Appendix VI

ICE FLOW PATTERNS & COPPER DISPERSAL TRAINS, EUREKA PROPERTY

By

Roger Paulen

Ice Flow Patterns and Copper Dispersal Trains
Eureka Property - Hudson Bay Exploration

Wells, B.C.

Roger C. Paulen
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INTRODUCTION

This report represents follow-up studies based upon initial results of a regional (one sample per km^2) C-horizon till sampling program. This incorporates detailed ice flow and sedimentological studies of which their regional implications were discussed within a previous report on surficial geology (Paulen, 2000). This report discusses the results of the second phase of this project and to support follow-up till sampling and to apply drift prospecting methods to find the up-ice source of the till samples with elevated Cu values.

The property is located north of Wells, between the Bowron and Willow river valleys, and extends north past Slender Lake (parts of NTS 93H/3, H/4, H/5 and H/6). The property includes Two Sisters Mountain, at the northernmost extension of the Palmer Range, within the northwest part of the Caribou Mountains.

METHODOLOGY

Sedimentology

Initial results from the regional till survey prompted additional work in several areas within or adjacent to the property boundary. These areas comprise 12 locales including the Lottie and Tow float areas but excluding the Bow float location (Fig. 1). Detailed studies were undertaken at each of these sites. Regional sample pits that obtained high copper values were closely inspected to identify the sample medium. To confirm the original results, an additional sample was taken under close supervision of the author. In some cases, the original sample was deemed of poor quality and only the latter samples should be used for follow-up work. All sites except Boyce Creek were visited by the author. These sites include: Ketcham Creek valley, May, FIP, Holly, Khan, Stephanie, Tow, Sam, Neil and 14 Mile anomalies. A legend for the profile descriptions and maps is provided in the appendices.

Striae - Ice Flow

Additional striation sites near the till anomalies were mapped and fabrics were conducted where there was a lack of outcrop exposure. Some questionable striation sites visited during regional mapping were revisited and reinterpreted. These sites should supersede all observed sites recorded on the original surficial geology map produced for Hudson Bay Exploration (Paulen, 2000).

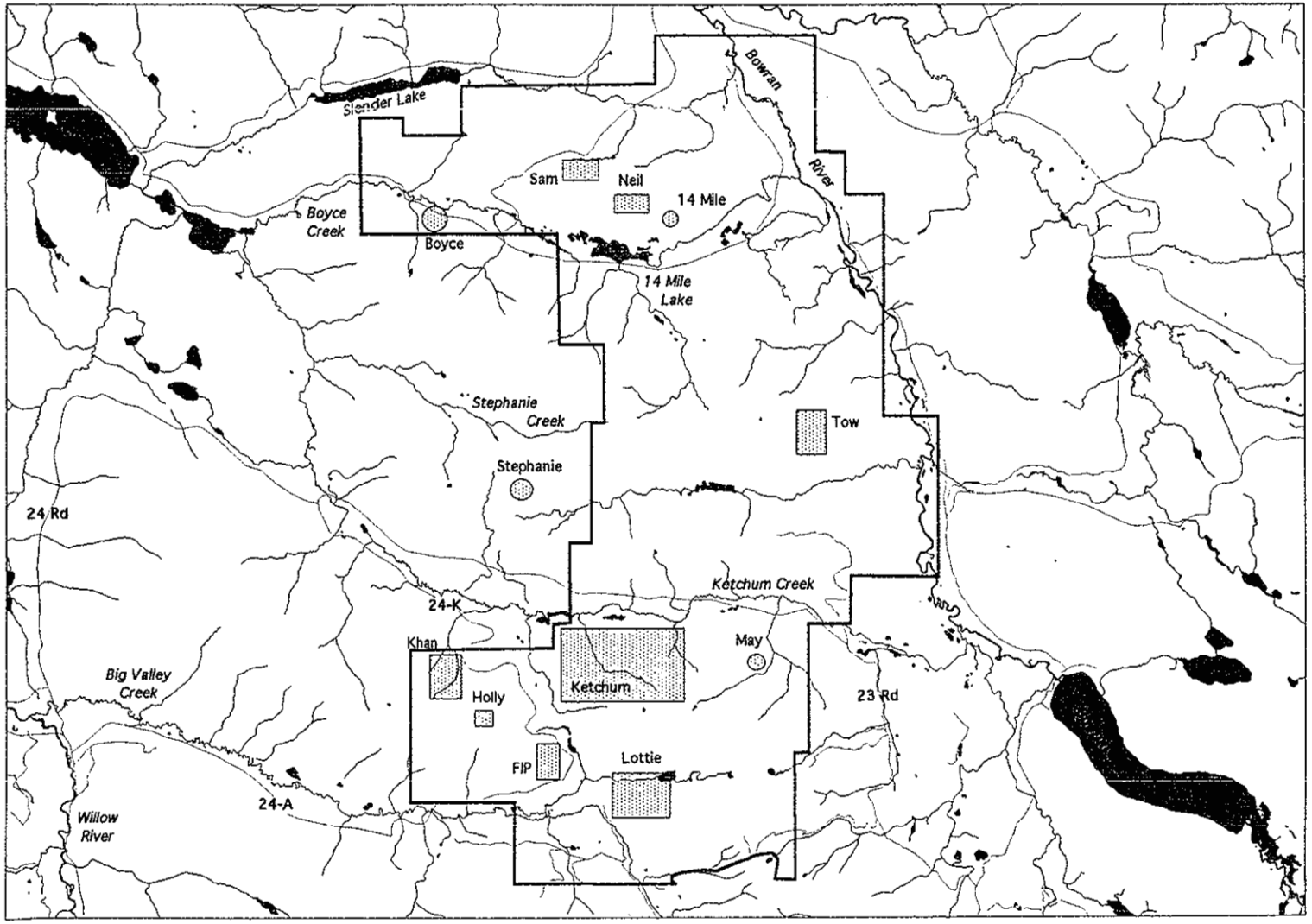

Fig. 1. Location of the Eureka property and the anomalies discussed within this report, north of Wells, B.C. (Map scale 1:200 000).

Pebble Fabrics - Ice Flow

Pebble fabric analyses were measured from several sites on the property. A large pit was dug well below the B-horizon and into the C-horizon. Inspection confirmed the presence of a suitable material (i.e. basal till) for clast fabric analysis. A minimum of 50 medium and coarse pebbles with long:intermediate axial ratios of 2:1 or greater were selected from a maximum of 1 m^3 of sediment for each analysis (Fig. 2). Typically, the established ratio for long:intermediate axial ratios is 1.5:1 with counts of 25 or more being statistically adequate (c.f. Catto, 1998), but the nature of the source bedrock allowed for greater discrepancy at this site. The fabric orientations were plotted on rose and equal-area stereonet plots, based on the eigenvector method of Mark (1973). Notes were made at each fabric site with respect to the character and nature of the sediment, stratigraphy, soil profile and weathering characteristics. Large features were also noted that could possibly affect potential drift prospecting.

