GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA

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

EXPLANATION OF LANDFORM UNIT NOTATIONS

Compositional-Genetic Category — Age Modifier — Process or Form Modifier — Textural Modifier — Morphologic Modifier(s)

Bn - 7

A/B Stratigraphic relationships given where thickness of upper unit is irregular and where underlying unit is a known compositional-genetic unit other than bedrock.

Compositional-Genetic Categories[1]

- A- Alluvial Deposits: sand and gravel with veneer of fine sediment and organics; mainly Holocene; floodplain (Ap) moders.
- C- Colluvial Deposits: various materials, mainly rubble, includes landslides (C/A); undifferentiated age.
- D- Drift: undifferentiated till, sand, and gravel.
- E- Eolian Deposits: fine sand and silt; pre-Wisconsinan (pre-Reid).
- G- Glaciofluvial Deposits: sand and gravel with veneer of fine sediment.
- L- Lacustrine Deposits: mainly silt and clay with little fine sand; Late Wisconsin (McConnell).
- M- Morainal Deposits: till, silty/sandy diamicton; rock glaciers (MR), rubble; modern.
- R- Bedrock: various types; pre-Pleistocene.

Textural Modifiers

- a- sand or gravel
- b- boulders, blocks, bouldery
- f- fine sand, silt and clays commonly with high organic content
- g- gravel, gravelly
- r- rubble, predominantly sand to boulder-sized fragments

Age Modifiers[2]

- 1- Late Wisconsin (McConnell)
- 2- Early Wisconsin or Illinoian (Reid)
- 2a- Early Wisconsin or Illinoian (Laurentide Glaciation)
- 3- Illinoian or pre-Illinoian (pre-Reid)

Morphologic Modifiers

- a- apron
- b- blanket[3]
- f- fan
- h- hummocky
- m- undulating, rolling
- n- nondescript slope, bedrock controlled
- p- plain, floodplain
- r- ridge, ridged
- s- steep slope (greater than 35°); cliff
- t- terrace, terraced
- v- veneer[4]
- 1- gentle to moderate slope (5-15°)
- 2- moderate to steep slope (15-35°)

Process or Form Modifiers

- A- active deposition
- X- thermokarst, modified by thermokarst
- R- rilled

[1] General descriptions of texture and age are given for each category; only where texture and age differ from the general description are textural and age modifiers used.

[2] The age modifier is used only where the deposit can be definitely ascribed to a single age, except for Ap which is modern.

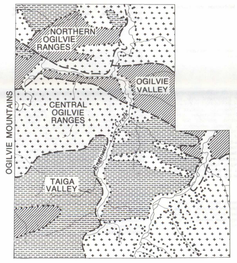
[3] Blanket indicates category forms nearly continuous cover greater than 1 m thick, generally 0.3 to 3 m thick, over a unit, commonly rock.

[4] Veneer indicates category forms broken thin cover, generally less than 1 m thick, but averaging 0.3 m thick, over a unit, commonly rock.

Geological boundary (defined, approximate, assumed)
Fault scarp, postglacial
Fluted bedrock
Fluted till
Moraine (ridge type as given by modifier)
Meltwater channel (age as given by modifier)
Nivation terrace
Pingo
Thermokarst depression
Landslide scar
Stream-trimmed scarp (unconsolidated material, bedrock in part)
Stream-cut ravines and canyons (unconsolidated material, bedrock in part)
Limit of mapping

Note: Not all units and symbols shown in the legend necessarily appear on this map.

PHYSIOGRAPHY



VALLEY or BASIN (DEPRESSION) - Low-lying land bordered by higher ground; flat, smooth, or gently undulating terrain with few surface irregularities.

PLATEAU - Land standing well above valleys but below elevation of nearby mountains; flat, smooth, gently sloping to moderately hilly terrain; in places dissected by valleys, but major part of surface is near summit level.

HILLS - Prominences that rise above surrounding terrain; relief less than 330 m; rounded summits.

MOUNTAINS - Prominences that rise above surrounding terrain; relief more than 330 m; have restrictive summit area and steep slopes.

BOUNDARIES

Between physiographic systems.
Between major physiographic subdivisions.
Delineating minor physiographic subdivisions.

