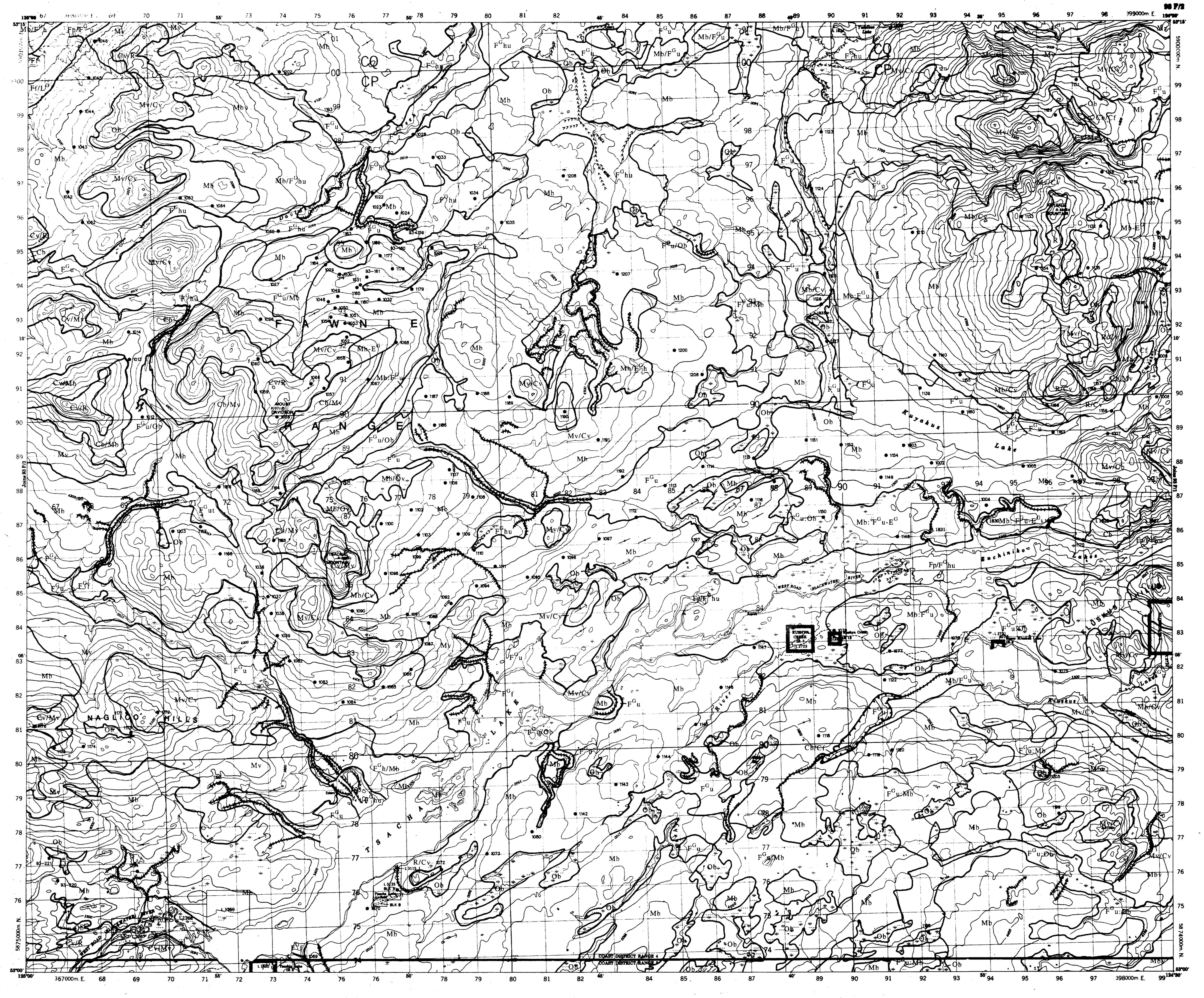

QUATERNARY GEOLOGY NOTES

INTRODUCTION

This map results from one part of a multi-component geological and mineral exploration survey of the Tsacha Lake and Chedakuz Creek map areas that includes bedrock geology (Diakow *et al.*, 1995), lake sediment geochemistry (Cook and Luscombe, 1995), till geochemistry and surficial geology (Giles *et al.*, 1995, Weary *et al.*, 1995), and mineral deposit (Lane and Schroeter, 1995) studies. This work is a continuation of surficial mapping (Levson and Giles, 1994; Giles and Levson, 1994a,b) and regional till geochemical surveys (Levson *et al.*, 1994) conducted in the Fawnie Creek map sheet (93F/3). A total of 195 till samples (~1 sample per 5 km^2) were collected for geochemical analyses in the Tsacha Lake (93F/2) map area in order to locate glacially dispersed mineralization potentially present in the region. Final results of the till geochemical sampling program will be published at a later date. The study area is approximately 120 kilometres southwest of Vanderhoof and is accessed by the Kluskus-Ootsa Forest Service road. Logging road access is poor for much of 93F/2 and many areas are accessible only by trail bike, foot or helicopter. The surficial map was prepared using the Terrain Classification System for British Columbia (Howes and Kenk, 1988).

PHYSIOGRAPHY

The Tsacha Lake map area lies within the Nechako Plateau, in the west-central part of the Interior Plateau (Holland 1976). The Fawnie Range trends south-southeast on the west side of the area and the Nechako Range parallels this on the east side. The highest peaks are Mount Davidson at an elevation of 1861 metres (6107 feet) in the Fawnie Range and Kuyakuz Mountain at 1781 metres (5842 feet) in the Nechako Range. The lowest elevation in the area is on Tatelkuz Lake, around 940 metres (3090 feet). Valleys in the area are broad with gently sloping sides reflecting glacial modification. The Fraser Plateau, in the southeast part of the map sheet, reaches as far north as the Blackwater River. The Chedakuz valley extends through the centre of the area, from the Blackwater River northwest to the top of the map sheet and is flanked on either side by the Fawnie and Nechako ranges. Chedakuz Creek flows south from the east side of Kuyakuz Mountain, into Kuyakuz Lake and north into Tatelkuz Lake. The Fraser Plateau and the southern flanks of the Fawnie Range drain into the Blackwater River which flows east into the Fraser River.

QUATERNARY STRATIGRAPHY

Late Wisconsinan Glacial Deposits (M)