Fabric analysis is a major diagnostic tool used in the determination of depositional environments. Lodgement tills deposited subglacially are characterized by strong fabrics, with primary eigenvalues (E1) in excess of 0.6, aligned in the direction of glacial transport, and tertiary (E3) eigenvalues of less than 0.15 (Dowdeswell and Sharpe, 1986; Hicock *et al.*, 1996). Modal plunge angles are generally low, with pebble plunging in the direction of up-ice. Basal lodgement till fabrics also are characterized by clustered distributions, where the cluster index (K) is in excess of 1.0 (Woodcock, 1977; Hicock *et al.*, 1996).

Basal melt-out and ablation till fabrics may show a lesser degree of orientation, with primary eigenvalues of less than 0.6, and cluster distributions with $K < 1$. Plunge angles are more variable with both up-ice and down-ice plunge angles (Dowdeswell and Sharpe, 1986; Hicock *et al.*, 1996). Local deviations of fabric trend within a cubic metre are common. The alignment of clasts flowing within ice are products of local ice flow conditions. Local variations in subglacial topography, ice temperature and ductility, and debris concentrations exist, producing differing stress fields, ice flow direction and fabric alignment. Larger clasts may be of a different alignment from smaller ones, as ice carrying smaller clasts flows around the boulders and cobbles. Modification can be expected during deposition around drumlins, flutings and craig and tail structures as ice flows from high pressure regimes to low pressure 'shadows' down-ice of the obstacle.

Trenching

A small trenching program was conducted at the Lottie float site and at a site within the Ketcham anomaly. Detailed sedimentology and geochemical profile sampling were

Fig. 2. Pebble fabric measurements in basal till. Aluminium knitting needles are placed in pebble casts parallel to the long axis and plunge of the pebbles.

conducted to gain insight into the distribution of pathfinder elements in the surficial deposits proximal to an unknown mineralized point source.

BACKGROUND

As mentioned in the previous report (Paulen, 2000), the major source of ice in the region was the Caribou Mountains to the southeast. Ice flowed locally during the onset of glaciation, following the topography. Regional work by Clague (1987), shows as the ice sheet thickened, ice flowed southwesterly from the Caribou Mountains, across the Mowdish Range and then flowed to the northwest roughly parallel to the regional bedrock structure that is occupied by the Bowron, Swan and Spectacle lakes. Clague (1988), reports northeastward flowing ice west of the Fraser River at Quesnel and to the north at Prince George. The oldest ice flow in the region was topographically controlled and ice flowed from the Caribou west and northwest to the Interior Plateau. During glacial maximum, ice flowed from the interior plateau, possibly behaving as an ice sheet with ice divides migrating to the thickest area of ice accumulation. Flow here was to the northeast and was deflected to the north and northwest in the vicinity of the Bowron River as the ice sheet converged with mountain glaciers flowing from the Caribou Mountains. During late glacial times, the ice sheet in the interior would have gradually thinned and topographically controlled ice would again affect the property. Ice flow directions were highly variable and ranged from northward to southwesterly flowing ice, depending on topography and ice thickness. Cirque glaciation on Two Sisters Mountain extended into the Holocene as ice flowed from the mountain into the valleys below. The maximum extent of this mountain glacier likely only reached the bottom of Big Valley Creek.

Previous work with ice directional studies in the region is poor. A southwest to northeast glacial advance was reported for the region north of 14 Mile Creek (Hoffman and Reimchen, 1992). Drift exploration studies are in progress with the British Columbia Geological Survey Branch (P. Bobrowsky, pers. comm. 2000).

TILL ANOMALIES

Ketcham Anomalies

No less than 12 till samples on the plateau south of the Ketcham Creek valley obtained minimum values of 100 ppm Cu. Moss mat samples downslope from these till samples are also high in Cu. Several of these were clustered together on the southern edge of the ridge overlooking the Ketcham Creek valley. To the west and south, till samples

with elevated values of Cu were also obtained. Close inspection of each sample pit was conducted to confirm if the sample medium was C-horizon basal lodgement till. Suspect pits were noted and additional samples of basal till were collected. Additional striae were discovered and till fabrics were measured to confirm if the ice flow that deposited the glacial till was parallel to the striations.

Ice flow indicators show there was at least two directions of glacial movement in the local area during the last glaciation. Observations indicate a dominant ice flow event trending NE-SW. Within the till anomaly area, there is a lack of polished outcrop preserved with directional indicators. Fabric R-1 taken at sample site #17553 indicates an ice flow from the northeast to the southwest. During the early stages of deglaciation, the thinning ice conformed to topography and flowed westward to northwestward down the Ketchum Creek valley. Fabric R-2 taken adjacent to the Ketchum Creek valley confirms that the later ice flow was strong enough to rework the tills and redistribute them to the west (Fig. 3).

The till is moderately shallow here, often less than 3 m thick but can be up to 5 m thick on the larger hillslopes. Steeper slopes have a thin veneer of colluvium in parts, comprising a mixture of basal and ablation tills and bedrock. On the higher plateau between the Ketchum and Lottie creeks, the till is thin and discontinuous with numerous outcroppings. Above 1300 m elevation, there is a thin veneer or ablation till overlying basal till or locally overlying bedrock. It should be noted that ablation till is deposited in an englacial environment, that is, material that was transported on or within the ice sheets and deposited during ice stagnation on the higher slopes (Clague, 1989). This material is not suitable for following up individual anomalies and effort must be made to ensue test pits are deep enough to sample the basal till. Below 1170 m elevation, the basal till is discontinuous and may be locally overlain by sand and gravel or has undergone minor erosion from meltwaters flowing into the glaciofluvial system that once occupied the Ketchum Creek valley. Any float material found below this elevation is difficult to trace having a minimum two-vector component of transport (glacial and glaciofluvial).

It is premature to assume the relationship of the till anomalies and whether they are derived from a single mineralized source or from multiple point sources. They should be treated as separate entities until the close-spaced grid sampling is completed and analyzed. Throughout the detailed site inspection, samples were being collected at 250 m spacing to attempt to put some boundaries on the dispersal train and provide a 2-dimensional picture of copper dispersion in the area. Due to the steep southern slope of the Ketchum Creek valley, hydromorphic dispersion is to be expected and should be accounted for when interpreting the results from grid sampling.

