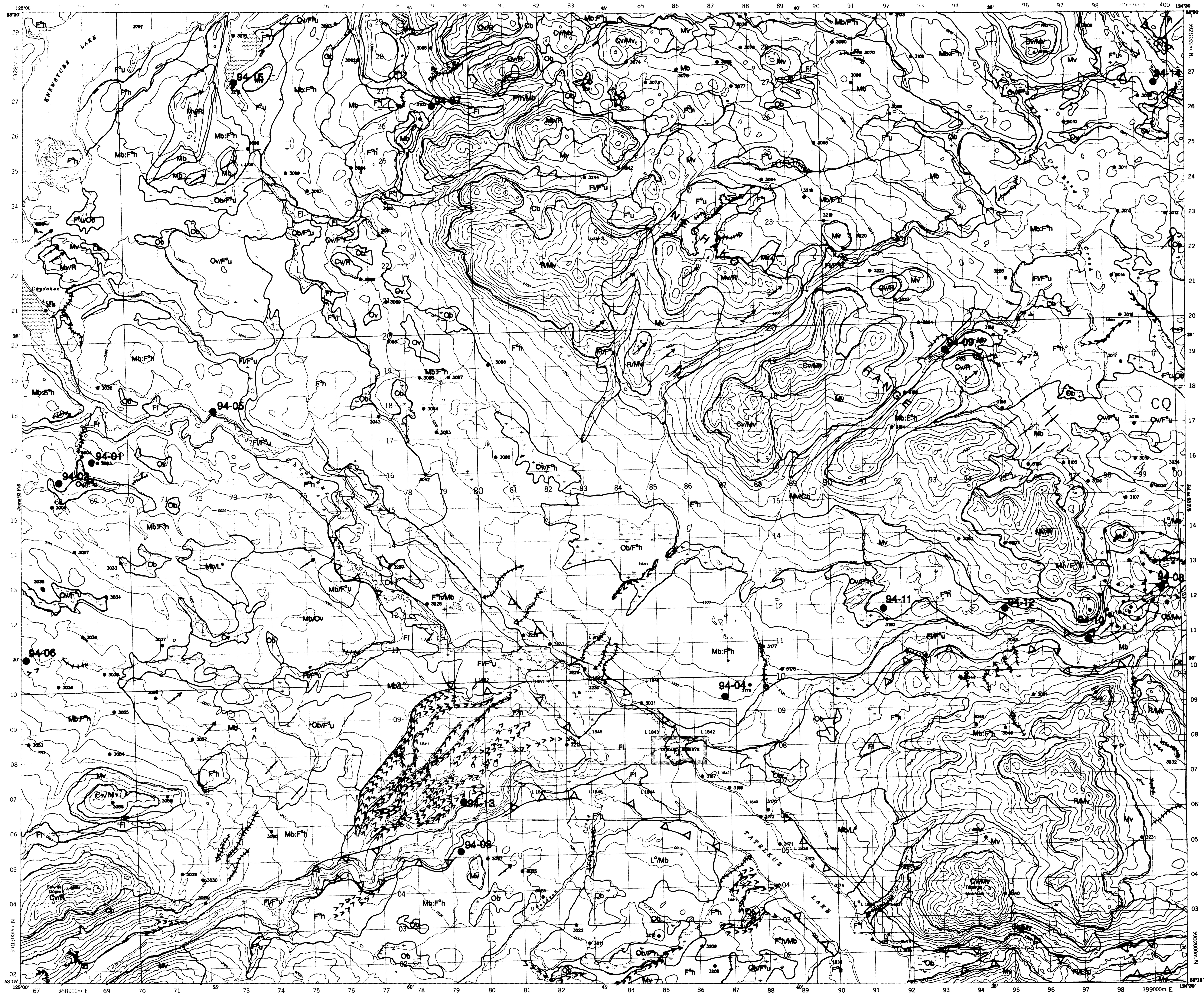
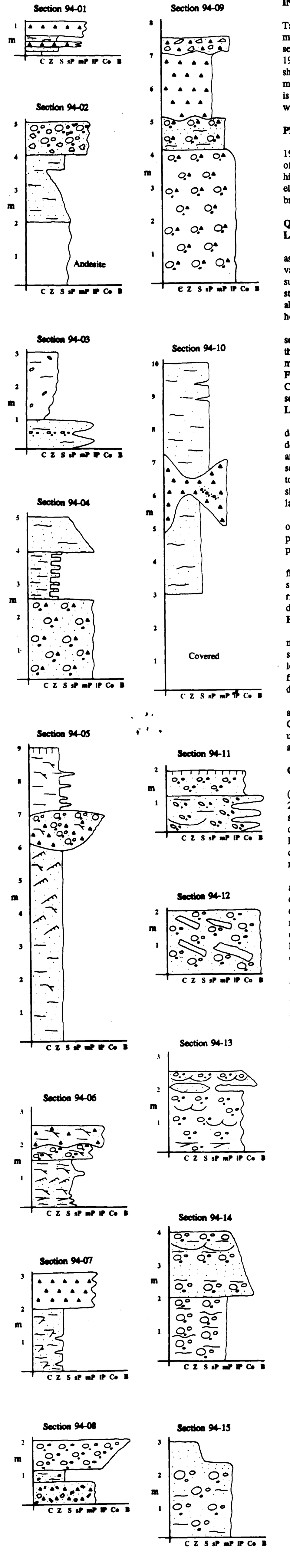
OF 95-13





