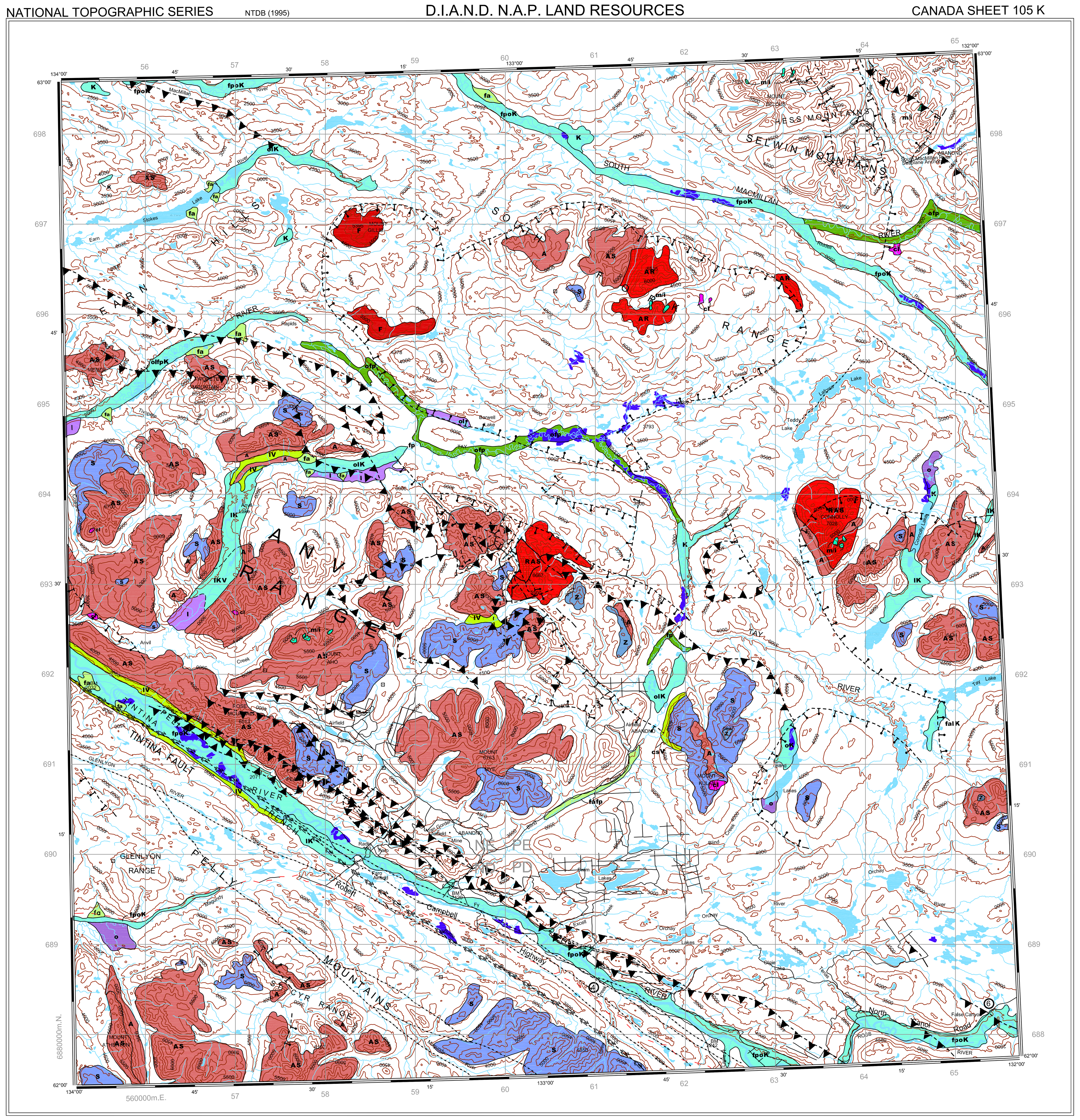
Yukon
Government

YUKON GEOLOGY PROGRAM

Canada

NATIONAL TOPOGRAPHIC SERIES NTDB (1995) D.I.A.N.D. N.A.P. LAND RESOURCES CANADA SHEET 105 K



TEN THOUSAND METRE UNIVERSAL TRANSVERSE MERCATOR GRID NAD 83 ZONE 8

NOTE: THIS MAP HAS BEEN PRODUCED BY THE COMPILATION OF DATA FROM VARIOUS SOURCES. IT IS NOT TO BE USED TO DEFINE LEGAL BOUNDARIES.

THIS MAP IS ISSUED AS A PRELIMINARY GUIDE FOR WHICH THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT WILL ACCEPT NO RESPONSIBILITY FOR ANY ERRORS, INACCURACIES OR OMISSIONS WHATSOEVER.

EDITION: 2 PRINT DATE: JULY 19, 1999

TAY RIVER

YUKON TERRITORY
105K

Scale

10 0 10 20 30 km
5 0 5 10 15 miles

CONTOUR INTERVAL 500 FEET Elevations in Feet above Mean Sea Level
North American Datum 1983 Transverse Mercator Projection
Universal Transvers Mercator Grid ZONE 8

N

105M MAYO	105N LANSING	105O NIDDERY LAKE
105L GLENLYON	105K TAY RIVER	105J SHELDON LAKE
105E LAKE LABERGE	105F QUIET LAKE	105G FINLAYSON LAKE

Index to Adjoining Sheets.

Magnetic Declination 1989 varies from 30° 35' easterly at the centre of the west edge to 30° 56' easterly at the centre of the east edge. Mean annual change 12.8' westerly.

GEOPROCESS FILE - SUMMARY REPORT

TAY RIVER MAP AREA - NTS 105K

INTRODUCTION

The GEOPROCESS File is a compilation of information and knowledge on geological processes and terrain hazards, including mass movement processes, permafrost, flooding risks, faults, seismic activity and recent volcanism, etc. Please refer to the GEOPROCESS File User Guide for more in-depth information on how the maps were developed, which other GEOPROCESS File maps are available, how to utilize this inventory and how to interpret the legend. Special interest should be taken in the detailed description of the terrain hazard map units. Appendices in the User Guide include summary papers on the geological framework, permafrost distribution, and Quaternary geology in Yukon and a list of comprehensive GEOPROCESS File references.