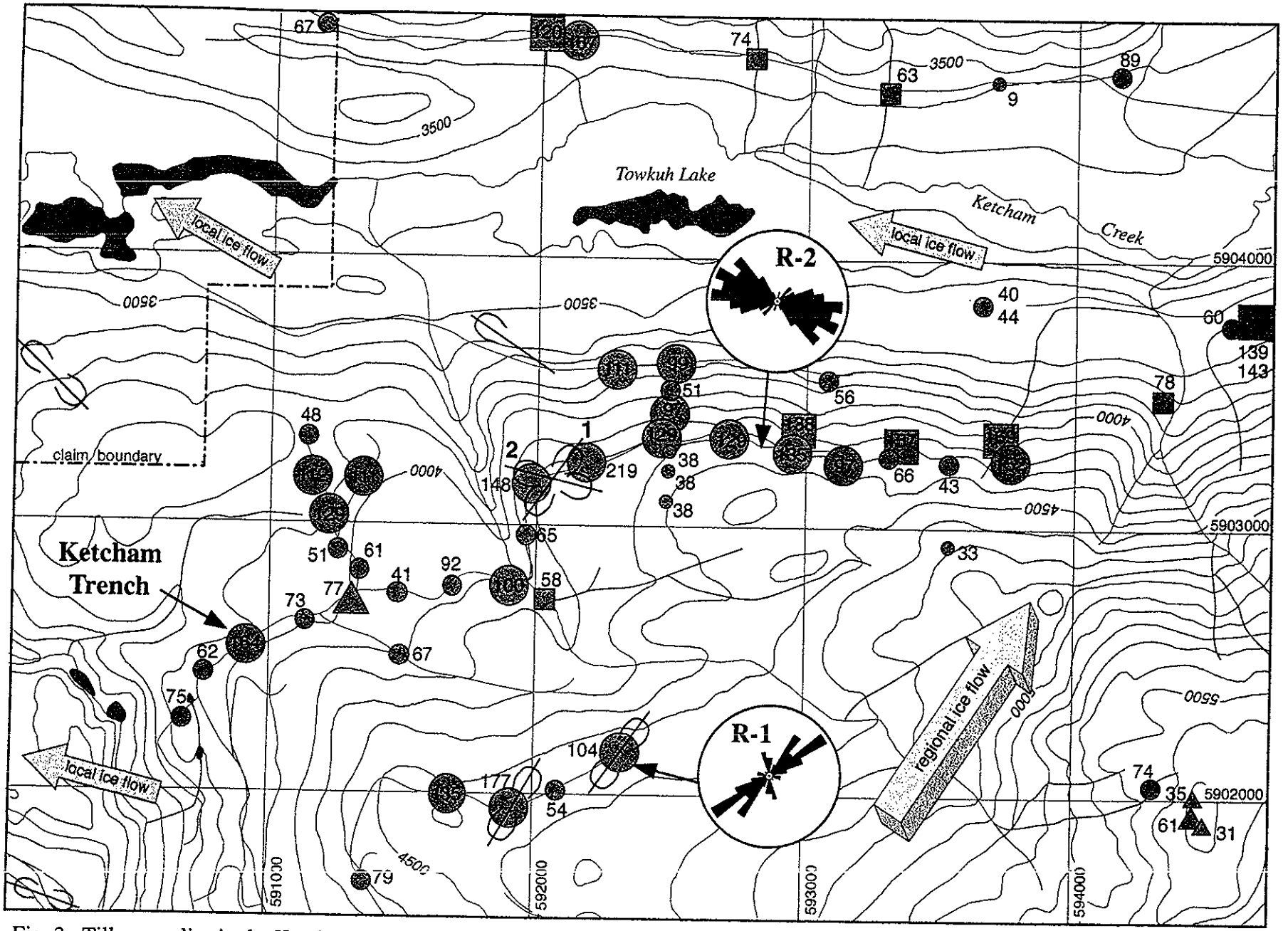

Fig. 3. Till anomalies in the Ketcham Creek valley, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. Ice flow directions from local striae and regional surficial mapping. Scale 1:20 000.

A value of 167 ppm Cu was obtained from a till sample north of Ketchum Creek. The till at this site is bounded by colluvium on the steep slope to the north and glaciofluvial sand and gravel to the south and east. Additional till sampling is futile and other methods of follow-up work is recommended. The area was also scoured for evidence of float boulders and cobbles. Grab samples of gabbroic float have minor chalcopyrite mineralization present at till site #17879. These cobbles are subangular and are probably of local provenance. It is suspected that the source of the Cu in the till here is local, likely within 1 km or less.

At site #17865 and 17867, the surface material is strongly cemented by leaching of sulphide cobbles. There are three areas in the 35 m long section in which gossanous cementation is visible. They occur no less than 2.5 m from the top of the section and likely represent a mineralized 'horizon' in the sediments. The material is not glacial till, but colluviated till with mineralized cobbles deposited in a sheet-like bed subparallel to slope. The mineralized source is not visible at surface, given that mineralized horizon is buried here, in a region with less than 3 m thickness of overburden, the source is very proximal, likely less than a few hundred metres upslope. 100 m up-ice. Grab samples of chalcopyrite in basalt and massive pyrite were noted in the section talus. This site was later chosen as a trenching target and is discussed in detail within in this report.

May Anomaly

At sample sites #17521 and 17522, a value of 160 ppm Cu was obtained from the sample pit. There is approximately 5 m of overburden exposed in the roadcut and the sample was obtained from the base of the section. The material is basal lodgement till and an excellent sample medium. Samples taken from nearby surface pits did not show elevated Cu values, indicating that the dispersal train at this site is buried near the till - bedrock interface, and the source is very proximal. The low Cu value obtained from a moss mat sample to the south (#10328) also indicates the copper dispersal train does not extend south into that drainage area. To the north-northeast, or down-ice, the glaciofluvial terraces and fan deposits at surface have either eroded or mantled the Cu-bearing till, thus explaining the lack of a dispersal train.

FIP Anomaly

The FIP anomaly was discovered by the regional till sampling survey. Samples #17626 and 17646 yielded values of 113 and 126 ppm Cu, respectively. Prospecting along an abandoned logging spur resulted in the discovery of several rusty float cobbles in the ditch at the hairpin of the spur (Fig. 4) and several more *in situ* within the till (Fig. 5). These mineralized cobbles are found only within the basal till, and not within the overlying

