

LEGEND

**SEDIMENTARY AND VOLCANIC ROCKS**

**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, conglomerate, siltstone, shale, minor coal

**CRETACEOUS**  
LOWER CRETACEOUS  
Kc CHRISTOPHER FORMATION: dark coloured shale, volcanic flows, pyroclastic rocks (see note 1); minor sandstone, mudstone and siltstone  
Ki ISACHSEN FORMATION: sandstone, volcanic flows, pyroclastic rocks; minor shale, siltstone and conglomerate

**JURASSIC AND CRETACEOUS**  
JK DEER BAY FORMATION (Upper Jurassic and Lower Cretaceous): dark coloured shale, minor siltstone, sandstone and mudstone  
JK1 Unnamed formation (see note 2): Deer Bay, Avingak and Savik Formations  
J AWINGAK AND SAVIK FORMATIONS (Undivided)  
S SAVIK FORMATION (Lower, Middle and Upper Jurassic): dark coloured shale, minor siltstone and sandstone

**TRIASSIC**  
UPPER TRIASSIC  
Th HEIBERG FORMATION: sandstone, siltstone, minor shale  
LOWER, MIDDLE AND UPPER TRIASSIC  
Rba BLAA MOUNTAIN FORMATION: dark coloured shale and siltstone, light grey calcareous siltstone; minor sandstone  
LOWER TRIASSIC  
Tbi BLIND FIORD FORMATION: siltstone; minor shale and sandstone

**PERMIAN**  
UPPER PERMIAN  
Pd DEGERBÖLS FORMATION: limestone, cherty limestone and chert  
LOWER PERMIAN  
Pv VAN HAUEN FORMATION: dark coloured siltstone, shale and limestone; minor sandstone and chert

**CARBONIFEROUS AND PERMIAN**  
UPPER CARBONIFEROUS AND LOWER PERMIAN  
CPn NANSEN FORMATION: light coloured limestone, chert; minor shale and siltstone (CPn1; see note 3)  
CPh HARE FIORD FORMATION: dark coloured siltstone, shale and limestone

**SILURIAN**  
MIDDLE AND (?) UPPER SILURIAN  
Sts LANDS LOKK FORMATION (Member A): slaty siltstone and shale; minor lithic and tuffaceous sandstone, tuff and conglomerate

**ORDOVICIAN (?)**  
RENS FIORD COMPLEX  
Orc Carbonate Unit: dolomite, limestone (stratigraphic unit; age relationship with volcanic unit uncertain)  
IP LOWER PALEOZOIC (?) Clastic sediments (air photo interpretation)

**ORDOVICIAN AND (?) CAMBRIAN**  
RENS FIORD COMPLEX  
Orp Pelitic and Cherty Unit: slate, phyllite, bedded chert; minor sandstone and argillaceous dolomite (lithological unit occupying different stratigraphic levels; includes green and red slates mapped as Grant Land Formation on Ellesmere Island)

**ORDOVICIAN AND/OR CAMBRIAN**  
Cg GRANT LAND FORMATION (Sandstone Unit of Rens Fiord Complex): quartzose sandstone; minor siltstone, slate, phyllite, conglomerate, dolomite

**INTRUSIVE ROCKS**  
Co1 OTTO FIORD FORMATION: anhydrite, gypsum, minor limestone and shale (see note 4)

**CRETACEOUS AND OLDER**  
Gabbro, diabase and basalt dykes (solid circle indicates downthrow side of fault; intruded by dyke) see note 6

**DEVONIAN**  
MIDDLE OR UPPER DEVONIAN (?)  
Dd Dacite dyke

**Geological boundary (defined, approximate, assumed)**  
Bedding, tops known (horizontal, inclined)  
Bedding, tops unknown (inclined; from ground observation or air photographs)  
Bedding from air photographs or observed from aircraft  
Trend of bedding (from air photographs)  
Fault (defined, approximate; solid circle indicates downthrow side)  
Thrust fault (defined; teeth indicate upthrust side)  
Anticline (defined, approximate; showing culmination and plunge of axis)  
Syncline (defined, approximate; showing culmination and plunge of axis)  
Fossil locality  
Measured section showing approximate line of traverse  
Boundary of Quaternary sediments  
Locality where age has been determined radiometrically  
Geological boundary, fold axis, or fault inferred beneath water, glacier, or Quaternary sediments