This report includes a brief discussion of the scope and limitations of the GEOPROCESS File compilation maps followed by summaries of the bedrock geology, surficial geology and terrain hazards for this NTS map area, and a list of references.

Geological Processes and Terrain Hazard Compilation Maps

The GEOPROCESS File map units were drafted on the 1:250 000 topographic base maps through interpretation from bedrock geology maps, surficial geology maps and in some cases terrain hazard maps at various scales. The compilation maps have a confidence level reflecting the original source material. All materials used to produce the maps are listed in the references on each map. A file containing the documentation used to construct these maps is available at the Indian and Northern Affairs library in Whitehorse, Yukon. Areas for which no surficial geology or terrain hazard information is published were left blank. Summary reports on surficial geology and terrain hazards for these map sheets were written by extrapolating the data from adjacent map sheets or smaller scale maps. Information from small scale (e.g., 1:1 000 000) maps was used for the summary reports, but not redrafted onto the 1:250 000 GEOPROCESS File maps.

The GEOPROCESS File compilation maps are intended as a first cut planning tool; the legend on the maps describes the general aspects of terrain hazards (also see below) and associated geological processes. **These maps should never replace individual site investigations for planning of site specific features, such as buildings, roads, pits, etc.**

Bedrock Geology Summaries

Each 1:250 000 NTS map area is described according to morphogeological belts and terranes defined by Gabrielse et al. (1991) and Wheeler et al. (1991). Bedrock geology (including structure) and mineral occurrences are briefly described and taken largely from the referenced, most recent 1:250 000 geological map with additional contributions from Wheeler and McFeely (1991), and Yukon MINFILE (1993). A summary paper ("A Geological Framework for Yukon") in Appendix A of the User Guide provides a framework and context for each of the bedrock summaries.