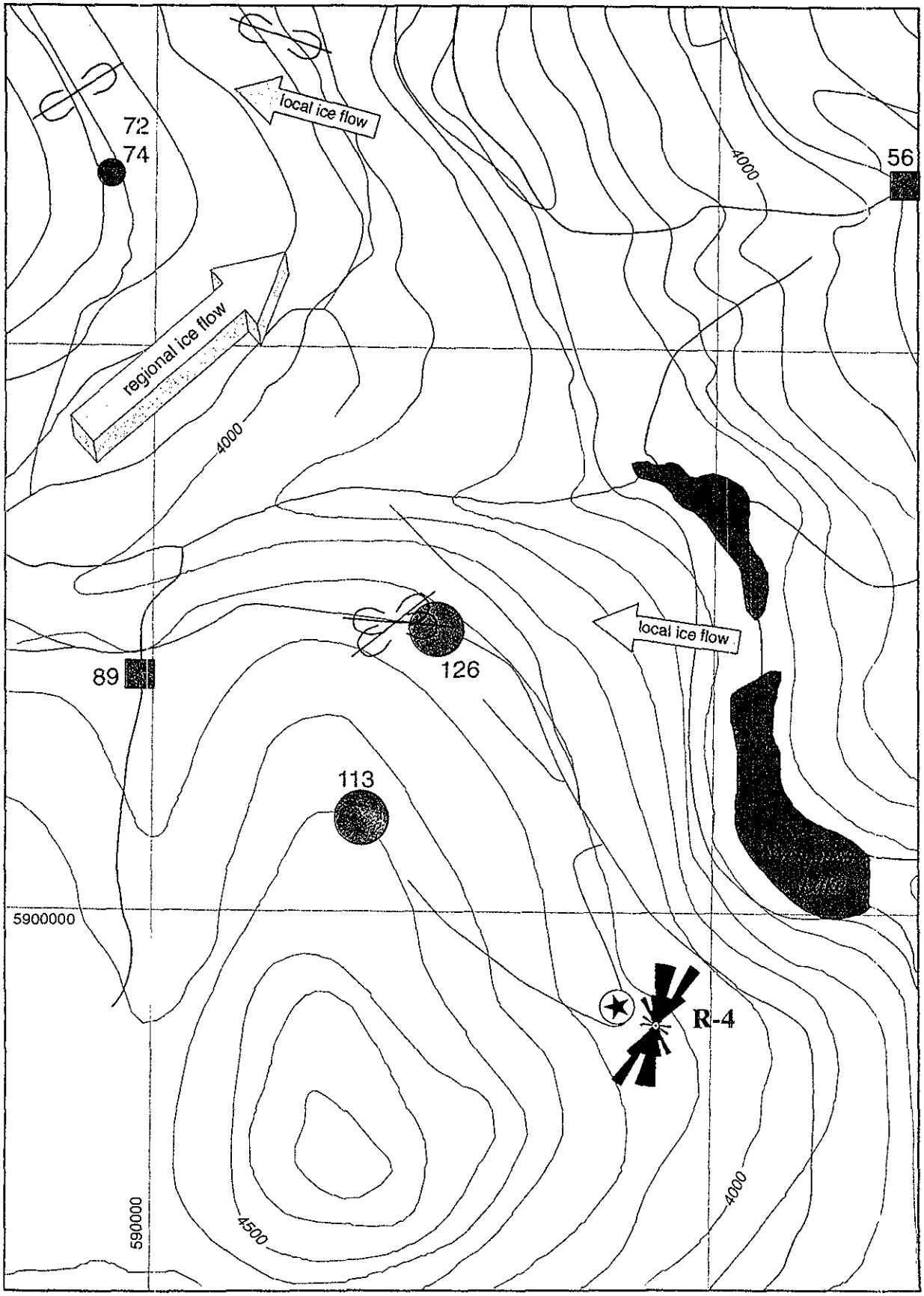

Fig. 4. The FIP anomaly, west of Westpass Lake, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. Ice flow directions inferred from regional surficial mapping. Scale 1:10 000.

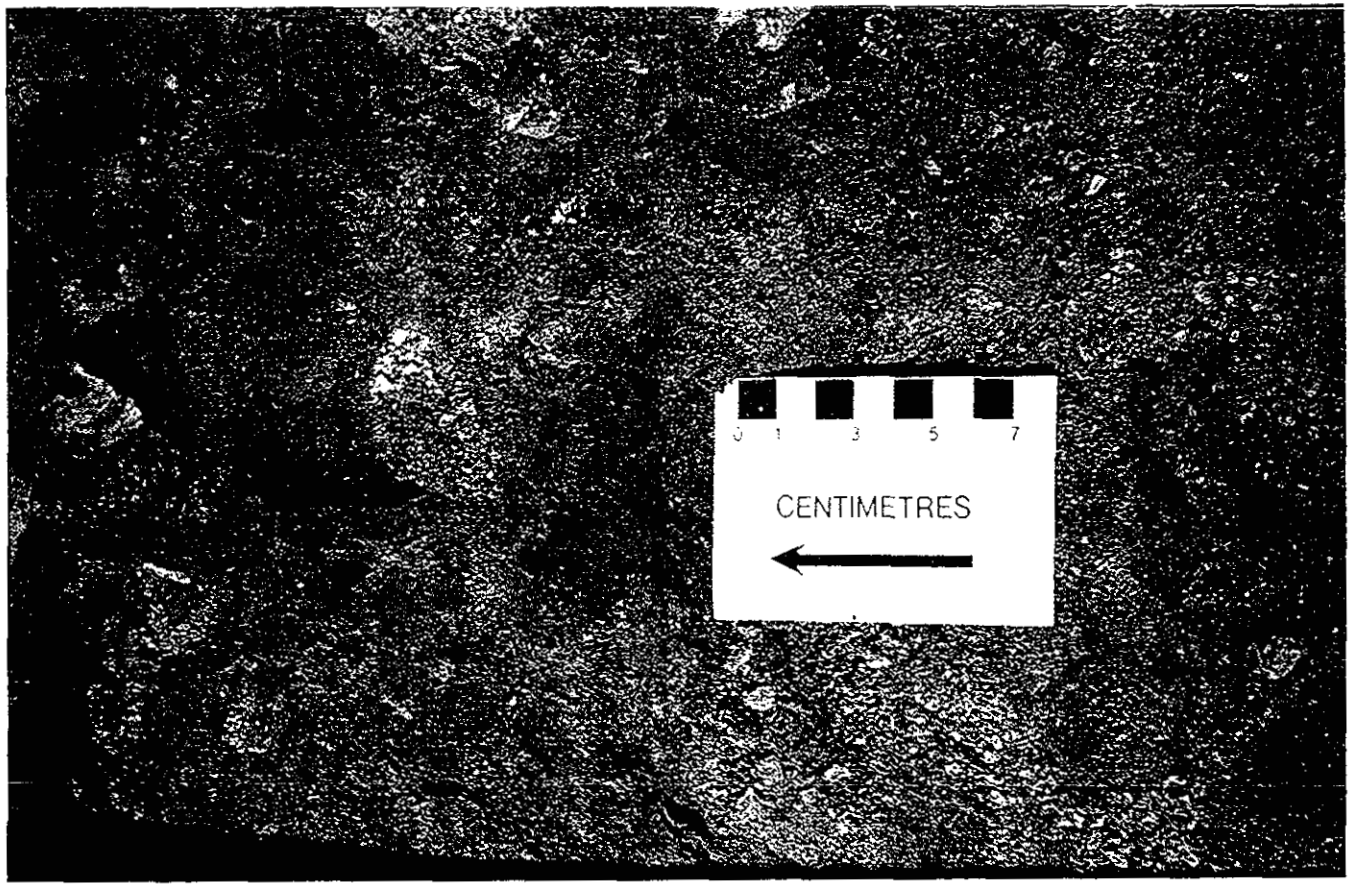

Fig. 5. Gossanous subangular pebble discovered in basal lodgement till at the FIP anomaly.

colluviated till veneer (Fig. 6). A fabric was measured in the basal till and has a strong northeast-southwest trend (E1= 0.765). A small outcrop was discovered by sample #17646 with two sets of striae preserved. No directional or age relationship was determined, but a northeasterly and westward ice flow direction is suspected for regional and late-glacial ice movement, respectively. The till thickness varies from <1 m near the top of the hill to >4 m at the site of the float. Detailed up-ice grid sampling was undertaken and the results are pending.

Holly Anomaly

The Holly anomaly was discovered by the regional till sampling survey. Located in a saddle between two bedrock knobs, initial follow-up sampling also yielded excellent results, with a maximum value of 198 ppm Cu in the till. Close inspection of the sample pits revealed a minor percentage of the pebbles being gossanous. Numerous polished outcrops exposed in an old skidder trail provide excellent age relationships and directional indicators with respect to the last glacial event (Fig. 7). The oldest flow in the immediate area is the only one without a directional indicator; it trends NNE-SSW. The second ice flow direction is also the most dominant, molding and shaping the outcrops, and rat-tails from epidote veins indicate ice flowed towards the NE. The last ice flow direction was measured from the flat tops of outcrops and also left rat-tails as evidence of a westward ice flow direction (Fig. 8). The till in the general area rarely exceeds 2 m and it is suspected that the source of the Cu is from the southwest. Grid sampling was in progress when the author visited the site so a cut-off point up-ice has yet to be defined.