Geology of Carboniferous and younger rocks by R. Thorsteinsson 1956, 1957, 1961, 1962, 1963 and E.T. Tozer 1956, 1961, 1962, 1964  
Geology of Devonian and older rocks by H.P. Trettin 1961, 1962  
Compilation by R. Thorsteinsson and H.P. Trettin

**NOTES**

1. A conspicuous feature of the Christopher Formation in this map-area is the presence of interbedded volcanic rocks. The formation is limited to two areas on the south side of Bunde Fiord. The westernmost outcrop area has been examined in some detail. It contains two and possibly three units of volcanics, the oldest and thickest of which is about 3,000 feet thick.

2. Although the Avingak Formation, south of Bunde Fiord and in the environs of Bats Fiord and Li Fiord, is a distinct formation that consists mainly of sandstone, it contains a high proportion of siltstone and shale, and is therefore less resistant than typical developments of the formation. Because of this, the Avingak is not readily differentiated in the topography from the underlying Savik Formation and overlying Deer Bay Formation and the three formations are mapped as one rock-unit that bears the symbol JK.

North of the latitude of Bunde Fiord the Avingak grades laterally into mainly dark coloured shale and siltstone. As a result of this facies change, strata equivalent to the combined Savik, Avingak and Deer Bay Formations are represented as one formation (as yet unnamed) composed of shale and siltstone with minor interbeds of sandstone and mudstone. These rocks carry the map symbol JK1. The best exposures occur on Bjarnason Island where the unnamed formation is about 4,000 feet thick.

3. Extensive areas of northwestern Axel Heiberg Island are shown here as undated by map-unit CPn1, which includes five formations. In ascending stratigraphic order, these formations are: Borup Fiord, Otto Fiord, Nansen, van Hauen and Degerbøls. The Borup Fiord and Otto Fiord Formations are commonly covered with talus derived from the overlying Nansen Formation, and nowhere in the Bukken Fiord map-area have they been mapped separately. The Borup Fiord Formation is made up largely of red quartzose sandstone and carbonate, and attains a thickness of 400 feet or less. The Otto Fiord Formation consists mainly of anhydrite. It is represented locally by a few tens of feet of beds in the Bukken Fiord map-area, but appears to be absent in most places. The Otto Fiord is a facies equivalent of the lower part of the Nansen, and exposures of the formation in the Bukken Fiord map-area, in normal stratigraphic sequences, undoubtedly represent but a small portion of the formation which attains thicknesses in the order of 1,000 feet where typically developed; in northwestern Ellesmere Island, the van Hauen and Degerbøls Formations are each bounded below and above by unconformities, at any given locality one or both formations may be missing. Moreover, the van Hauen and Degerbøls Formations are relatively thin rock-units with individual maximum thicknesses generally less than 1,000 feet. In contrast, the thickness of the Nansen Formation is in the order of 3,000 to 4,000 feet. The strata included in map-unit CPn1 are characterized generally by low to moderate dips, even though they are commonly broken by high-angle faults. On the basis of circumstances outlined above, an estimated ninety-five per cent of the area mapped as CPn1 exposes only strata of the Nansen Formation.

4. Intrusive bodies of the Otto Fiord Formation occur in the Bukken Fiord map-area, but are common in adjacent map-areas to the south 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.

5. The contact between the Carbonate unit of the Rens Fiord Complex (Orc) above, and the Grant Land Formation (Cg) and argillaceous strata of the Rens Fiord Complex (Orp) below, is possibly an unconformity, and is represented on this map as a formational contact. It is possible, however, that this contact is in fact a low angle fault.

