger and more conspicuous dykes are shown on the map but sills have not been mapped.

   Sills are rare in all Carboniferous, and most Permian formations in this area. They are moderately abundant in the Blind Fiord and Heiberg Formations, and in outcrops of the Trold Fiord Formation southeast of the head of Hare Fiord. Sills are abundant in virtually all exposures of the Blaa Mountain Formation where they attain thicknesses up to about 300 feet.

8. The map-area contains the type sections of the Grant Land Formation, members A and C of the Lands Lokk Formation, Borup Fiord Formation, Otto Fiord Formation, Hare Fiord Formation, van Hauen Formation and Degerbols Formation.

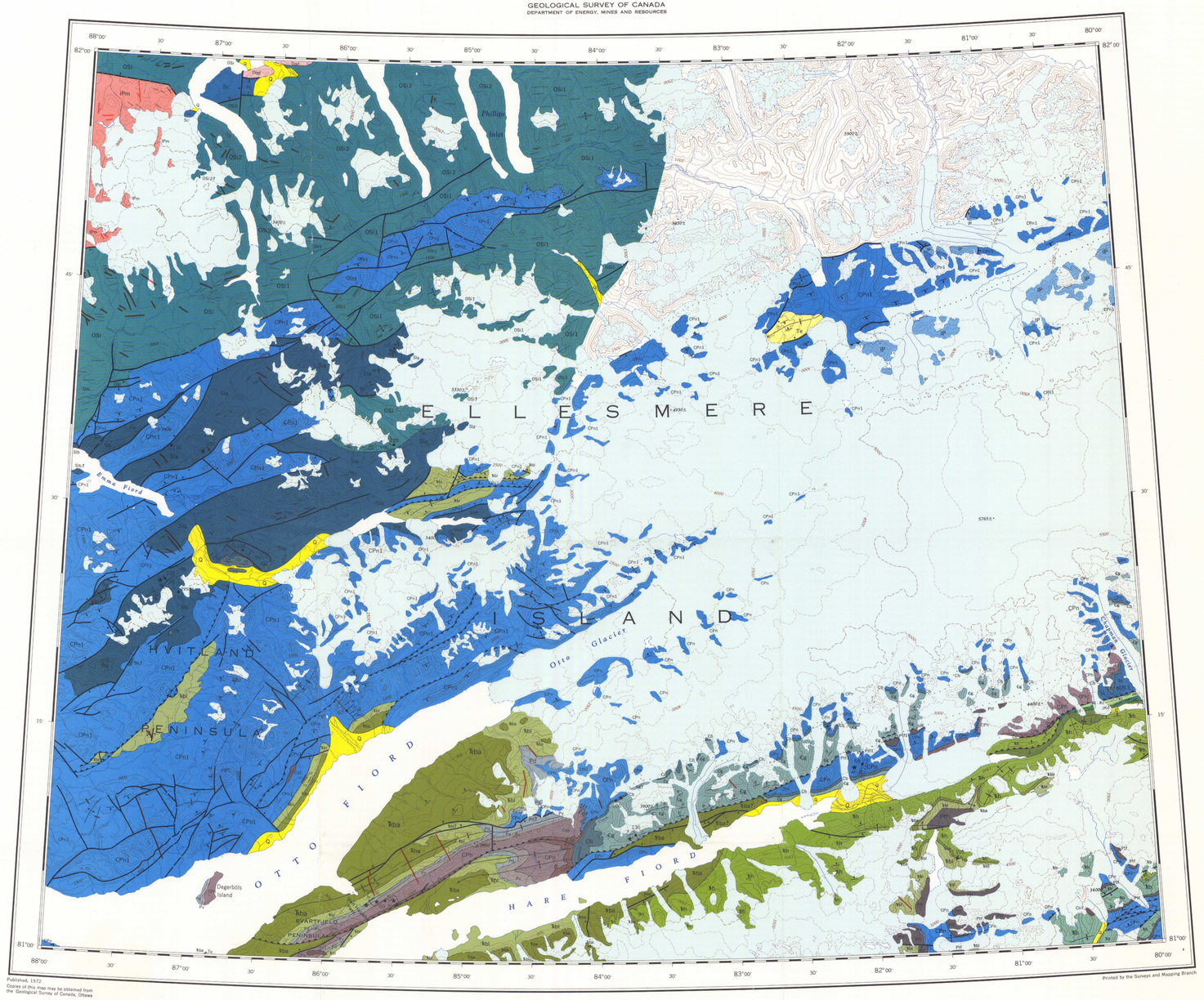
Geological cartography by the Institute of Sedimentary and Petroleum Geology, Geological Survey of Canada, 1971

Intermittent stream
Indefinite lake
Icefield, glacier.
Dry river bed with channel
Moraine, scree
Contours (interval 500 feet) 2500
Height in feet above mean sea-level 3400

Topographic base-map at the same scale published by the Surveys and Mapping Branch, 1967 with revisions by the Institute of Sedimentary and Petroleum Geology

The daily change of the North Magnetic Pole causes the magnetic compass to be very erratic in this area

Geographical names subject to revision



Published, 1972
Copies of this map may be obtained from the Geological Survey of Canada, Ottawa

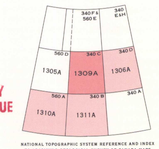
Printed by the Surveys and Mapping Branch

INDEX MAP

MAP 1309A
GEOLOGY
OTTO FIORD
DISTRICT OF FRANKLIN

Scale 1:250,000

Miles 4 0 4 8 12 Miles
Kilometres 6 0 6 12 18 Kilometres



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

1309A
MAP 1309A
OTTO FIORD
DISTRICT OF FRANKLIN

N.W.T. OTTO FIORD
1:250,000
MAP 1309A