Geology by R.D. Thomas and V.N. Rampton, 1980

Linework by Terrain Analysis and Mapping Services Ltd., Carp, Ontario

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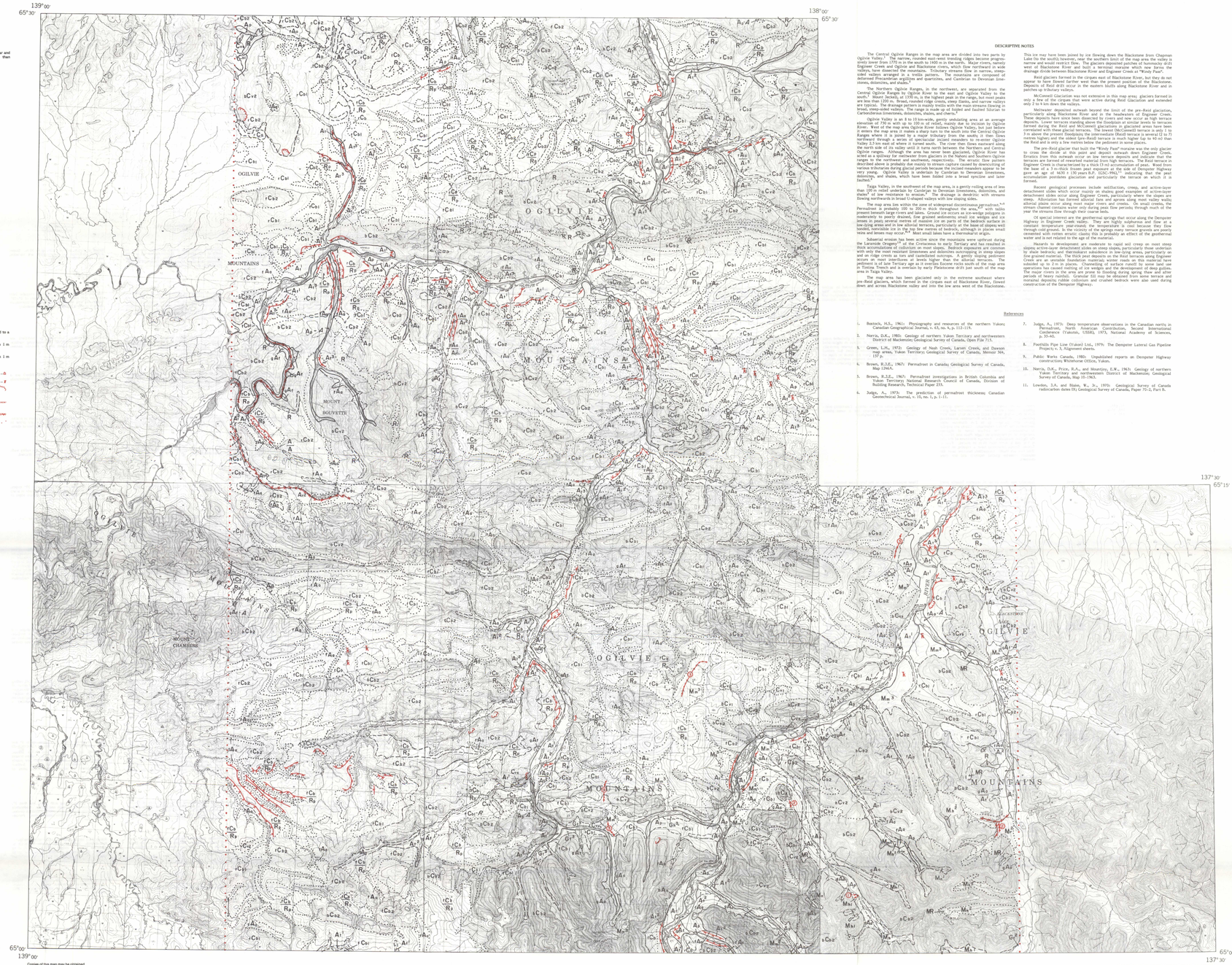
Approximate magnetic declination, 1982, 32°56' East decreasing 3.0' annually

Elevations in metres above mean sea level



DESCRIPTIVE NOTES

The Central Ogilvie Ranges in the map area are divided into two parts by Ogilvie Valley.[1] The narrow, rounded east-west trending ridges become progressively lower from 1770 m in the south to 1400 m in the north. Major rivers, namely Engineer Creek and Ogilvie and Ogilvie River follows Ogilvie Valley, but just before it enters the map area it makes a sharp turn to the south into the Central Ogilvie Ranges. The river then flows eastward along the north side of its valley until it turns north between the Northern and Central Ogilvie ranges. Although the area has never been glaciated, Ogilvie River has cut a valley through the Ogilvie Mountains and Ogilvie Ranges, which are 1500 m higher ranges to the northwest and southwest, respectively. The erratic flow patterns described above is probably due mainly to stream capture caused by downcutting of various tributaries during glacial periods because the inclined meanders appear to be very young. Ogilvie Valley is underlain by Cambrian to Devonian limestones, dolomites, and shales, which have been folded into a broad syncline and later faulted.[2]

Taiga Valley, in the southwest of the map area, is a gently rolling area of less than 150 m relief underlain by Cambrian to Devonian limestones, dolomites, and shales[2] of low resistance to erosion.[3] The drainage is dendritic with streams flowing northwards in broad U-shaped valleys with low sloping sides.

The map area lies within the zone of widespread discontinuous permafrost.[4,5] Permafrost is known to be at least 200 m thick throughout the area,[6] with talliks present beneath large rivers and lakes. Ground ice occurs as ice-wedge polygons in moderately to poorly drained, level areas underlain by fine-grained sediments. Ice masses in peat, several metres of massive ice on parts of the bedrock surface in low-lying areas and in low alluvial terraces, particularly at the base of slopes; well bedded, nonvisible ice in the top few metres of bedrock, although in places small veins and lenses may occur.[7,8] Most small lakes have a thermokarst origin.