The level of knowledge and understanding of Yukon geology is constantly evolving with more detailed mapping and development of geological models. Names, ages and terrane affinities of rock units on the most recent 1:250 000 geological maps may, in some cases, now be considered incorrect. Thus information contained within some of the bedrock geology summaries may be out of date. Although much of the information reflects the knowledge at the time that the source map was published, additional information has been inserted whenever possible to assist the user in merging the information with current geological maps, concepts and understanding. The age ranges for similar packages of rocks may also vary between map areas since the actual rocks, or at least the constraints on their age, may vary between map areas.

BEDROCK GEOLOGY (Gordey and Irwin 1987)

The Tay River map area is in the Omineca Belt and is mainly underlain by rocks of the Selwyn Basin. The southwestern part of the map area is cut by the northwest-trending Tintina Fault and its associated linear depression, the Tintina Trench. Several major northwest-trending thrust faults further divide the stratigraphy of both ancient North America and accreted terranes.

Three main packages of rocks occur in the Tay River map area. The northeastern package is composed of 800-530 million year old Hyland Group slate, quartz-pebble conglomerate, quartz sandstone and limestone; 530-450 million year old Gull Lake Formation slate, siltstone and quartz-muscovite-biotite-garnet schist; 450-390 million year old basalt, tuff, breccia, siltstone and chert, Rabbitkettle Formation limestone, Road River Group mudstone, siltstone, chert and shale; overlain by 390-325 million year old Earn Group siltstone, sandstone, shale, limestone, chert, chert- pebble conglomerate, slate and chert-quartz arenite and wacke; 290-250 million year old Mount Christie Formation chert; and the 250-205 million year old Jones Lake Formation siltstone, sandstone, shale and limestone. These ancient North American rocks of Selwyn Basin take up the northeastern two-thirds of the map area.

Nested within this folded and thrust faulted package of mainly sedimentary rocks are several 100 million year old granite, quartz monzonite, granodiorite and diorite plutons of the Selwyn and Cassiar Plutonic Suites. Three of these are large batholiths: the Anvil (west central area), Orchay (southeast corner) and Glenlyon (southwest corner). These plutons have metamorphosed the adjacent sedimentary rocks such that their aureoles are hornfelsed or foliated. In addition, two very large, 100 million year old volcanic caldera complexes are faulted into the thick sedimentary package in the northeastern area. The volcanic rocks belong to the South Fork volcanics and are composed of thick, monotonous sequences of biotite-quartz-hornblende-feldspar crystal tuff which are locally columnar-jointed.

The central package are accreted rocks that belong to the Yukon-Tanana Terrane. These rocks form a narrow, fault-bounded belt parallel to, and on the northeast side of the Tintina Fault. Rocks there are composed of 400-320 million year old Nisutlin Assemblage quartzite, schist and conglomerate, and similar aged Anvil Assemblage (Slide Mountain Terrane) basalt, tuff, breccia, chert, limestone and serpentinite.

The rock package southwest of the Tintina Fault belongs to Cassiar Terrane and is composed of: pre-550 million year old slate, siltstone, limestone and biotite-muscovite-quartz schist; 550 to 440 million year old Kechika Group shale, phyllite and limestone; Askin Group dolomite, sandy dolomite, quartz arenite and siltstone; and 380-340 million year old black siliceous slate. These rocks are cut by numerous splays of the Tintina Fault system.

Much of the Tintina fault zone in the Tay River map area is filled with 50 million year old volcanic and fluvial, clastic sedimentary rocks. These rocks include ash flow tuffs, quartz-feldspar porphyry, basalt flows, chert-quartz conglomerate, chert sandstone, siltstone and shale.