QUATERNARY GEOLOGY NOTES

INTRODUCTION

Surficial geology mapping and till geochemical sampling was completed in the Chedakuz Creek (NTS 93F/7) and Tsacha Lake (NTS 93F/2) map areas during the summer of 1994 (Giles and Levson, 1995, Giles *et al.*, 1995) as part of a multi-component geological and mineral exploration survey that included bedrock geology (Diakow *et al.*, 1995) and lake sediment geochemistry (Cook and Luscombe, 1995). 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 adjoining map sheets. A total of 187 till samples (~1 sample per 5 km^2) were collected for analyses in order to locate glacially dispersed mineralization potentially present in the region. The study area is approximately 80 kilometres southwest of Vanderhoof and is accessed by the Kluskus-Ootsa forest service road. Logging roads were used to access much of the region but many samples were collected from areas accessible only by trail-bike, foot or helicopter.

PHYSIOGRAPHY

The Chedakuz Creek map area lies within the Nechako Plateau, in the west-central part of the Interior Plateau (Holland, 1976). The Nechako Range dominates the east-central portion of the map sheet and trends northwesterly, reaching elevations of over 1660 metres. The Fawnie Range occurs in the southwest part of the region and includes Fawnie Dome which has the highest elevation in the study area at 1728 metres. The Nechako Reservoir, which crosses the northwest corner, has the lowest elevation at 852 metres. Along the centre of the map sheet, the Nechako Range is separated from the Fawnie Range by the broad, gently inclined Chedakuz valley.

QUATERNARY STRATIGRAPHY

Late Wisconsinan Glacial Deposits (M)

Morainal sediments in the map area were deposited during the Late Wisconsinan Fraser glaciation which began as early as 29 000 years ago, and ended 11 500 years before present (Ryder *et al*, 1991). Till occurs throughout the map area but varies in character both locally and regionally depending on source material and depositional environment. Compact, matrix-supported, silty to silty-sandy diamictons are interpreted to be basal lodgement and/or melt-out tills and occur throughout the study area. Less compact, sandier diamictons, commonly occurring with small interbeds of sand and gravel, are interpreted as ablation tills. Glacigenic debris-flows and resedimented deposits may possess characteristics very similar to primary till, however they are usually less extensive, less compact, and interbedded with stratified silt, sand or gravel.