Morainal sediments of the last glaciation are the oldest Quaternary sediments exposed in the map area. They occur as hummocky, kettled, fluted or relatively flat topography. In the Chedakuz valley, till thickness varies from a few to several metres in low-lying areas to less than a metre in upland regions and along steep slopes. Till thickness on bedrock ridges is much less than on the lee (northeast) of bedrock highs. Two distinct facies of morainal sediment are recognized: a compact, fissile, matrix-supported, sandy silt diamicton and a loose, massive to stratified, sandy diamicton. The first is interpreted to be basal lodgement and/or melt-out till and the latter to be glacigenic debris-flows and resedimented deposits. Basal tills seldom occur at the surface, usually being overlain by glacigenic debris-flow deposits and, on slopes, by resedimented diamictons of colluvial origin. Debris-flow units have gradational to clear lower contacts and typically overlie basal till or occur interbedded with glaciolacustrine or glaciofluvial sequences, such as in the Chedakuz valley, at elevations below 1040 metres (3400 feet). In the Blackwater River and Chedakuz Creek valleys, morainal sediments are largely buried by glaciofluvial, fluvial and organic sediments. Morainal sediments throughout the region were assigned by Tipper (1971) to the Fraser glaciation which is dated in several parts of British Columbia as Late Wisconsinan (Ryder and Clague, 1989).

Late Wisconsinan Deglacial Deposits (F^G, L^G)

Deposits formed during deglaciation of the area include both glaciofluvial and glaciolacustrine sediments. Glaciofluvial sediments (F^G) are common in valley bottoms and along valley flanks, occurring as eskers, kames, terraces, outwash fans and plains. They consist mainly of rounded to well rounded, poorly to well sorted, stratified, pebble and cobble gravel and sand in deposits up to 10 metres thick. On the eastern flank of Mount Davidson, meltwater channels, deeply incised into the morainal blanket, extend northward into eskers formed under stagnant ice masses in the Chedakuz valley. Frequently glaciofluvial deposits are interbedded with glacigenic diamictons indicating that they are proximal outwash deposits. Hummocky topography, consisting of ridges or hills of sand and gravel with intervening depressions (kettle holes), is commonly associated with these deposits and indicates the presence of stagnant ice blocks. Glaciolacustrine sediments (L^G)are found throughout the Chedakuz valley up to an elevation of approximately 1070 metres (3500 feet). They include horizontally or ripple bedded, fine to coarse sand and horizontally laminated fine sands, silts and clays.