Mineral Deposits and Occurrences

There are 114 mineral occurrences listed in Yukon MINFILE for the Tay River map area. The majority of the occurrences are strataform lead-zinc showings and deposits which occur in Selwyn Basin sedimentary rocks. Most of these occurrences are found within a broad belt, parallel and adjacent to the Tintina Fault. The dominant deposits are those of the Faro camp. To date, this camp has yielded nearly 1500 tonnes of silver, 2.7 million tonnes of lead and 4.6 million tonnes of zinc from approximately 50 million tonnes of ore. Total estimated reserves among the numerous deposits within this camp are 80 million tonnes of 4% lead, 6% zinc and 58 grams per tonne silver, including 59 million tonnes of similar ore with 1 gram per tonne gold in the Grum and DY deposits.

Within the mineral-rich belt adjacent to the Tintina Fault are numerous lead-silver veins and a few base metal skarns. Within the Tintina gault zone is the Grew Creek epithermal gold deposit, which is associated with the 50 million year old rhyolite tuff. This deposit contains 773 000 tonnes of 8.9 grams per tonne gold and 33.6 grams per tonne of silver. Small occurrences of coal which were mined during the 1980s are associated with the 50 million year old clastic strata in the Tintina Trench.

There are small amounts of placer gold in the Grew Creek area.

SURFICIAL GEOLOGY

The Tay River map area was glaciated by the McConnell ice advance and, with the exception of a few unglaciated summits (nunataks), the entire area was covered by the Selwyn Lobe of the Cordilleran ice sheet (Jackson, 1986). Deglaciation in this map area was characterized by large stagnant ice blocks, a complex system of glaciofluvial deposition and glacial lake ponding in parts of Anvil Creek and Tay River Valleys.

TERRAIN HAZARDS

The main source of information for the terrain hazards map is derived from surficial geology and soil survey maps. The Geological Survey of Canada Pacific Geoscience Centre in Victoria provided the seismic information.

Seismicity

The Tay River map sheet has seven earthquake epicentres plotted with the majority of those proximal to the Tintina Fault. The greatest magnitude recorded is within the >3.0 to <4.0 magnitude range, and the others fall within the >2.0 to <3.0 magnitude range.

Mass Movement Processes

Snow and rock avalanches are the most severe hazards in this map area. Landslides are common and often related to the thawing of permafrost or to the erosion of river banks composed of soft glaciolacustrine or glaciofluvial sediments. Solifluction lobes and slope creep are very common, but pose a less severe risk to development.

The Surprise Rapids landslide is in the northeastern part of the area, south of the Macmillan River (Ward et al., 1992). This failure, which consists of earthflows and debris flows, is the most extensive of its kind in central Yukon. Failure may have been initiated by thawing of permafrost due to denudation by a forest fire in the late 1800's.

Permafrost

The Tay River area lies within the discontinuous permafrost zone (Brown, 1978). Permafrost is probably extensive at higher altitudes with low to moderate ice contents in colluvial and morainal deposits. Valley bottom sediments may have a higher ice content including large ice inclusions such as ice wedges, ice veins and tabular ice bodies, especially in the fine-grained alluvial and glaciolacustrine sediments. The melting of these ice inclusions may trigger thermokarsting processes. If these areas lie in a water discharge area, the removal of the organic blanket will result in melting of the permafrost and excess water will be allowed to flood the surface, creating poorly drained soil conditions.

Flooding Hazards

No information available at time of writing.

NOTE: A new digital compilation of Yukon Geology is now available by Steve Gordey and Andrew Makepeace (GSC Open File D3826 and/or DIAND Open File 1999-1(D)), and more recent MINFILE updates should also be verified (Yukon MINFILE, 2001).

References: Tay River Map Area - NTS 105K

Note: To be thorough, check the references for adjacent NTS map sheets and the General Reference List.