Basal tills usually overlie bedrock and in turn are often overlain by ablation till, debris flow deposits, glaciofluvial sediments or glaciolacustrine deposits. Basal till thickness commonly varies from several metres in low-lying areas to less than a metre along bedrock ridges and steep slopes. A five metre thick exposure of basal till was exposed in the north of the map area at site 3100. A thick blanket of primary basal and ablation till preserved along the eastern slopes of the Nechako and Fawnie Ranges is likely due to gentle slopes that inhibit reworking by mass-wasting. In the Chedakuz valley area, south of Chedakuz arm and east of Fawnie Dome, basal and ablation tills are typically buried beneath a veneer of glaciofluvial sediments.

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

Glaciofluvial sediments, occurring as eskers, kames and outwash plains, form a thick blanket overlying the morainal deposits (Sections 94-02, 07, 15). These consist of poorly sorted and crudely stratified sand and gravel. Many of these deposits are interbedded with gravelly diamictons suggesting a proximal outwash origin. In upland areas around the Nechako and Fawnie Ranges, glaciofluvial sediment occurs as a veneer on top of till. Abundant reworked till and glaciofluvial sediments on the southwest flank of the Nechako Range may reflect rapid melting due to the southwesterly exposure. Rilled topography in this area is due to winnowing by glaciofluvial activity. In contrast, meltwater on the protected northeast facing slopes of both the Nechako and Fawnie Ranges was concentrated into major spillway channels. Northwest of Tatelkuz Lake, a large esker complex indicates ice stagnation in the Chedakuz valley.

A large meltwater channel (near Sections 94-10 and 12) follows a low pass (1067 m) through the Nechako Range north of Tatelkuz Mountain. This was likely formed when ice stagnating in the Chedakuz valley caused meltwater flow through this pass. Along this channel very high-energy, boulder gravels, that are tabular and crudely imbricated, suggest a southeasterly paleoflow (Section 94-12).

Typically, glaciolacustrine sediments overlie glaciofluvial sand and gravel and frequently are interbedded with debris flow deposits (Sections 94-04, 05, 10). Stagnating ice masses dam meltwaters and cause local deposition of glaciolacustrine sand, silt and clay (Section 94-03). Section 94-05 is interpreted as a glaciolacustrine deposit where a sequence of climbing ripple cross-laminated fine sand of deltaic origin is overlain by a debris flow diamicton. This is in turn overlain by more distal, quiet-water deposited, laminated silts and clays.

Holocene Deposits (F, C, O)

Fluvial deposits occur in valley bottoms throughout the area, especially in the Chedakuz and Top Lake 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 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

During the Late Wisconsinan Fraser glaciation, ice flowed onto the Nechako Plateau from the Coastal Mountains (Tipper, 1971). The highest peaks in the area show evidence of glacial abrasion indicating that ice may have been as much as 2000 metres thick. The last and most prominent direction of ice movement in the area was east-northeast as indicated by striae, drumlins, and flutings. As the ice thinned in the later stages of glaciation, topographic features exerted greater control on direction of movement. In the Fawnie Range ice melted off the highlands but remained as cohesive glaciers in the valleys. In the Nechako Range, ice thinned, broke into separate masses, stagnated, and melted 'in situ' (Tipper, 1963). On the east side of the Nechako Range sharply defined drumlins and flutings dominate and ice stagnation is confined to low-lying areas in the meltwater channel in the northeast corner of the map.

Elsewhere in the map area, esker and kame complexes, kettles, and abandoned channels are common. Their chaotic arrangement results from the decay of large masses of stagnant ice (Tipper, 1963). Meltwater followed depressions that were clear of active ice, incising steep-walled channels and forming high gravel terraces that border these channels. A large esker complex developed to the west of Tatelkuz Lake is evidence for stagnant ice masses in the Chedakuz valley and damming of meltwaters in the Top Lake valley to the west (Levson and Giles, 1994; Giles and Levson 1994a). Glaciofluvial delta complexes are common at the terminuses of meltwater channels where sediment-laden meltwater has entered a larger river or lake. Localized glaciolacustrine sediments are found along meltwater channels with more extensive deposits along the centre of Chedakuz valley.