Khan Anomaly

The Khan anomaly was found by the regional till sampling survey. Follow-up prospecting yielded an additional four samples taken in the general vicinity with values exceeding 100 ppm Cu. A duplicate sample taken at the discovery site also confirmed the elevated Cu in the till. Prospecting also revealed several float samples with up to 25% sulphides including chalcopyrite and possibly bornite. The till is commonly <2 m thick, with abundant outcrop exposure along the old logging road. Over a dozen polished outcrops were observed, the metavolcanic bedrock being extremely favorable to provide mineral clusters of epidote and siderite which produced some outstanding rat-tails, both in micro and macro forms. Large grooves and coarse-grained pebbles in a mudstone shist also provided age relationships and directional indicators (Fig. 9).

Three directions of ice flow were observed in the vicinity; the oldest direction preserved indicates an ice flow towards ENE. Subsequent directions mapped also indicate

FIP Anomaly

Nearby till anomalies led to the discovery of multiple sulphide-bearing float.
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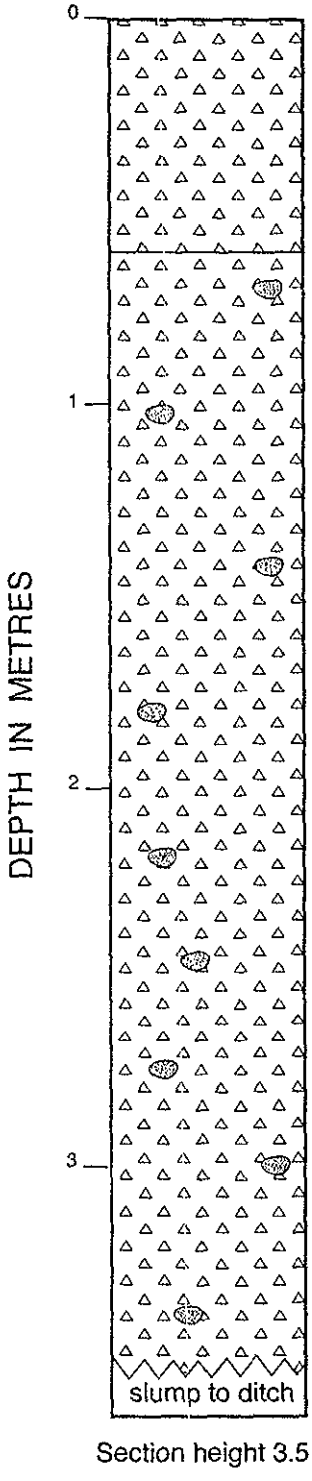


0.0 to 0.6 m Till
- weakly colluviated ablation till, poorly sorted moderately oxidized.
- clast content ranges from 35 to 50%, clasts are subangular to very angular
- No gossanous float observed in unit

0.6 to 3.5 m Till
- basal lodgement till, moderate compaction, moderately developed fissility, fine sandy olive-grey matrix
- clast content is 25% ranging from angular to subrounded with a subangular mean, mixed lithologies with abundant gossanous pebbles
- fabric R-4 measured at 2.4 m

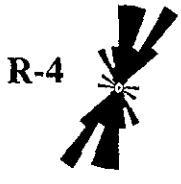


Fig. 6. The surficial geology profile at the FIP anomaly, west of Westpass Lake.

Fig. 7. Polished outcrop at the Holly anomaly. Main set of glacial striae indicates an ice flow direction towards the northeast.

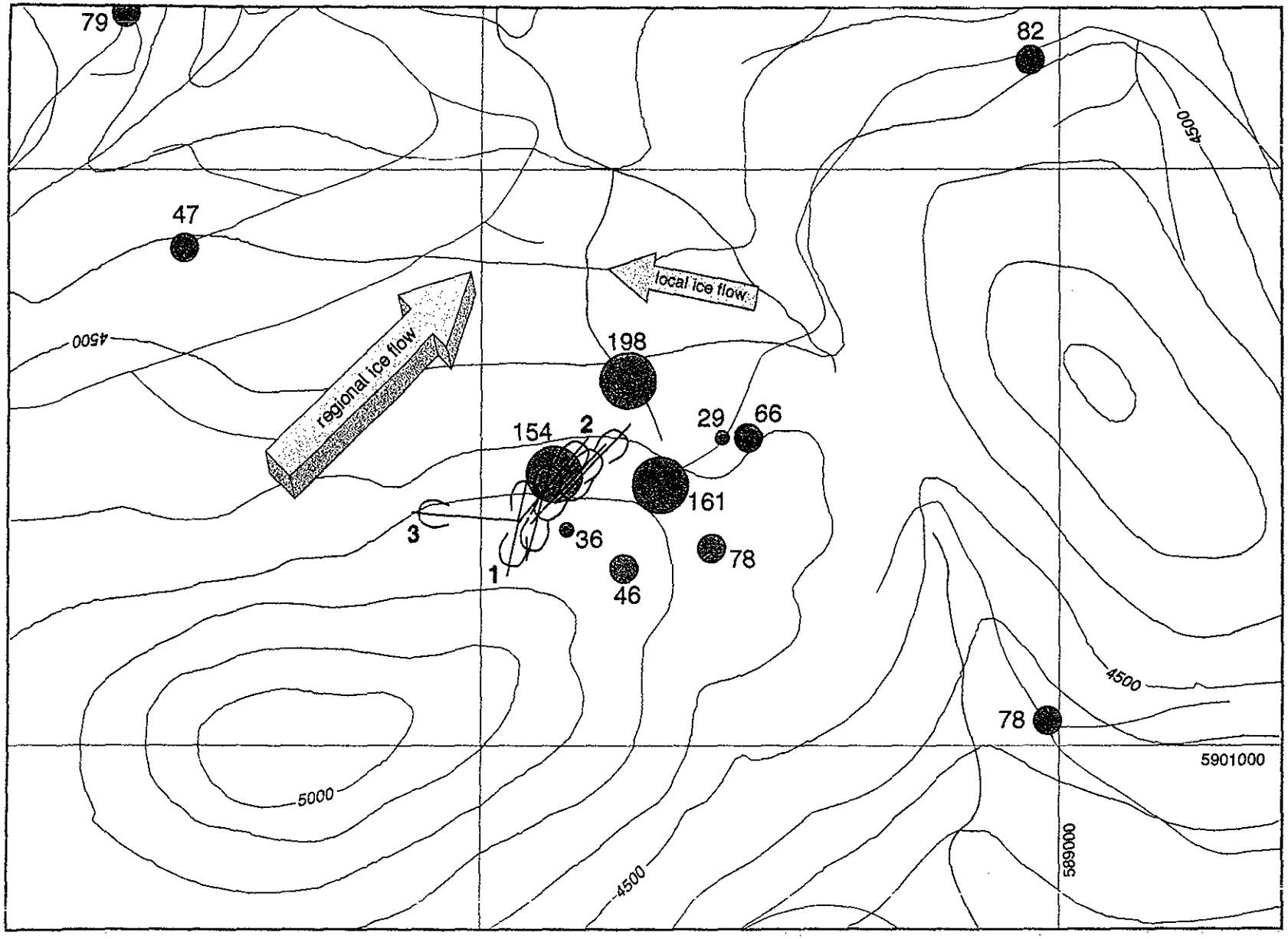


Fig. 8. The Holly anomaly, located in a saddle between two bedrock knobs, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation data from follow-up studies. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