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* References used in compiling this map

LEGEND

LEGEND TERRAIN HAZARDS

MAP SYMBOL	TERRAIN HAZARDS	ASSOCIATED RISK LEVELS, COMMENTS
	Mass Movement Processes	
A	Snow Avalanched.	high
F	Extremely slow to moderate rates of failure in soil and bedrock, including soil creep, rock creep, earthflow, soil or rock slump, debris or rock slide.	low to intermediate
R	Moderate to extremely rapid rates of failure in soil and bedrock (1.5 m/d to >3 m/s), including rock slump, debris slide, rock slide, debris flow, debris torrent, debris avalanche, rockfall, rock avalanche.	high
	Arctic, Alpine and Periglacial Processes	
X	Permafrost present.	low
K	Thermokarst present.	low
S	Solifluncted.	low to intermediate
Z	Grouped, cryoturbated, solifluncted, nivated.	low to intermediate
	Fluvial Processes	
B	Braided, unstable channels, risk of flooding.	intermediate to high
E	Fluvial erosion, deposition and low risk of flooding.	low to intermediate
J	Anastomosing.	intermediate to high
U	Flooded regularly.	intermediate to high
	Miscellaneous Erosion Processes	
T	Karst.	intermediate
P	Piping.	intermediate to high
V	Gullied.	low to intermediate

On Site Symbols	Risk Level
Unit boundary (defined, approximate).	
Erosional escarpment.	high
Landslide escarpment.	high
Landslide (includes source and runout areas).	high
Pingo.	high
Rock glacier.	high
Spring or saline seep.	low
Observation of frozen soil or ground ice.	low
Rapid mass movements (debris torrent) with known point source. Limits of runout not implied by symbol.	high
Slow mass movement (earth flow) with landslide, escarpment source. Limits of landslide runout not implied by symbol.	intermediate to high

LEGEND SEISMIC EVENTS

SYMBOL	MAGNITUDE REPRESENTED	SYMBOL	MAGNITUDE REPRESENTED
⊡	<2.0	⊡	4.0 to 4.999
⊡	2.0 to 2.999	⊡	5.0 to 5.999
⊡	3.0 to 3.999	⊡	>6.0

LEGEND GEOLOGICAL PROCESSES

MAP SYMBOL	DESCRIPTION	INFERRED HAZARDS
cf	Talus fan or apron, moderate to steep slope, coarse angular bedrock fragments, sources are often areas of rapidly disintegrating bedrock.	Rock fall and debris flows common on active fans, steep slopes generally unstable to traffic.
cl	Landslide, moderate slope, varies from large blocks of bedrock to finer material.	Landslides generally are recurrent in susceptible areas and may be become active if disturbed.
cs	Colluvium covered slope, gentle to moderate slope, underlain by unsorted rubble, solifluction and other periglacial features common.	Areas of fine textured materials and gentle slopes at high elevations, where there is ground ice will be susceptible to high solifluction rates and thermokarst if disturbed.
fa	Alluvial fan, active.	Subject to shifts in channel and bar positions, occasionally subject to flooding.
fp	Floodplain.	Subject to shift in channel and bar positions, occasionally subject to flooding.
ice	Glacier ice.	Crevasses.
im	Mountain ice caps.	Avalanches, ice and rock falls, and crevasses.
is	Cliff glacier.	Avalanches, ice and rock falls.
l	Lacustrine or glaciolacustrine sediments.	Silt and clay, usually susceptible to frost heaving and, if permafrost present, to thermokarsting when disturbed.
m/i	Rock glacier, debris covered glacier.	Ice at depth make surface susceptible to thermokarst, unstable slopes.
o	Organic.	Thick organic matter is often underlain by permafrost. Disturbance of permafrost may cause poor drainage and thermokarsting.