During postglacial times, surficial geology of the area was modified mainly by fluvial activity and development of alluvial fans in valley bottoms. Colluvial reworking of glacial deposits in areas of high relief is typical.

REFERENCES

Cook, S.J. and Luscombe, M.E. (1995): Update on 1994 Lake Sediment Geochemistry Studies in the Northern Interior Plateau, Central British Columbia (93F); *in* Geological Fieldwork 1994, Grant, B and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1995-1, in press.

Diakow, L.J., Webster, I.C.L., Whittles, J.A. and Richards, T.A. (1995): Stratigraphic Highlights of Bedrock Mapping in the Southern Nechako Plateau, Northern Interior Plateau Region; *in* Geological Fieldwork 1994, Grant, B and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1995-1, in press.

Giles, T.R. and Levson, V.M. (1994a): Surficial Geology and Drift Exploration Studies in the Fawnie Creek Area (93F/3); *in* Geological Fieldwork 1994, Grant, B. and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1994-1, pages 27-37.

Giles, T.R. and Levson, V.M. (1994b): Drift Prospecting Potential of the Fawnie Creek Area (NTS 93F/3); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1994-10 (1:50 000 map).

Giles, T.R. and Levson, V.M. (1995): Surficial Geology and Quaternary Stratigraphy of the Tsacha Lake Area (NTS 93F/2); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1994-10 (1:50 000 map).

Giles, T.R., Levson, V.M. and Weary, G.F. (1995): Surficial Geology and Drift Exploration Studies in the Tsacha Lake and Chedakuz Creek Areas (93F/2,7), Central British Columbia; *in* Geological Fieldwork 1995, Grant, B. and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1995-1, in press.

Holland, S.S. (1976): Landforms of British Columbia, A Physiographic Outline; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Bulletin 48, 138 pages.

Levson, V.M. and Giles, T.R. (1994): Surficial Geology and Quaternary Stratigraphy of the Fawnie Creek Area (NTS 93F/3); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1994-9 (1:50 000 map).

