GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

LEGEND TO ACCOMPANY SURFICIAL MATERIALS MAPS 49 C (Baumann Fiord) AND 59 D (Graham Island)

For explanation of designations see panel in lower left.

Compiled by D.A. Hodgson. Information derived from field work in 1974 with the assistance of A.C. Liard and W.G. Green, and from airphoto interpretation 1974-75.

TEXTURAL MODIFIER

Summary of grain size classes

The textural description of a map-unit is drawn from scattered field observations and occasional laboratory checks of samples, from estimates of the composition of depositional landforms identified on air photographs, and from estimates of the probable weathering products of source rocks.

In many units, materials are composed of more than one grain size class. In this case, classes are combined into a broader group (e.g., fines), or listed in the order of their occurrence.

c clay (<.002 mm)

si silt (.063-.004 mm)

ȼ silt and clay undifferentiated (<.063 mm)

ś silt and fine sand, undifferentiated (.25-004 mm)

f fines: clay, silt and fine sand present in unknown proportions (<.25 mm).

s sand, including fine sand if present (2-.063 mm)

g gravel (2-256 mm) little or no fines

b boulders (>256 mm)

r rubble: angular rock fragments >2mm in size; commonly up to 25% of the total mass is represented by sand or fines either in the fragment interstices, or concentrated locally by frost action.

Note that the character of rubble is dependent on the source rock; e.g., indurated sandstone produces fragments and sand, shale produces platy fragments and silt-clay. Refer to the rock/residual superscript and key to determine the lithology of source rocks.

Rubble on resistant formations often represents a veneer derived from mass-wasting of competent bedrock

o outcrop: exposed bedrock surface little altering by weathering; refer to rock/residual superscript and key to determine lithology

p peat

EXPLANATION OF UNIT DESIGNATION

The material-genetic term forms the core of the unit designation. This generally conveys a certain range of landforms and materials.

The textural modifier provides more specific information on the grain size distribution within a material.

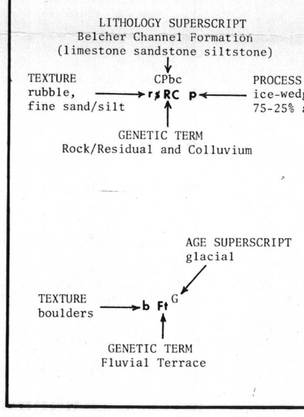
The lithology superscript provides detail on the composition of rock/residual units, using the notation from the area bedrock map as the key. A stratigraphic formational unit, which is frequently composed of more than one lithology, is not the ideal mode for presenting lithological information; however a great deal more field work would be necessary to map out each lithology.

The age superscript and process modifier are added when applicable.

The maps provide base data on the character and genesis of surficial materials.

A more generalized description of materials, plus information on topography, drainage, geomorphic processes, ground ice content, vegetation and sensitivity to disturbance, is available on the concurrent legend and series of physiographic maps.

EXAMPLES



MATERIAL - GENETIC TERM

Identified from air photographs and field observations.

Fp Fluvial plain

Active stream channels and their associated floodplains. There are normally one or two main channels, plus a secondary network of braided channels which contain the excess discharge during snowmelt or following heavy or extended rainfall.

A fluvial plain will only partially reflect the material through which a stream is passing, as the coarser fraction from it is emphasized; it frequently also carries a coarse bedload derived from an upstream source.

Ft Fluvial terrace

Inactive floodplain

Fpt Floodplain and terrace indivisible at the scale of the map.
Ftp

Ff Fluvial/Alluvial fan

Cone or fan-shaped deposit of stream sediments on land; usually at a point where the gradient abruptly decreases.

Provides a heterogeneous mixture of materials, though with a tendency for grading from coarser to finer from apex to toe.

Fd Fluvial delta

Sediment deposited where a stream enters the sea or a lake. Commonly divisible into coarse topset beds, finer foresets, and fine bottomset beds; i.e., coarse material overlying fine. Fine-grained 'slackwater' deposits at the margins.

As most deltas in the map-area are adjacent to tidewater, their form has been modified by the (relatively) falling postglacial sea level to provide multiple terraces, in addition to an active braided surface. Deltas with inactive surfaces extensive enough to be mapped as a unit or partial unit, can be identified by the 'I' (inactive) superscript.

m Marine plain

Sediments deposited by nearshore marine processes; or re-worked older deposits.

