GEOPROCESS FILE
SUMMARY REPORT

SNAKE RIVER MAP AREA
N.T.S. 106F

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 Introduction and User's 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's 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 and summaries followed by summaries of the bedrock geology, surficial geology and terrain hazards for this N.T.S. 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 attached to 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 N.T.S. 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 Introduction and User's 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

The northern part of the Snake River map area is in the MacKenzie Platform. The central and southern parts are dominated by the Backbone and Knorr Mountain ranges contained within the Selwyn Basin. The Snake River flows from north to south through the map area. Cretaceous (70 to 140 million year old) sedimentary rocks of the northern interior platform consisting of sandstone and conglomerate underlie the northern part of the map area. The central part of the map area is dominated by 570-320 million year old shales, limestones, cherts and chert-pebble conglomerate of the Selwyn Basin. The southern part of the map area is underlain by Precambrian (older than 570 million years) sedimentary rocks of the Rapitan Formation, Gillespie Lake Group and Quartet Group. Northwest trending faults, many of which are thrust faults, cut the Ordovician to Precambrian rock packages.

Mineral Deposits and Occurrences

There are nine known mineral occurrences in the Snake River map area. Five of these are Mississippi Valley type showings containing zinc and lead. There is one coal and one sedimentary gypsum occurrence. The largest deposit is the Crest iron deposit. Unconfirmed resources suggest reserves on the order of 100 billion tonnes.

SURFICIAL GEOLOGY

The Snake River map area is within the limits of the McConnell glaciation. There is no published information on surface geology or Quaternary geology in this area. General information on glacial history and permafrost is available in the Introduction and User=s Guide of the Geoprocess File. The following general comments are derived from maps published in adjoining map sheets and on general landform-hazards relationship expected in areas of similar latitude.

TERRAIN HAZARDS

The Geological Survey of Canada=s Pacific Geoscience Center in Victoria provided the seismic information.

Mass Movement Processes

There is no mapped information or published information on mass movement hazards in this area. The following comments are based on landforms and hazards relationships identified on adjoining maps to the south and general considerations for areas at these latitudes.

Steep cirque walls and arretes (Vernon and Hughes, 1966) are likely to present avalanche and rock fall hazards. Most alpine slopes are likely covered by thin residual bedrock, colluvial veneer and may contain permafrost. Solifluction, detachment slides and poor drainage will likely result from surface disturbance on such slopes. In addition, the very long exposure of surfaces to weathering, frost shattering and creep has probably resulted in well developed colluvial blankets on most surfaces at mid to high elevations and thick alluvial fans and aprons in valley bottoms. These deposits can also be subject to slope and permafrost related processes. Surfaces are usually sensitive to disturbance and prone to slow to moderate, long term mass movements such as retrogressive thaw slides, as well as more rapid detachment slides common on soliflucted surfaces. Slow mass movement, such as soil creep and solifluction are probably common on most alpine slopes.

Permafrost

There is no mapped information or published information in this area. The following comments are based on adjoining maps to the south and general considerations for areas at these latitudes. This southern part of the map area is in the Extensive Discontinuous Permafrost Zone, and the northern part of the map area is in the Continuous Permafrost Zone (Heginbottom, 1995; Heginbottom and Radburn, 1992). Ice contents vary from low to moderate (10 to 20% ground ice) in morainal and colluvial deposits above valley floors, low to moderate in alluvial and fluvial deposits, and moderate to high (10->20%) in fine grained glaciolacustrine deposits and in fine-grained alluvial fans and terraces above stream level. Permafrost is assumed to be absent or thinner under south facing, well drained slopes. Mean annual ground temperatures range from -2 to -5 degrees Celcius.

In the adjacent map area, 106D, (Vernon and Hughes, 1966) there is permafrost thickness in excess of 122 m (400 ft) in addition to solifluction lobes, patterned ground, and palsa bogs, as well as large surfaces covered by patterned ground. Similar features are likely found in 106F.

Active and inactive rock glaciers are most likely to occupy northeast to northwest facing cirques, and locally more southerly slope aspects.

Flooding and Other Risks

The lowermost terraces of the major rivers are most likely subject to flooding. Some sections of the braided channels are probably unstable. In addition to flooding risks, the steep portions of alluvial fans are also exposed to the additional possibility of mud flows and debris flows associated with rapid increases in discharge. Alluvial and colluvial fans are usually susceptible to channel migrations and erosion.

Seismicity

This is a highly active seismic area. There are 133 recorded seismic events ranging from <2.0 t >6.0 in magnitude.

References

Snake River Map Area
N.T.S. 106F

To be thorough, check the references for adjacent N.T.S. map sheets and the General Reference List (See Introduction and User's Guide).

Most of the following references should be available for viewing in the DIAND library on the third floor of the Elijah Smith building in Whitehorse. The library and call number of some internal government reports are listed.

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NTS 106E, 106F, 106/NW, 116F, 116G, 116H, 117

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Norris, A.W., 1968, Reconnaissance Devonian stratigraphy of northern Yukon Territory and northwestern District of Mackenzie. Geological Survey of Canada, Paper 67-53, 287 p.

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