Fig. 9. Sheared pebbly mudstone schist at the Khan anomaly with three sets of striae. Large grooves are gouged into the schist, with rat-tails formed around psammite clasts, from ice flowing towards the northeast (see compass above). Subsequent ice flowing to the north-northeast has lightly polished the outcrop and inside the older grooves (see knife) and the last ice flow event that affected the area left very light striae on the outcrop top, with no directional indicators (see marker).

northeasterly flow, with ice flow shifting more northerly during late glacial time (Fig. 10). A fabric taken at sample site #17709 produced a weak northeast trend but with poor clustering. Possible shifts in ice flow directions or late glacial ice drawing down into the Ketcham Creek valley to the north possibly explain the poor fabric results.

As previously mentioned, the till is quite thin here and the mineralized source is expected to be proximal. The additional samples that were taken at 200-250 m spacing to the south and west should help define the dispersal train.

Stephanie Anomaly

The Stephanie anomaly was discovered by the regional moss mat sampling survey. A value of 487 ppm Cu was obtained from sample #10388, a regional till sample (#17594) several hundred metres to the north yielded a value of 108 ppm Cu. Additional reconnaissance sampling was undertaken along the road network prior to the author's visit to the site. All the sample pits were inspected and consist of basal till, an excellent sample medium. Several outcrops were visited in the area and three ice flow directions were observed (Fig. 11). The oldest ice flow direction was towards the NE, with ice flow later shifting to NNE and N. Ice later flowed down the Ketcham Creek valley, which lies to the south, with a westerly flow direction. The till thickness is quite variable, but can exceed 5 m in the areas adjacent to the rock knobs. It is difficult to pinpoint the source and closer examination of the follow-up sample results are necessary.

Sam Anomaly

The elevated Cu in till at the Sam anomaly was discovered by the regional till sampling survey and confirms the geochemistry reported in B-horizon soils by DES Exploration (Hoffman, 1991). Inspection of the sample pit indicated some gossanous cobbles and partial iron cementation of the till (Fig. 12). While the test pit was being expanded for a pebble fabric, a cobble was pulled from the section bearing up to 2% chalcopyrite. The overburden in the immediate area is quite thick, as usually is the case in small valleys such as this. The anomalous till sample also occurs at an elevation just above the sand and gravel glaciofluvial deposits that commonly occupy the larger valleys. There is evidence of two ice flow directions from striation sites and is also reflected in till fabrics measured at the section (Fig. 13) of the discovery sample (#17834) indicating a regional ice flow towards the NE and a local flow subparallel to the 14 and 18 Mile creek valleys (Fig. 14). Less than 500 west of the site, thick deposits of advance outwash sand and gravels are overlain by basal till. This poses a potential problem if the Cu-bearing till is not derived from the bedrock, but from the underlying gravels. Samples were taken at 250 m intervals