In the map-area, characteristically low surface gradient (<1°); dominantly silt to fine sand, deposited in a low energy environment.

A combination of poor drainage and raised-rim ice-wedge troughs often leads to the development of thermokarst ponds.

mv Marine veneer

Veneer of marine deposits <1 m thick. Often derived from underlying material rather than being transported from elsewhere on the coast.

Thermokarst ponds less frequent than on a marine plain.

mb Marine beaches

Flights of well-developed ridges and swales, raised by postglacial isostatic uplift. Commonly found where higher energy conditions exist (e.g., headlands), and where a source of coarse material is available.

Ridges are normally sand or gravel, 0.5 to 1.5 m high; swales are underlain by a finer fraction with a thin veneer of organic material.

M Moraine

Subglacial non-fluvial deposits which may vary from a clay or silt to a heterogeneous mixture of grain sizes.

In this area, morainal material does not generally appear to have undergone much transport, and varies little from the underlying or adjacent source material. Identifiable deposits appear to be confined to softer rock formations, where it is difficult to distinguish them from residual weathered material, or covers on old gravel deposits which themselves are usually heterogeneous in composition.

Deposits probably do not exceed a few metres in thickness.

P Gravels: Pleistocene or Pliocene
Conjectured to be remnants of a preglacial sheet of fluvial deposits extending over a large part of western Ellesmere Island and eastern Axel Heiberg Island.

Material varies areally from clean gravels and boulders, to silty or clayey gravels >10 m thick. Granites and other exotic rocks are common. Often overlain by a thin stony loam, that is probably morainal.
Deposits are especially common where softer rock formations appear to have been planed off, at elevations of 130 to 200m.

C Colluvial deposits

Material displaced or altered by mass-wasting processes to such a degree that it differs from source materials underlying or adjoining it.

R Rock/Residual

Bedrock and its weathered mantle, essentially in situ but may include up to 25% colluvium. Note that even with a complete cover of weathering products, or a partial colluvial cover, the structure of underlying bedrock is often fully visible on an air photograph.

The character of the material can be determined from:
1. the textural modifier (note that 'o' indicates outcrop).
2. the lithology superscript, which refers to the lithological key.

RC Rock/Residual and Colluvium

75% to 25% rock/residual, the remainder colluvium.

CR Colluvium and Rock/Residual

>75% colluvium, >25% rock/residual.

Rm Marine washed Rock/Residual

Bedrock or residual rock material washed by a falling postglacial sea level. Not readily distinguished from weathered rock, however a discontinuous veneer of marine deposits, including beach ridges, is present in many places.

Relief is commonly low, due to repeated (i.e., not only Holocene) periods of marine erosion in this zone, up to ca. 130m.

I Perennial Ice

Ov Organic veneer

Thin (usually <50 cm) layer of plant debris.

ROCK/RESIDUAL LITHOLOGY SUPERSCRIPT

Descriptions of the bedrock are based mainly on members, formations and groups described by Greiner (1963), Kerr (1968a, 1968b), Kerr and Thorsteinsson (1971), Thorsteinsson (1974) and Tozer (1963). Typical weathering products in the bedrock units were examined in the field in 1974.

If more than one weathering product is listed, the finer fraction will generally be more in evidence on gentle slopes than on steep slopes.

KTe Eureka Sound Formation

Siltstone, sandstone, shale, minor conglomerate and coal. Poorly cemented and readily eroded.

Weathers to loose silt and sand, clay, minor gravel. Develops 'badland' topography.

K Cretaceous, undifferentiated, on Graham Island

Little areal information available (see Greiner, 1963). The island is underlain by Kanguk, Hassel, and possibly Christopher Formations, of Cretaceous age.

For the purposes of surficial mapping, the following lithologies are recognized:

K1 (Kanguk). Shale; fissile, minor siltstone, diabase dykes. Weathers to small platy fragments and fines (mainly silt). May include areas of K3.

K2 (Kanguk-Hassel?). Siltstone; shale, fine-grained sandstone. Weathers to silt, fine sand, and minor clay.

K3 (Kanguk?). Shale; fused by combustion. Weathers to lightweight, white-grey-pink-red blocks and platy fragments.

K4 (Hassel?). Sandstone; friable fine- to medium-grained; minor siltstone shale. Weathers to sand, silt, minor rubble.