LEGEND FAULTS

Fault
defined, approximate, assumed,
extrapolated beneath overburden

Fault
Solid circle indicates downthrown side
Arrows indicate relative movement

Thrust Fault (teeth indicate upthrust side)

Airphoto Lineament

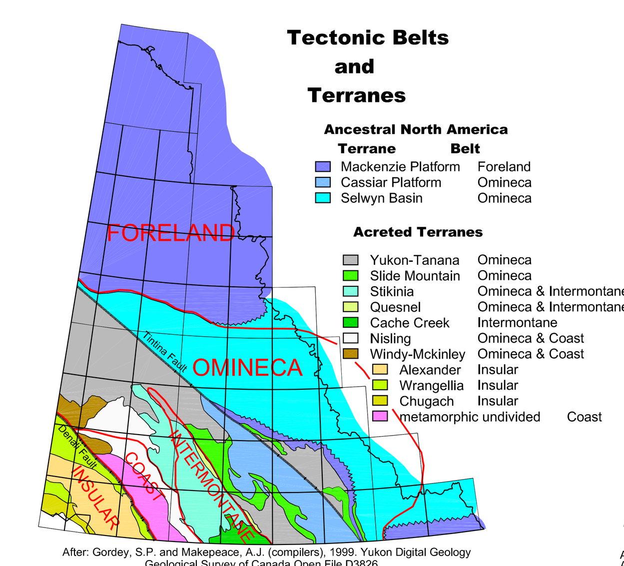
LEGEND QUATERNARY VOLCANISM

No known recent volcanism in map area 105K

OTHER FEATURES

Roads Lakes
Streams Marsh

NOTE: Where areas have more than one identified process or hazard, the colour of the encompassing polygon is assigned based on a hierarchical scheme relating to the severity of the hazard.
The relative order of severity is: Terrain Hazards (Mass Movement Processes then Fluvial Processes then Arctic, Alpine and Periglacial Processess) followed by Geological Processes.



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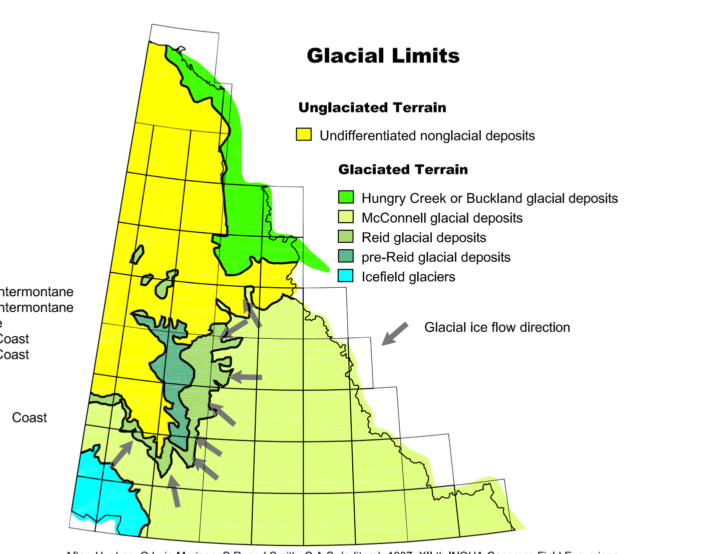
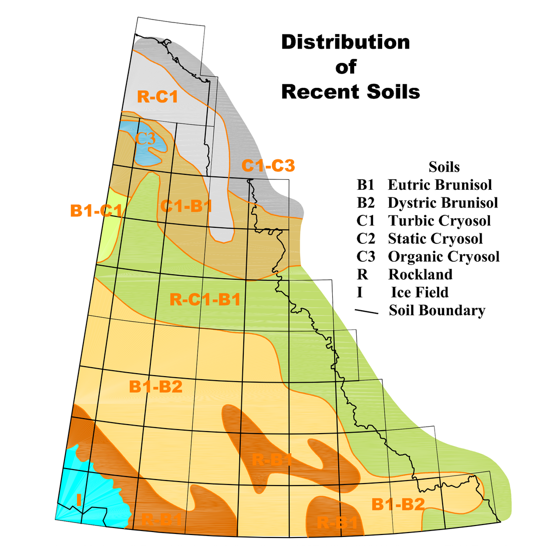
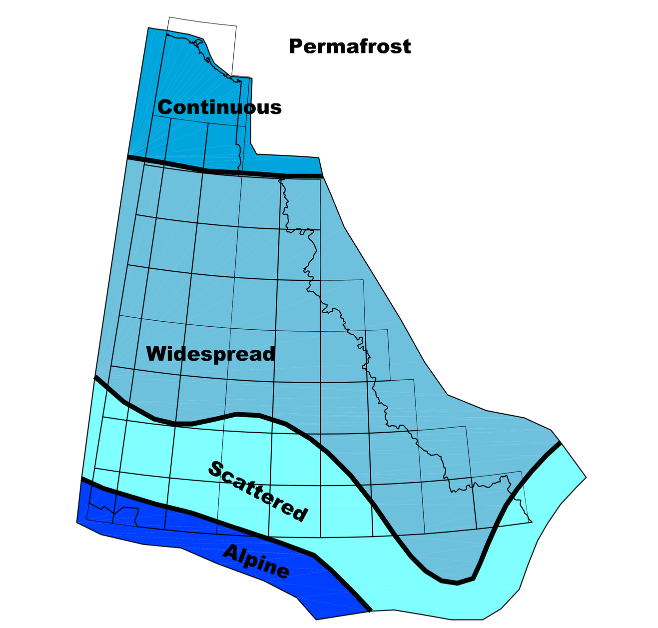