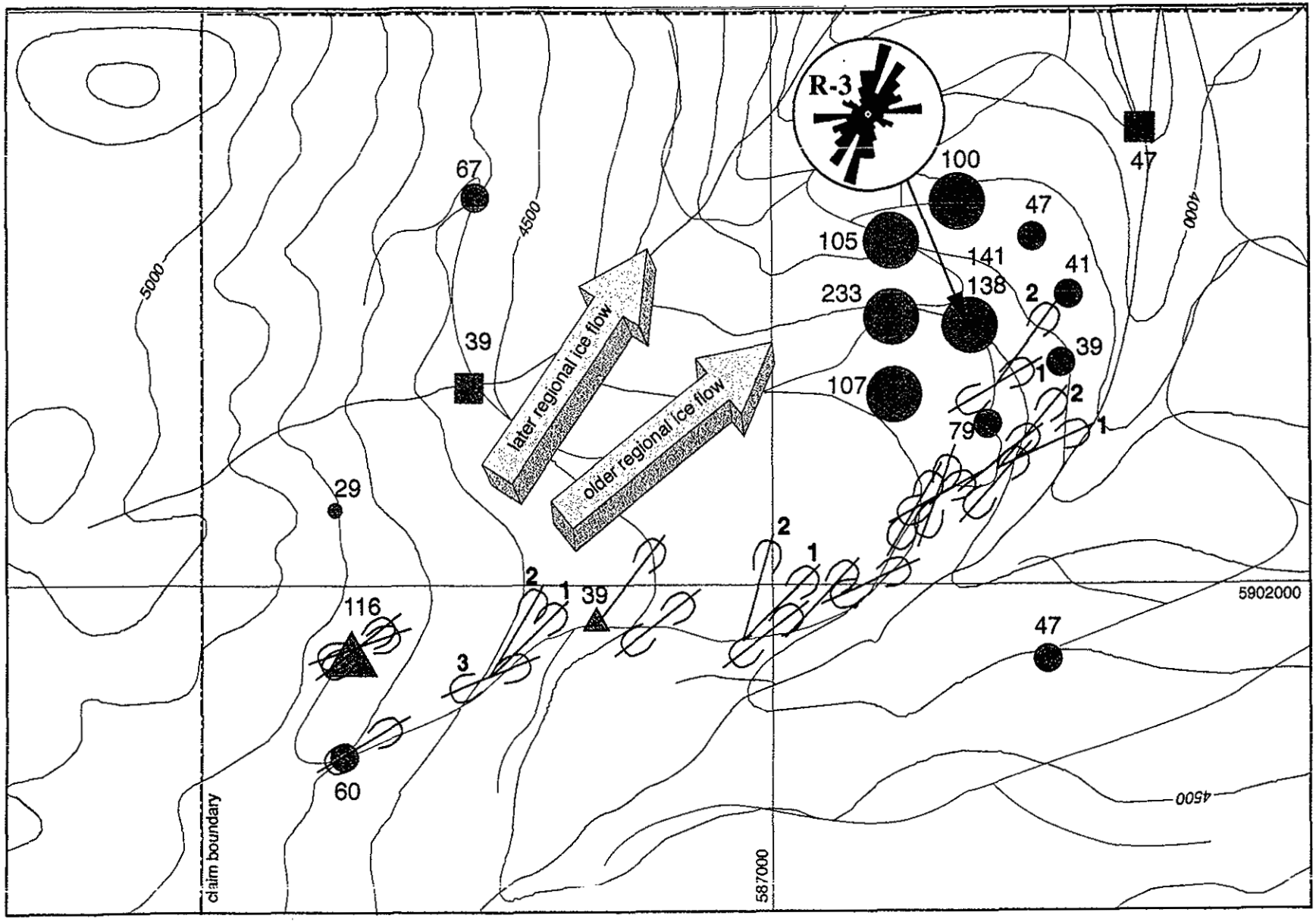


Fig. 10. The Khan anomaly, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

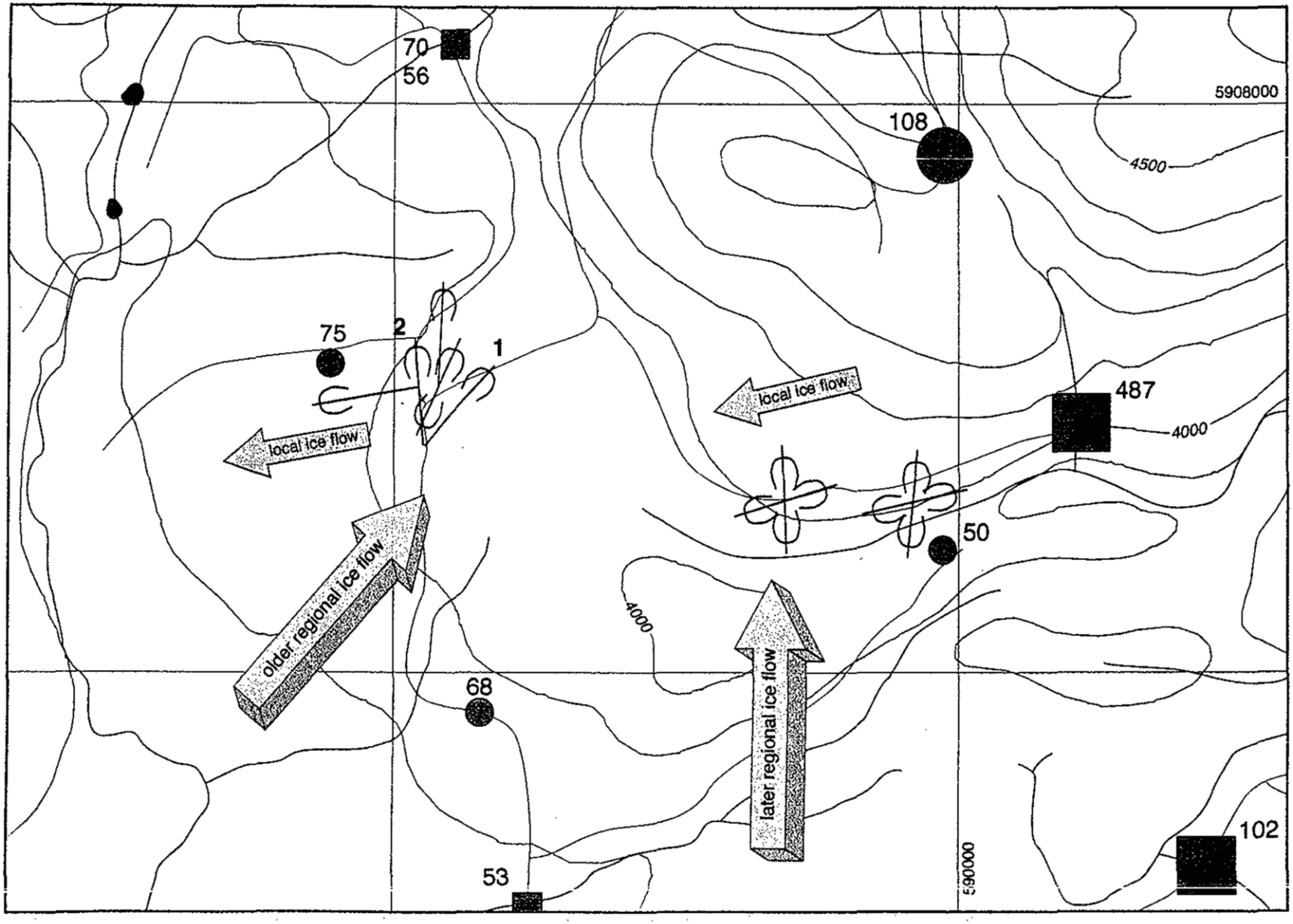
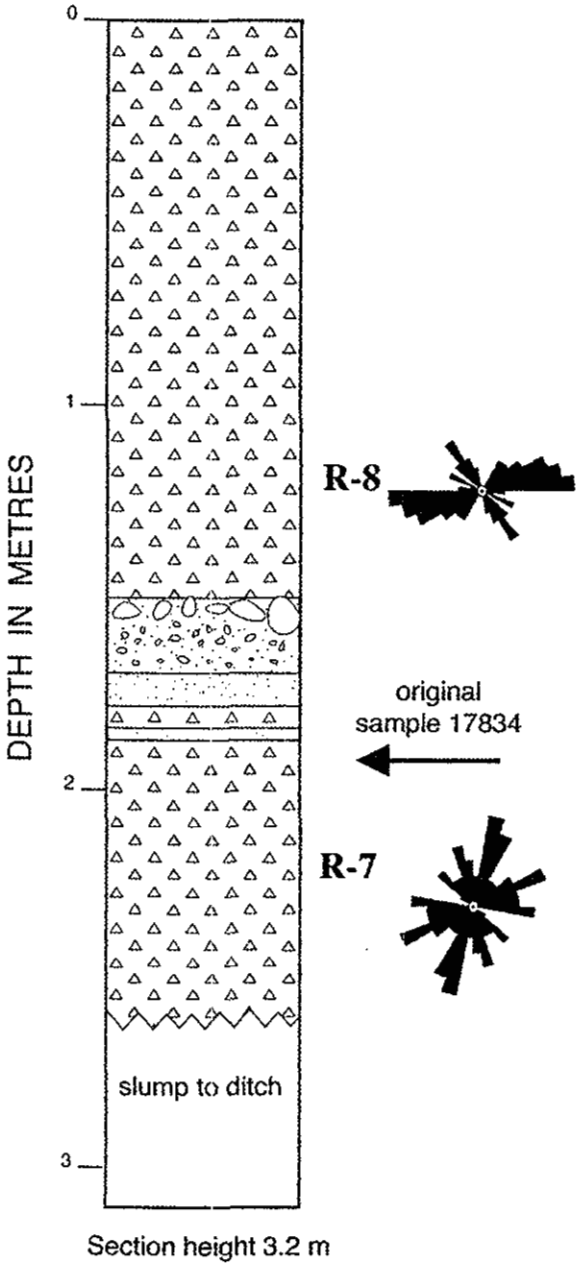


Fig. 11. The Stephanie anomaly, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation data from follow-up studies. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

Fig. 12. Regional till sample pit #17834 where a value of 366 ppm Cu was obtained from the <63μm fraction (Sam anomaly). A thin sorted layer between the two till units is gossanous and iron-cemented.

Sam Anomaly

Till anomaly (#17834) from an overgrown roadcut. Follow-up work led to the discovery of float bearing up to 2% chalcopyrite. UTM Zone: 10, 591566E, 5917977N, 1166 m asl.