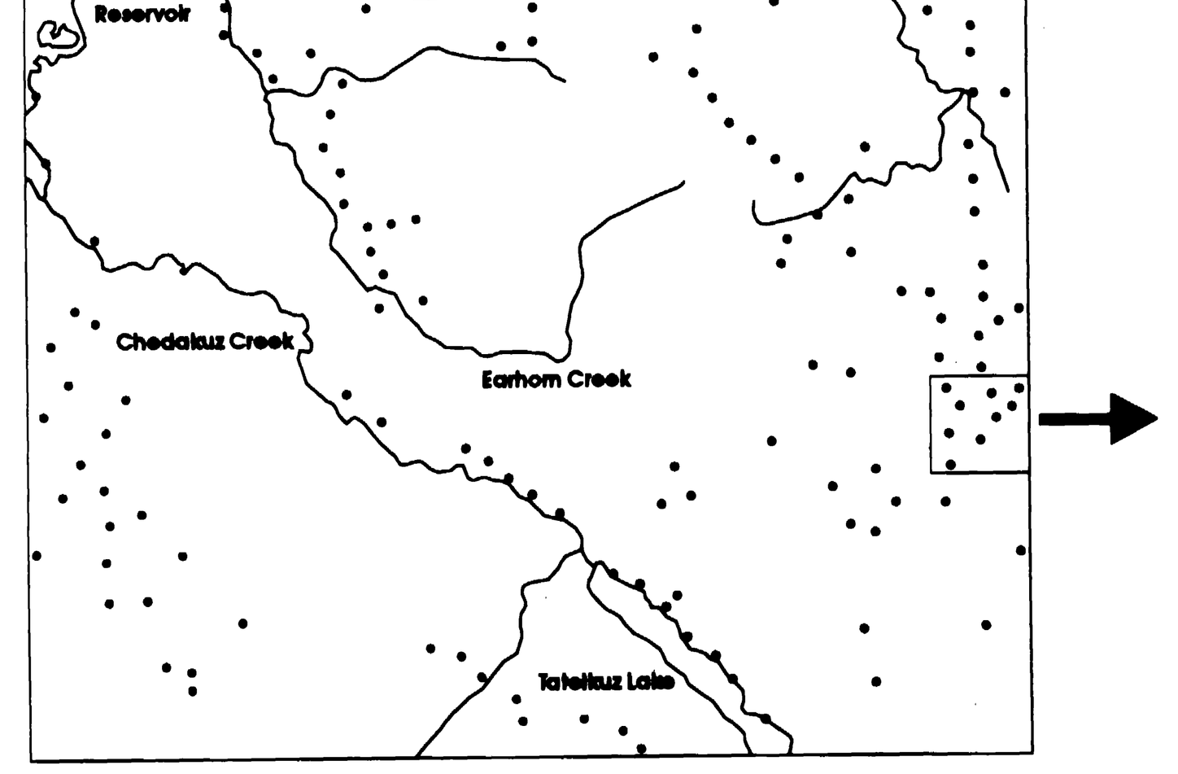
Levson, V.M., Giles, T.R., Cook, S.J. and Jackaman, W. (1994): Till Geochemistry of the Fawnie Creek Area (93F/03); *B.C. Ministry of Energy, Mines and Petroleum Resources*, Open File 1994-18, 34 pages with appendices.

Ryder, J.M., Fulton, R.J. and Clague, J.J. 1991. The Cordilleran ice sheet and glacial geomorphology of southern and central British Columbia . *Geographie Physique et Quaternaire*, 45: pp. 365-377.

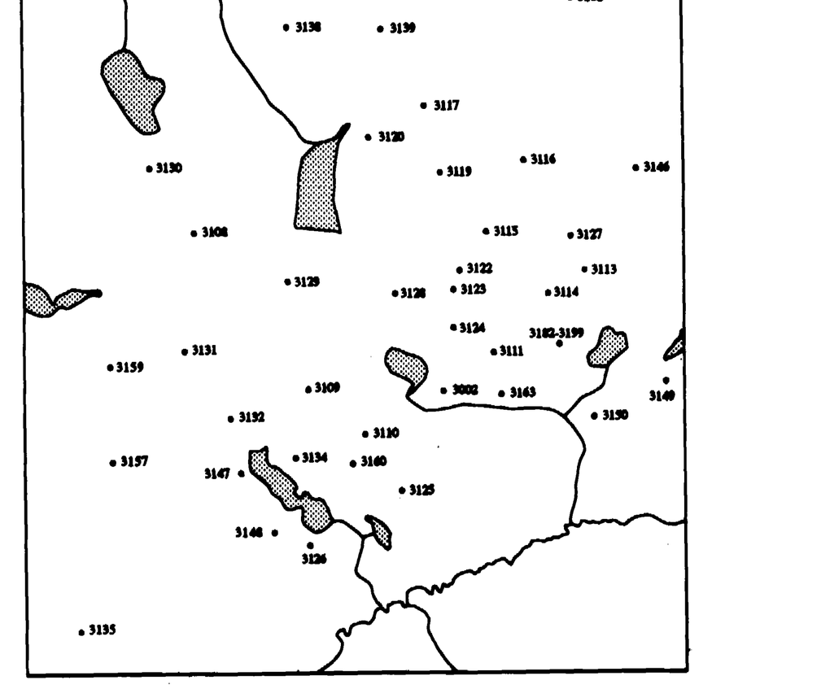
Tipper, H.W. 1963. Nechako River map-area . British Columbia; *Geological Survey of Canada*, Memoir 324, 59 pages.