Ki Isachsen Formation

Medium-bedded to massive and commonly cross-bedded quartzose sandstones, fine to coarse-grained. Minor shale beds.

Generally poorly cemented, and exposed as a loose sand. Easily gullied, especially in moderate to strong relief.

J Jurassic (undivided Awingak and Savik Formations)

Sandstone, siltstone and shale. Generally friable, some indurated beds.

Weathers to silt, sand and lag rubble.

Th Heiberg Formation

Succession of sandstone, siltstone, with minor shale, especially near the base. Generally friable, some indurated beds.

Weathers to sand, silt, fine sand, sandstone/siltstone fragments, with minor clay. Where beds are moderately to strongly dipping, differential weathering and erosion leads to a succession of minor and major scarps.

The formation is less resistant to weathering than the Triassic Formations below.

Ts Schei Point Formation

Calcareous siltstone and sandstone, shale, and minor limestone. Generally friable, some indurated beds.

Weathers to silt, sand and sandstone fragments. Differential weathering and erosion as with the Heiberg Formation.

Tb Bjorne Formation

Quartzose sandstone, grey to orange, red weathering; minor siltstone clay and conglomerate ranges from well-cemented to poorly-cemented.

Weathering product varies from rubble to loose sand and silt, with minor clay in the upper succession.

The formation is generally more massive and resistant than the Schei Point.

T Triassic System (undivided)

Heiberg + Schei Point + Bjorne Formations.

Pd Degerbols Formation

Light coloured limestone, minor chert.

Weathers to rubble.

Pv Van Hauen Formation

Shale (dark coloured), chert and siltstone.

Weathering product varies from a plastic clay-silt to soft platy shale fragments.

The formation is less recessive than would be expected in the north-central Bjorne Peninsula, due to the intrusion of basic sills. There is some gabbro, diabase and basalt rubble in this area.

Note that in the transitional zone of the facies change from Van Hauen to Assistance, fine-grained deposits are labelled Pv, and coarser resistant deposits Pa.

Pa Assistance Formation

Sandstone, minor siltstone and limestone.

Weathers to rubble, minor silt.

CPbc Belcher Channel Formation

Grey limestone, sandstone, siltstone.

Weathers to rubble and silt over slightly more than half the unit; the remainder is recessive silt and rubble colluvium and residual material.

Cc Canyon Fiord Formation

Succession of red to buff, well to poorly cemented sandstones, siltstone, minor shale, conglomerate, limestone.

Weathers to silt-fine sand, sand, clay, rubble, conglomerate pebbles especially near the base.

Differential weathering and erosion of flat-lying and inclined beds produces a succession of minor and major scarps.

Dob_4 Okse Bay Formation: Upper Sandstone and Shale Member

Succession of argillaceous sandstones, shales, siltstones, minor coal.

A recessive unit, it weathers to fines, minor rubble.

Dob_3 Okse Bay Formation: Upper Sandstone Member

Light coloured orange weathering quartzose sandstone, with shaly intervals.

Weathers to rubble and fines.

Dob_2 Okse Bay Formation: Lower Sandstone and Shale Member

Succession of argillaceous quartz sandstones, sandy mudstones, shale, siltstone.

A recessive unit, it weathers to fines, minor rubble.

Dob_{1b} Okse Bay Formation: Lower Sandstone Member-upper beds

Quartz sandstone, massive to thick-bedded, well cemented, yellow to orange weathering.

Weathers to boulders and rubble.

Dob_{1a} Okse Bay Formation: Lower Sandstone Member-lower beds

Quartz sandstone (as above) and recessive red shale beds.

Weathers to rubble and fines.

Dob Okse Bay Formation (undivided)

Dbi_2 Bird Fiord Formation: Upper Member

Quartz sandstone, partially calcareous.

Weathers to rubble

Dbi_1 Bird Fiord Formation: Lower Member

Limestone, shale, sandstone

Weathers to rubble and fine sand, silt.

Dbl_2 Blue Fiord Formation: Brown Limestone Member

Limestone, medium- to thick-bedded.

Weathers to rubble.

Dbl_1 Blue Fiord Formation: Limestone and Shale Member

Light grey limestone and recessive calcareous shale.

Weathers to rubble and silt.

De Eids Formation

Shale, siltstone, minor limestone, gypsum. Poorly consolidated and very fissile, to unconsolidated.

