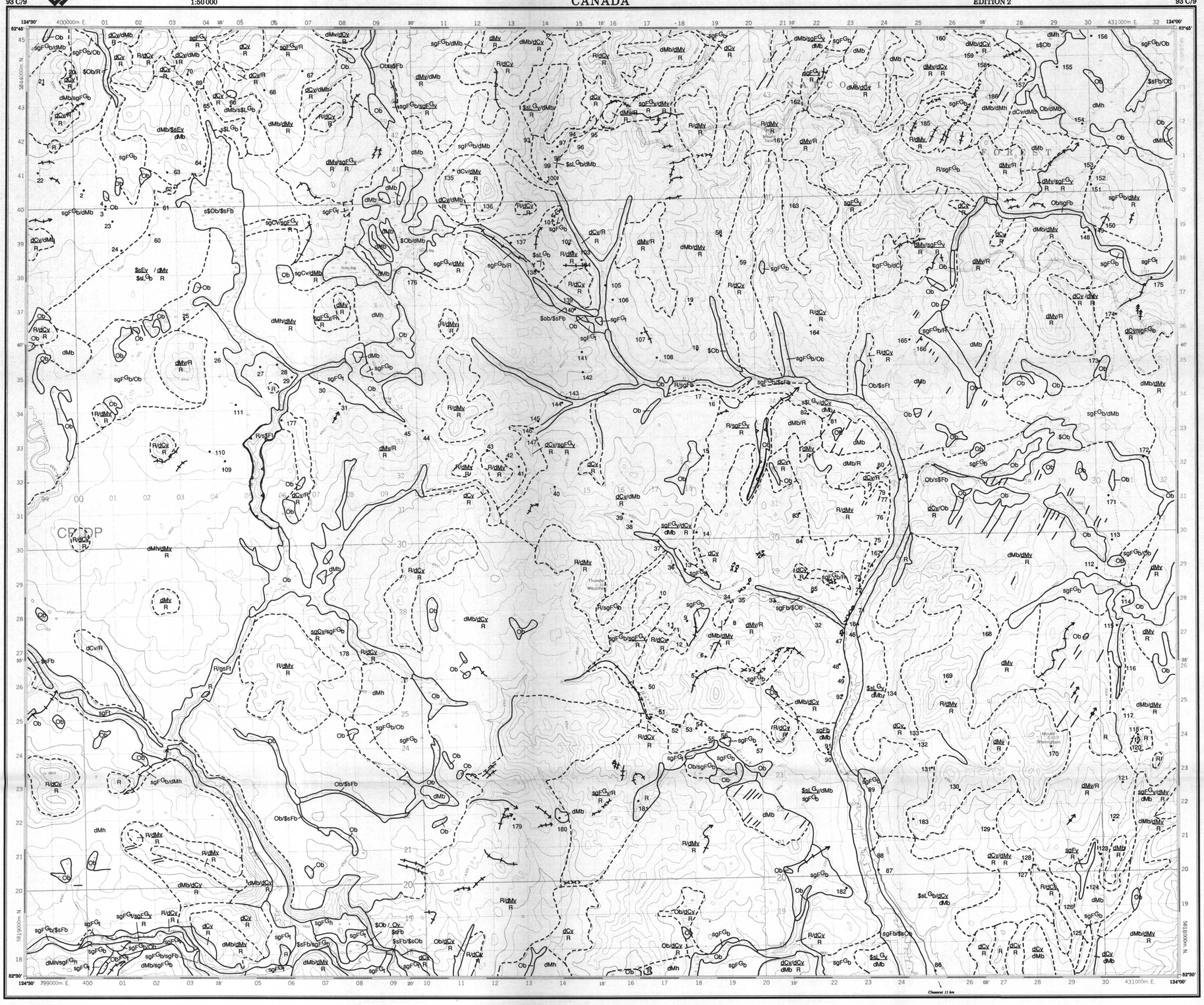
Mineral Development Agreement

93 C/9 | 1:50 000 | CANADA | EDITION 2 | 93 C/9



BASE MAP PRODUCED BY THE SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA

Province of British Columbia
Ministry of Energy, Mines
and Petroleum Resources

Geological Survey Branch

OPEN FILE 1993-18

SURFICIAL GEOLOGY OF THE CLUSKO RIVER AREA

NTS 93C/9

Geology by D.N. Proudfoot and R.F. Allison

1:50 000

Miles 1 0 1 2 3 Miles
Metres 1000 0 1000 2000 3000 4000 Metres

For an overview of the surficial geology of the Clusko River map area please refer to the report entitled "Drift Exploration and Surficial Geology of the Clusko River (93C/9) and Toil Mountain (93C/16) Map Sheets" by D.N. Proudfoot *in* Geological Fieldwork 1992, *B. C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1993-1. Geology based on air photo interpretation followed by ground verification. Fieldwork completed in 1992.