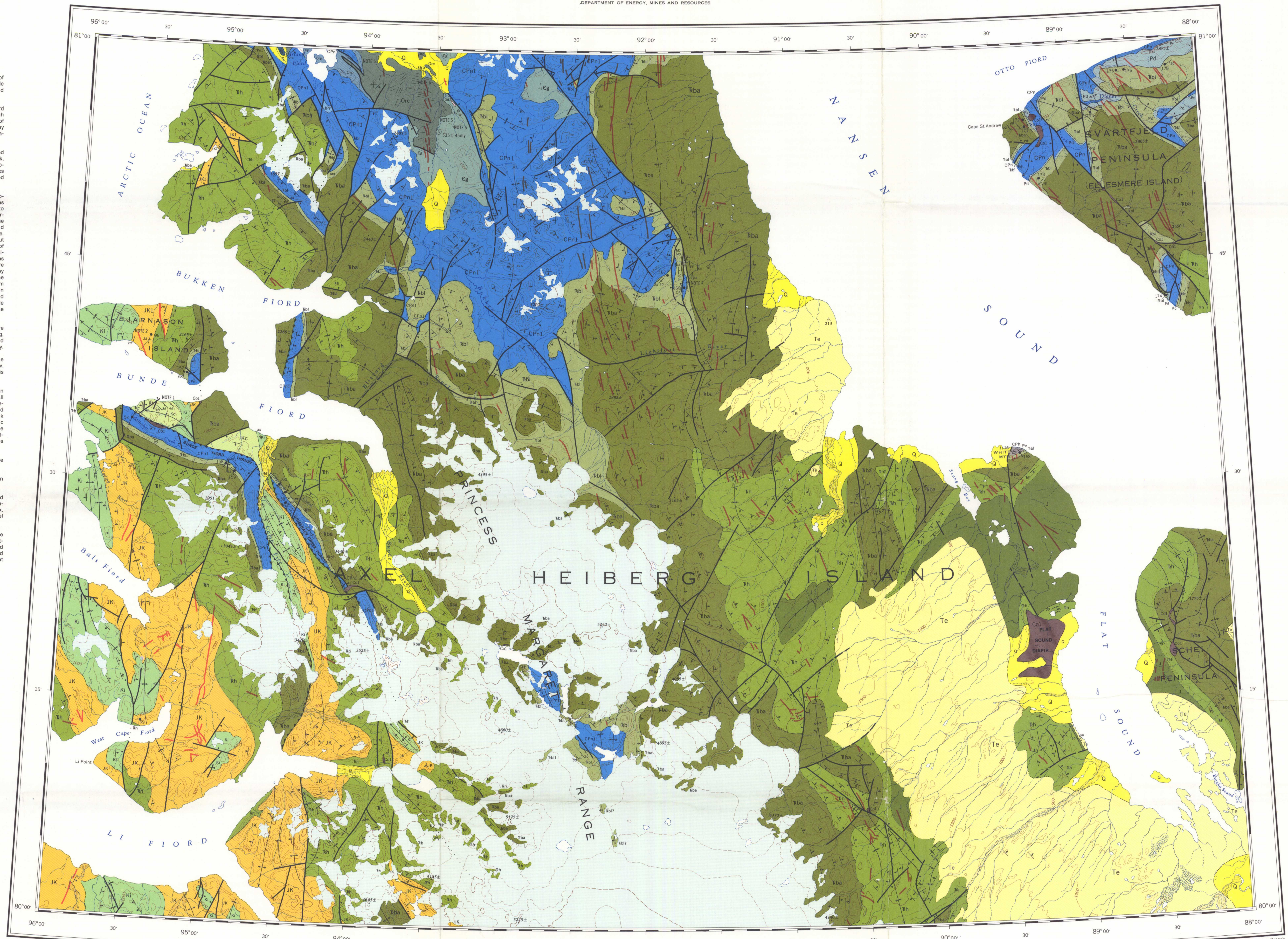
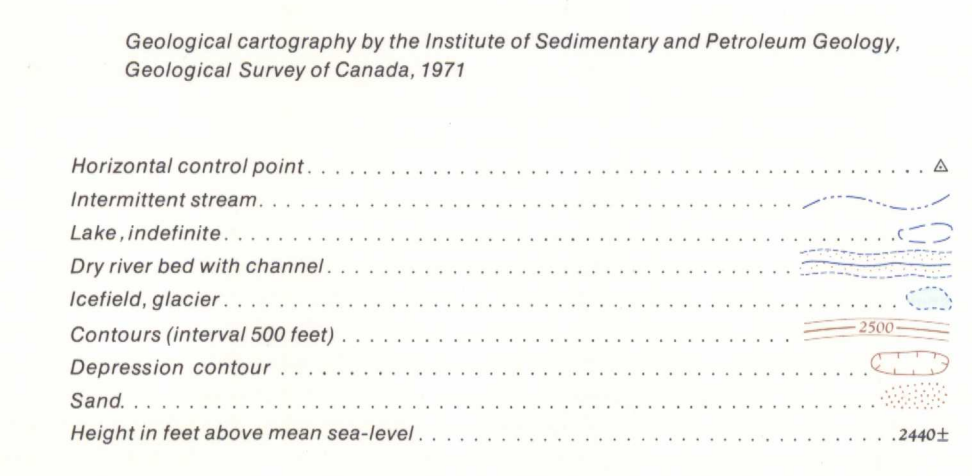
6. Basic dykes and sills intrude upper Paleozoic and Mesozoic sediments of the Sverdrup Basin throughout much of Axel Heiberg Island and western Ellesmere Island. They intrude all formations older than, and including the Upper Cretaceous Strand Fiord Formation, a sequence of volcanic rocks that crops out in Axel Heiberg Island south of the Bukken Fiord map-area. 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 - particularly in view of extrusive rocks in both Isachsen and Christopher Formations of the Bukken Fiord map-area - it is probable that the vast majority of dykes and sills cutting rocks of the Sverdrup Basin are Cretaceous in age.