Weathers to silt-clay, minor platy siltstone and shale fragments.

Slopes and stream channels adjacent to quartz members, other resistant formation, or pre-glacial gravel deposits may have up to 50% rubble or gravel incorporated in the active layer. Washed areas include a discontinuous veneer of gravel. Presence of scattered erratic boulders indicates discontinuous morainal deposits.

De_1 Eids Formation: Quartz Sandstone Member

Resistant sandstone; weathers to rubble.

Dcp Cape Phillips Formation

Shale, siltstone, minor limestone. Dark, fissile to thin-bedded.

Weathers to fines and platy fragments.

Osa Allen Bay Formation

Very resistant dolomite, minor limestone, shale.

Weathers to rubble, minor fines.

Oci Irene Bay Formation

Limestone, shaly interlayers; thin-bedded, recessive.

Weathers to rubble, minor fines.

Oct Thumb Mountain Formation

Limestone and dolomite; very resistant.

Weathers to rubble; much outcrop also.

Ocb Bay Fiord Formation

Limestone, dolomite, gypsum-anhydrite, siltstone; recessive.

Weathers to rubble, fines.

Oc Cornwallis Group (undivided)

Irene Bay + Thumb Mountain + Bay Fiord Formation.

Oe Eleanor River Formation

Limestone and dolomite.

Weathers to rubble; outcrop present.

Ob Baumann Fiord Formation

Anhydrite, gypsum, minor limestone, shaly interlayers.

Weathers to rubble and fines.

Oco Copes Bay Formation

Limestone, minor anhydrite, gypsum, shale.

Weathers to rubble.

uO Upper Ordovician: Allan Bay Formation

mO Middle Ordovician (undivided): Cornwallis Group

lO Lower Ordovician (undivided): Oe + Ob + Oco

When grouped with the other Lower Ordovician beds, the Baumann Fiord Formation is a minor component.

I Intrusive rocks

Gabbro, diabase and basalt sills and dykes.

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AGE SUPERSCRIPT

A Active forming processes
e.g., Fd^A deltaic sediments currently being deposited.

I Inactive forming processes
e.g., Fd^I delta forming processes inactive.

G Glacial: forming processes associated with an ice mass, not currently active unless specified.

Non-morainal supra-, intra-, sub-, and pro-glacial deposits.

Usually applied to fluvial processes. e.g., Ft^G glacio-fluvial terrace.

As late-glacial conditions produced larger volumes of water and higher energy conditions than exist at present, deposits are normally coarser and more extensive than Holocene fluvial deposits.

Where terms are used in combination, the leading letter is dominant.

PROCESS MODIFIER

Identifies important processes which may modify the texture and form of materials.

If a modifier is added, then the process affects >75% of the unit.

If a bar (-) is placed over the modifier, then 25% to 75% of the unit is affected.

p Ice wedges

Ice-wedge polygon troughs identified from air photographs or in the field, indicating a substantial volume of surficial material (ca. 10-20% in the upper 2m) is wedge ice.

Not all polygon areas have been identified, as a large ice wedge may have only a weak surface expression.

k Thermokarst

Local depression of the ground surface following thawing of ground ice. Mainly on the marine plains, which now have a close pattern of small ponds. The ponds could also occupy poorly-drained depressed-centre polygons. The ponds are floored by a thin veneer of fines and organics.

pk Ice-wedge troughs - thermokarst melting, thaw ponds.

Wedges over which greater than average amount of thawing has taken place, resulting in deep (>1m) broad troughs, often containing standing water for at least part of the summer.

SYMBOLS

unit boundary

Unit boundary very poorly defined

tie line linking similar units

marine washed zone, see description below

prominent beach ridge(s) too narrow to be drawn as an individual map-unit

&, + compound units, see description below

Compound units

Where the areas of two or more map-units are too small to be separately delineated at the map scale, compound units are used. Components are listed in order of area.

Two linking symbols are used:
1. If the textural term is common throughout the unit, terms are linked by '+' e.g., fFf+C
2. If different textural terms apply to each component of the unit, terms are linked by '&' e.g., gFf&fC

Marine Washed Zone

Zone washed by marine processes, but not to a degree requiring delineation as a separate unit. May include perched fluvial deposits, coarse beach deposits, or a discontinuous veneer of fine to medium grained materials.

1. Zone coincident with unit boundary
2. Zone not coincident with unit boundary