MAP UNIT LETTER NOTATION

SIMPLE TERRAIN UNIT SYSTEM

surficial material / texture — surface expression: gR

COMPOSITE UNITS

Cv/Mb — The component (Cv) above the symbol stratigraphically overlies the one below (Mb)

Mb/R — The component (Mb) in front of the symbol is more extensive than the one that follows (R)

SURFACE EXPRESSION

b	blanket (> 1 metre)
f	fan
h	hummocky
l	terraced
v	veneer (< 1 metre)

TEXTURES

c	clay
$	silt
s	sand
g	gravel
b	boulder
d	diamicton

SURFICIAL MATERIALS

A	anthropogenic	Man-made or man-modified materials.
C	colluvial	Diamicton with variable structure and texture; includes talus, avalanche, landslide, debris flow and other mass wastage products and weathered bedrock.
E	eolian	Fine sand and silt transported by wind; includes dune and loess deposits.
F	fluvial	Gravel, sand or silt deposited by streams and rivers; includes floodplain, river terrace, delta and alluvial fan sediments.
FG	glaciofluvial	Fluvial sediment deposited in association with glacier ice; generally consists of gravel and sand; includes kettled outwash, kame terraces and eskers.
I	ice	Permanent snow and ice; glaciers and icefields.
L	lacustrine	Sediment deposited in lakes or around lake shorelines; generally consists of sand, silt and clay; includes beach and lacustrine terrace deposits.
LG	glaciolacustrine	Lacustrine sediment deposited in association with glacier ice; similar to lacustrine deposits but displays features such as slump structures, ice-rafted stones and kettles.
M	morainal	Diamicton (till) deposited directly by glaciers; generally consists of well-compacted material with variable structure and texture; includes moraine, till plain and drumlin features.
O	organic	Material resulting from the accumulation and decay of vegetative matter; generally consists of peat; includes bogs, swamps and marshes.
R	bedrock	Outcrops and rock covered by less than 10 cm of unconsolidated material.
U	undifferentiated	Material of variable texture and origin.
V	volcanic	Unconsolidated pyroclastic sediments including volcanic ash, lapilli and coarser ejecta.
W	marine	Sediment deposited in marine waters or along coastlines; generally consists of clay, silt, sand or gravel; includes beaches and deeper water deposits.
WG	glaciomarine	Sediment deposited in a marine environment in close proximity to glacier ice; generally poorly sorted and stratified or massive; includes glaciomarine deltas and deeper water deposits.

GEOLOGICAL BOUNDARIES

Defined

Approximate

ON-SITE SYMBOLS

Drumlin, crag and tail

Striae, grooves (ice flow direction known; unknown)

Flutings

Moraine ridge (major, minor)

Esker (flow direction known; unknown)

Meltwater channel (major, minor)

Escarpment

Cirques

Glacier flow

Strandline

Landslide (headwall scar)

QUATERNARY GEOLOGY NOTES

GLACIAL HISTORY

At the peak of glaciation, ice covered the entire Clusko River map sheet. Evidence for ice-flow direction survives for only the most recent glaciation in the area (Fraser glaciation of Wisconsinan age, Tipper, 1971). On the eastern half of the map area, striations on bedrock and numerous flutings and crag-and-tail ridges indicate a north-northeastern flow of ice. A later eastward flow is interpreted from flutings in the southwest corner of the map area. It is unlikely that they were created by the north-northeastward flow in the east because the topography between them was not high enough to redirect glacier flow. The area between these two flow directions does not preserve any flow indicators. A single north-northeast trending crag-and-tail ridge in the west-central part of the map area may be evidence for this earlier flow direction in that area.

SURFICIAL GEOLOGY

Till occurs mainly out of valleys and is thinnest and most discontinuous in higher areas (**Mv**) and where subglacial and proglacial meltwater has removed much of it. It reaches thicknesses of of 8 metres in some places (**Mb**) but averages much less. Till typically has a silty sand matrix, subrounded to subangular clasts, which are 5 to 25 percent by volume of the sediment, ranging in size from pebbles, which are most common, to cobbles and boulders. Where till is interpreted to overly its bedrock source, it contains much less matrix (25 to 50 percent of total volume) and clasts are angular and of one main rock type. The absence of recessional moraines throughout the area indicates that during deglaciation, the ice stagnated and melted in place. This created an abundance of hummocky terrain (**Mh**), with hummocks 1 to 6 metres high, in large relatively flat areas. These are areas of mainly meltout till, which contain relatively far travelled material. Large areas were affected by escaping meltwater as it flowed generally north-northeastward, parallel to the general direction of ice flow. Numerous channels cut into bedrock such as in the hills west-northwest of Canyon Mountain and in the southwest corner of the map area. Eskers and esker complexes that cross modern drainage were created by this meltwater. They left sand and gravel deposits up to 10 metres thick in valleys and eskers. Most of the modern drainage is now occupied by streams and rivers too small to have carved their valleys. After local ice had melted, meltwater flow from the south and southwest left extensive deposits up to 10 metres thick of sand and gravel (**FG**). Regional drainage beyond the ice margin was to the northeast and east, as it is today. Where small bodies of ice remained to block this drainage away from the glacier, small lakes formed such as along the Clusko River, where it now flows south in the southeastern part of the map area. They behind a discontinuous deposit, which is tens of centimetres to 8 metres thick, of moderately cohesive, massive to laminated silts, sands and minor amounts of clay (**LG**). These deposits have been significantly eroded since deposition by proglacial and postglacial drainage. When the meltwater supply flowing through the area stopped, river and lake basins dried up. Exposed areas of non-cohesive sand and silt, which were blown by wind and deposited as a veneer of eolian sediment (**Ev**) and dunes up to 5 metres high overlying nearby till and sand and gravel deposits. Modern rivers have reworked deposits of till, sand and gravel, and silt, leaving new deposits (**F**). Where modern drainage is poor, in local depressions, bogs have produced a significant cover of organic sediment (**O**), which is a mixture of decayed organic detritus, sand, silt and clay. On gentle slopes, mass movements (debris flows, slope wash) have produced discontinuous deposits of pebbly sand and silt and stratified diamicton (**Cv**) derived from till, sand, gravel and silt. At the base of steeper slopes, rock falls have produced a mixture of talus where there is rock exposed above.

Tipper, H.W. (1971): Glacial Geomorphology and Pleistocene History of Central British Columbia; *Geological Survey of Canada*, Bulletin 196, 89 pages.

LOCATION OF GROUND INVESTIGATION SITES