After: Hughes, O.L. in Morison, S.R. and Smith, C.A.S. (editors), 1987, XII th INQUA Congress Field Excursions A20, p12 to 16 - Research in Yukon, National Research Council of Canada, Ottawa, Canada, 110p



After: Morison, S.R. and Smith, C.A.S. (editors), 1987, XII th INQUA Congress Field Excursions A20a and A20b - Research in Yukon, National Research Council of Canada, Ottawa, Canada, 110p



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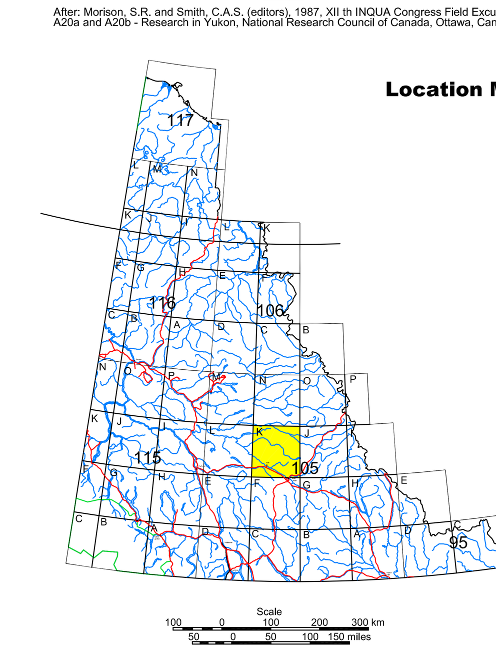

North American Datum 1927, Universal Transverse Mercator Projection ZONE 7

Exploration and Geological Services Division
Yukon Region
Indian and Northern Affairs Canada

Yukon GEOPROCESS File

Geological Processes and Terrain Hazards of Tay River 105K

by

Doherty, R.A., Mougeot, C.M. and vanRanden, J.A.

Copies of this map
may be obtained from Geoscience and Information Sales
c/o Whitehorse Mining Recorder, Indian and Northern Affairs Canada,
Room 102, 300 Main Street, Whitehorse, Yukon Y1A 2B5
(867) 667-3266; FAX; (867) 667-3267

Recommended citation: Doherty, R.A., Mougeot, C.M. and vanRanden, J.A., 1994.
Yukon GEOPROCESS File (2002), Geological Processes and Terrain Hazards of Tay River, 105K
Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, 1:250 000 scale.