Holocene Deposits (F, C, O)

Recent fluvial sediments occur in valley bottoms throughout the area, especially in the Chedakuz and Blackwater valleys. Most modern creeks and rivers in the area are meandering streams with gravel channels. Floodplains are dominated by fine sands, silts and organics. In upland areas small gravelly creeks have reworked glacial, glaciofluvial and colluvial sediments and locally are incised into bedrock. The flat, open terrain of the Chedakuz valley and the Fraser Plateau is characterized by marshes and shallow lakes filled with organic sediment. The organic deposits consist of decayed marsh vegetation with minor sand, silt and clay. Organic deposits also occur in low areas in valley bottoms.

A thin veneer of weathered and broken bedrock clasts in a loose sandy matrix occurs on steep slopes throughout the area. These deposits grade downhill into a thicker cover of colluvial diamicton derived from both local bedrock and till. Colluvial veneers are commonly found over tills on slopes. Colluvial diamictons are differentiated from till by their loose, unconsolidated character, dominance of coarse, angular clasts of local bedrock, crude stratification and lenses of sorted sand and gravel.

QUATERNARY HISTORY

Ice-flow history

Results of ice-flow studies in the area, including measurements of crag-and-tails, drumlins glacial flutings and striae indicate that there was one dominant flow direction towards the east-northeast. Striation measurements from exposed bedrock typically indicate northeast to east flow, varying from 055° to 080°. At the Late Wisconsinan glacial maximum, ice covered the highest peaks in the region and movement appears to have been unaffected by topography, suggesting the elevation of the ice surface to be in excess of 1750 metres. This is supported by northwest trending striae and flutings on top of Tsacha Mountain (1734 metres, 5690 feet.). A more complex local ice-flow history in the southeast part of the map area is indicated by highly variable striae trends at a site east of Kuyakuz Lake.

Quaternary Geology

During the Late Wisconsinan glaciation, ice moved into the map area from the Coast Mountains before flowing further north, northeast and east onto the Interior Plateau (Tipper, 1963). The first lobes of Late Wisconsinan Fraser glaciation ice advancing from the southwest were probably confined to the major valleys now occupied by the Nechako Reservoir and Blackwater River. At the margins of the advancing ice, coarse-grained proglacial outwash was deposited locally in the valley bottoms. Massive, matrix-supported, compact lodgement and melt-out tills were subsequently deposited by advancing ice. Loose, sandy gravelly diamictons were deposited on top of the tills by debris flows as ice retreated.

During deglaciation a large glacial lake formed in the Chedakuz valley. Lake waters deposited sediment as high up as 1070 metres (3500 feet) on the valley sides, approximately 160 metres (500 feet) above the present valley floor. This lake probably was confined to the Chedakuz valley by an ice mass to the north in the Nechako Reservoir valley and by stagnant ice at the south end of Tatelkuz Lake. Confined subglacial flow under ablating ice in the valleys created eskers on the eastern flank of Mount Davidson and on the northwest shore of Tsacha Lake. Deeply incised meltwater channels are common in Tsacha Lake and Blackwater River areas. Gravelly outwash plains formed in main valley bottoms as water and sediment were transported away from glacial ice. Melting ice on the Fraser Plateau appears to have had free drainage eastward along the Blackwater River, away from the study area. During postglacial times, the surficial geology of the area was modified mainly by fluvial activity and the local development of alluvial fans in the valley bottoms as well as by colluvial reworking of glacial deposits along the valley sides.

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OF95-10

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SURFICIAL GEOLOGY AND QUATERNARY STRATIGRAPHY OF THE TSACHA LAKE AREA

NTS 93 F/2

by Timothy R. Giles and Victor M. Levson

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 Tsacha Lake area please refer to the paper entitled "Surficial Geology and Drift Exploration Studies in the Tsacha Lake and Chedakuz Creek Areas (93F/2, 7), Central British Columbia" by Timothy R. Giles, Victor M. Levson and Gordon F. Weary *in* Geological Fieldwork 1994, B. Grant and J.M. Newell, Editors, *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Paper 1995-1. Surficial geology based on interpretation of air photographs followed by field verification, and stratigraphic and sedimentologic studies of Quaternary exposures. Fieldwork completed in 1994.