Tipper, H.W. 1971. Glacial geomorphology and Pleistocene history of central British Coloumbia; *Geological Survey of Canada*, Bulletin 196, 89 pages.

REGIONAL TILL GEOCHEMICAL SAMPLE SITES



CASE STUDY SAMPLE SITES



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

1895 - 1995
100 YEARS OF GEOLOGICAL SURVEYING

Geological Survey Branch

OPEN FILE 1995-13

SURFICIAL GEOLOGY AND QUATERNARY STRATIGRAPHY OF THE CHEDAKUZ CREEK AREA

NTS 93 F/7

by Gordon F. Weary, Timothy R. Giles, Victor M. Levson and Bruce E. Broster

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 Chedakuz Creek 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

Adapted from Levson, V.M. and Giles, T.R. (1994): Surficial Geology and Quaternary Stratigraphy of the Fawnie Creek Area (NTS 93F/3). *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Open File 1994-9.

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 gravels; up to tens of metres thick; examples of well developed alluvial fans occur at the top of Tatelkuz Lake.

Fl — **Floodplains:** silt, clay and fine sands; shallow water tables common; most abundant in shallow cut modern river valleys; commonly veneered by organic deposits.

C — **Colluvium:** poorly sorted diamicton with abundant angular clasts of bedrock; occurs mainly as veneers over bedrock in upland areas and on steep slopes.

Cb — **Colluvial blanket:** diamicton more than 1 metre thick; occurs mainly around bedrock highs in the Nechako Range.

Cv — **Colluvial veneer:** diamicton less than 1 metre thick; usually associated with exposed bedrock.

O — **Organic deposits:** accumulations of decayed vegetative material; locally includes small areas of fluvial, glaciofluvial, glaciolacustrine, 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:** organic deposits less than 1 metre thick.

LATE PLEISTOCENE

M — **Morainal deposits:** unsorted to poorly sorted diamicton; dominantly basal tills and glacially-derived debris flow deposits; compact; massive or crudely stratified; matrix fine sand to silty clay; clasts up to boulder size and often striated; in upland areas unit includes small regions of exposed rock or colluvium; in low areas unit includes ablation till.

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 may be present.

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

F^G_h — **Eskers and kames** coarse gravels and sands, typically several metres thick; hummocky or ridged topography typical; locally includes kettled outwash and glaciofluvial terraces; common outside of valleys and can be associated with small morainal deposits.

F^G_f — **Glaciofluvial fans:** interbedded sand, gravel and diamicton; common along valley sides and at the lower ends of meltwater channels.

F^G_u — **Glaciofluvial outwash plains:** sands and gravels; 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 sands, silts and clays; well sorted, laminated or thinly bedded; ice-rafted stones, normal faults and slump structures common; locally kettled; often associated with resedimented glacial debris; invariably overlain by organic materials and locally by fluvial or glaciofluvial deposits; unit occurs in the valley north of and along the western margin of Tatelkuz Lake.

TERTIARY AND OLDER

R — **Bedrock:** rock at or near the surface; exposures are most common along Nechako Range.

LEGEND FOR STRATIGRAPHIC SECTIONS

Clays, Silts, Sands, Small pebbles, Medium Pebbles, Large Pebbles, Cobbles, Boulders

- Diamicton
- Gravelly Diamicton
- Gravel
- Sand
- Soil
- Fault
- Horizontal Laminations
- Planar Laminations
- Wavy Laminations
- Trough Cross-Beds
- Climbing Ripples

GEOLOGIC MAP SYMBOLS

- Drumlin, crag and tail
- Fluting
- Striae, glacial grooves (ice flow direction known; unknown)
- Esker (flow direction known; unknown)
- Meltwater channel (major; minor)
- Till sample site — • 3044
- Stratigraphic section — ● 94-10
- Gravel pit