Subaerial erosion has been active since the mountains were uplifted during the Laramide Orogeny[9] of the Cretaceous to early Tertiary and has resulted in widespread mass movement of material on slopes. Rockfall is common on slopes with only the most resistant limestones and dolomites outcropping in steep slopes and on ridge crests as tors and castellated outcrops. A gently sloping pediment surface is well developed at levels higher than the alluvial terraces. The pediment is of late Tertiary age as it overlies Eocene rocks south of the map area in Tintina Trench and is overlain by early Pleistocene drift just south of the map area in Taiga Valley.

The map area has been glaciated only in the extreme southeast where pre-Reid glaciers, which formed in the corques east of Blackstone River, flowed down and across Blackstone valley and into the low area west of the Blackstone. This ice may have been joined by ice flowing down the Blackstone from Chapman Lake (to the south); however, near the southern limit of the map area the valley is narrow and would restrict flow. The glaciers deposited patches of hummocky drift west of Blackstone River and built a terminal moraine which now forms the drainage divide between Blackstone River and Engineer Creek as "Windy Pass".

Reid glaciers formed in the corques east of Blackstone River, but they do not appear to have flowed farther west than the present position of the Blackstone. Deposits of Reid till are found in the eastern bluffs along Blackstone River and in patches up tributary valleys.

McConnell Glaciation was not extensive in this map area; glaciers formed in only a few of the corques that were active during Reid Glaciation and extended only 2 to 4 km down the valleys.

Meltwater deposited outwash beyond the limit of the pre-Reid glaciation, particularly along Blackstone River and in the headwaters of Engineer Creek. These deposits have since been dissected by rivers and now occur as high terrace deposits. Lower terraces standing above the floodplain at similar levels to terraces bordering the Ogilvie River in Ogilvie Valley, suggest that these terraces may be correlated with these glacial terraces. The lowest (McConnell) terrace is only 1 to 3 m above the present floodplains; the intermediate (Reid) terrace is several (2 to 7) metres higher; and the oldest (pre-Reid) terrace is much higher (up to 40 m) than the Reid and is only a few metres below the pediment in some places.

The pre-Reid glacier that built the "Windy Pass" moraine was the only glacier to cross the divide at this point and deposit outwash down Engineer Creek. Meltwater from the McConnell glacier deposited outwash down Ogilvie River. The terraces are formed of reworked material from high terraces. The Reid terrace in Engineer Creek is characterized by a thick (3 m) accumulation of peat. Wood from the base of a 3 m-thick frozen peat exposure at the side of Dempster Highway gave an age of 4630 ± 130 years B.P. (GSC-996),[10] indicating that the peat accumulation postdates glaciation and particularly the terrace on which it is formed.

Recent geological processes include solifluction, creep, and active-layer detachment slides which occur mainly on shales; good examples of active-layer detachment slides occur along Engineer Creek, particularly where the slopes are steep. Alluviation has formed alluvial fans and aprons along most valley walls; alluvial plains occur along most major rivers and creeks. On small creeks, the alluvial deposits are reworked during low flow periods through much of the year the streams flow through their coarse beds.

Of special interest are the geothermal springs that occur along the Dempster Highway in Engineer Creek valley. They are highly sulphurous and flow at a constant temperature year-round; the temperature is cool because they flow through cold ground. In the vicinity of the springs many terrace gravels are poorly cemented with rotten erratic clasts; this is probably an effect of the geothermal water and is not related to the age of the material.

Hazards to development are moderate to rapid soil creep on most steep slopes, active-layer detachment slides on shales, and widespread mass movement by shale bedrock; and thermokarst subsidence in low-lying areas, particularly on fine-grained material. The thick peat deposits on the Reid terraces along Engineer Creek are an unstable foundation material; winter roads on this material have subsided up to 2 m in places. Channelling of surface runoff by some land use practices may accelerate the development of thermokarst depressions and gullies. The major rivers in the area are prone to flooding during spring thaw and after periods of heavy rainfall. Granular fill may be obtained from some terrace and morainal deposits; rubble collluvium and crushed bedrock were also used during construction of the Dempster Highway.

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INDEX MAP

MAP 8-1982

SURFICIAL GEOLOGY AND GEOMORPHOLOGY

ENGINEER CREEK

YUKON TERRITORY

Scale 1:100 000

Kilometres 2 0 2 4 6 8 Kilometres
Miles 2 0 2 4 Miles

Universal Transverse Mercator Projection

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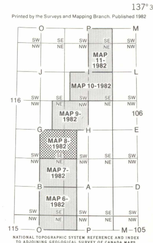

ENGINEER CREEK
YUKON TERRITORY

8-1982 c.2

Canada

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