LEGEND

QUATERNARY SEDIMENTS

HOLOCENE

F — **Fluvial deposits:** sand, pebble-gravel and silt; typically stratified and moderately well sorted; includes minor modern delta and terrace deposits.

- **Ff** — **Alluvial fans:** mainly pebble to cobble gravel; occurs on the margin of Top Lake.
- **Fp** — **Floodplains:** silt, clay and fine sand; shallow water tables common; commonly veneered by organic deposits.

C — **Colluvium:** unsorted or very poorly sorted diamicton with abundant angular clasts of bedrock.

- **Cb** — **Colluvial blanket:** diamicton more than 1 metre thick; occurs mainly around bedrock highs in the Fawnie Range and the Nechako Range.
- **Cf** — **Colluvial fans:** diamicton more than several metres thick; typically small, debris-flow dominated fans; occurs on the steep slopes of Nechako Range.
- **Cv** — **Colluvial veneer:** thin cover of loose diamicton over bedrock, occurs mainly in upland areas of Fawnie Range and Nechako Range.

O — **Organic deposits:** accumulations of decayed vegetative material; locally includes small areas of fluvial, glaciofluvial, morainal or colluvial deposits too small to be mapped individually.

- **Ob** — **Organic blanket:** peat bog and swamp deposits more than 1 metre thick.
- **Ov** — **Organic veneer:** small swamp and marsh deposits spatially associated with morainal deposits in hummocky or undulating terrain.

LATE PLEISTOCENE

M — **Morainal deposits:** unsorted to very poorly sorted diamicton; dominantly basal tills and glacigenic debris flow deposits; compact; massive or crudely stratified; sandy silt to silty clay matrix; clasts up to boulder size, often striated; in upland areas, includes small regions of exposed rock or colluvium.

- **Mb** — **Till blanket:** diamicton more than 1 metre thick; mainly basal tills; common on lower valley slopes; often mantles bedrock; flutings and drumlinoid ridges typical.
- **Mv** — **Till veneer:** diamicton less than a metre thick; dominantly basal tills; typically occurs on upper valley slopes and around bedrock highs; crag-and-tail features common.

F^G — **Glaciofluvial deposits:** mainly pebble to boulder gravel and sand; poorly to well sorted and well stratified; often interbedded with glacial debris flow deposits.

- **F^Gh** — **Eskers and kames:** coarse gravel and sand, typically several metres thick; steeply dipping strata and collapse structures common; hummocky or ridged topography typical; locally includes kettled outwash; common outside of valleys and often associated with small morainal deposits.
- **F^Gf** — **Glaciofluvial fans:** interbedded sand, gravel and diamicton; common along valley sides and at the lower ends of meltwater channels.
- **F^Gt** — **Glaciofluvial terraces:** step-like form consisting of a scarp face and a horizontal or gently inclined surface above it.
- **F^Gu** — **Glaciofluvial outwash plains:** sand and gravel; horizontal bedding typical; subdued topography; common in valley bottoms and often underlies or is associated with fluvial and organic deposits.

L^G — **Glaciolacustrine sediments:** dominantly fine to medium sand, silt and clay; well sorted, laminated or thinly bedded; invariably overlain by organic materials and locally by fluvial or glaciofluvial deposits; unit occurs in the Chedakuz and Top Lake valleys.

TERTIARY AND OLDER

R — **Bedrock:** rock at or near the surface; exposures are most common along the Fawnie Range and Nechako Range; may be covered by a discontinuous blanket or veneer of surficial sediment.

Geological Processes and Qualifying descriptors

-E^G this symbol indicates two characteristics of the unit. The first letter refers to any geological processes that are currently modifying or have modified the surficial materials or the surface expression. In this case the 'E' indicates erosion and channel formation by water. The second letter indicates the status of the geological process, the 'G' indicates that this was a glacial process.

Composite Units

Composite units are employed where two types of terrain are intermixed or occupy such small areas that they cannot be designated as separate units at the scale of mapping. Symbols are used to indicate the relative amounts of each terrain type , and the components are always written in decreasing order of importance.

: the components on either side of this symbol are approximately equal.

/ the component in front of the symbol is more extensive than the one that follows.

GEOLOGIC MAP SYMBOLS	
Drumlin, crag and tail	
Fluting	
Striae, glacial grooves	
Esker (flow direction known; unknown)	
Meltwater channel (major; minor)	
Till sample site	• 1064