Basic dykes and sills intrude lower Paleozoic rocks in the Bukken Fiord map-area and some of these may well predate the development of the Sverdrup Basin.

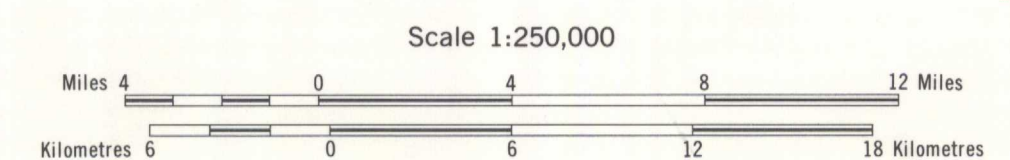
The larger and more conspicuous dykes are shown on the map but sills have not been mapped.

Sills are rare in all Carboniferous and Permian formations. They are abundant generally and thick (up to about 300 feet) in the Blind Fiord, Blaa Mountain and Heiberg Formations throughout the map-area. Sills also are abundant but generally thin (up to about 100 feet) in the Savik, Avingak and Deer Bay Formations that crop out south of Bunde Fiord in western Axel Heiberg Island.

7. Strata mapped as CPn1 along a steeply dipping gravity fault some five miles north of the Lightfoot River include in upward order: (1) About 100 feet of chert and limestone representing the uppermost beds of the Nansen Formation; (2) About 150 feet of volcanic flows assigned tentatively to the Esayoo Formation; (3) A few tens of feet of chert and limestone assigned to the Degerbøls Formation. Esayoo rocks are of special interest inasmuch as they represent the only exposures of the Esayoo Formation in the Bukken Fiord map-area.



MAP 1310A  
GEOLOGY  
BUKKEN FIORD  
DISTRICT OF FRANKLIN



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MAP 1310A

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