0.0 to 1.5 m Till
- massive sandy till, strong fissility, moderate compaction, mottled oxidation, grades to B-horizon and soil at surface
- 35 to 40% clasts, clasts are subangular to subrounded with silt skins removed on bottoms, pebble casts are lined with sand and most pebbles do not have striae preserved
- fabric R-8 measured at 1.3 m

1.5 to 1.7 m Gravel
- "dirty" gravel (silt-coated pebbles), well sorted, mean clast size ≈ 2 cm, 90% clast content
- bed is oxidized and partially iron cemented
- upper contact contains large cobbles and small boulders, possible boulder paving
- sharp upper and lower contacts

1.7 to 1.8 m Fine sand
- fine and coarse bedded sand, moderate to well-sorted, sharp undulating lower contact

1.8 to 2.4 m Till
- compact, grey, fine sandy matrix, sandier near top grading into compact till over 20 cm
- clast content 25%, mean clast size ≈ 2 cm with silt skins removed on bottom and some pebble casts are lined with sand
- fabric R-7 measured at 2.3 m

Fig. 13. The surficial geology profile at the Sam anomaly, northwest of 14 Mile Lake.

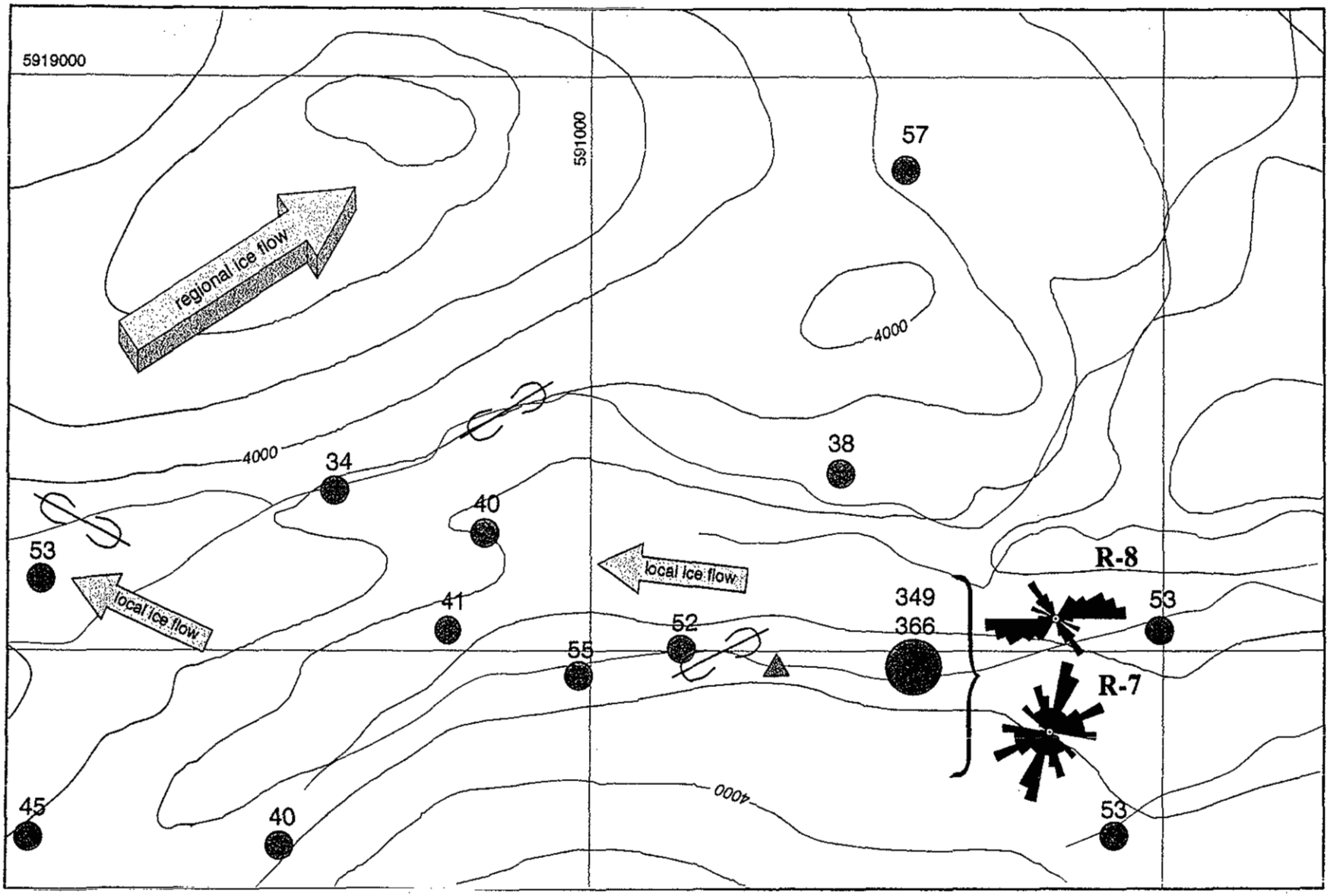


Fig. 14. The Sam anomaly, northwest of 14 Mile Lake, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. The grey triangle marks an area where the basal till overlies several metres of advance outwash pebbly sand and gravels. Ice flow directions inferred from regional surficial mapping. Scale 1:10 000.

to the south and west where the basal till directly overlies bedrock and their results should resolve the pattern and nature of Cu dispersal.

Neil Anomaly

The Neil anomaly was discovered with the regional till survey with sample #17819 yielding a value of 103 ppm Cu. The sample was collected from a shallow roadcut. A pebble fabric was attempted at the sample pit, but possible anthropogenic disturbance from road construction is suspected to have influenced the fabric results for fabric R-9 (See appendices). Another fabric was undertaken at a favorable section nearby (Fabric R-12), where bullet-shaped boulders were also noted in the section (Fig. 15). Striae from nearby outcrops also confirmed the ice flow directions that affected the locality. During glacial maximum, ice flowed towards the NE, late glacial ice followed westerly along the 14 and 18 Mile creek valleys (Fig. 16). The observed till thickness is <3 m; samples were taken at 250 m intervals to the south and west and their results should put some dimensions to the dispersal train.

14 Mile Anomaly

This anomaly was discovered by the regional till sampling survey. A value of 110 ppm Cu was obtained from sample #17811 from a section of till >3 m thick. The site is located on the north slope of 14 Mile Creek valley, at 1166 m elevation (ASL). Large deposits of glaciofluvial sand and gravel occupy the 14 Mile Creek valley that lies to the south, with deposits occurring at elevations up to 1150 m. Therefore, there is no suitable sample material to follow-up this anomaly up-ice. A weak correlation could be speculated with potential Cu sources from the Grid C area to the southwest (2.5 km up-ice), where Cu values exceed 300 ppm in the bedrock, but there is no evidence of a dispersal train as it was likely obliterated by glaciofluvial erosion.

Tow Anomaly

Ice flow studies were conducted south of the original Tow float site. This information is to compliment the detailed follow-up till sampling and possible spectrum conductors that lie to the southeast. Striae were observed on the hilltop to the south of the Tow area and indicate a NNE regional ice flow (Fig. 17). This is a contradictory statement to the author's previous report and map where direction of regional ice flow, based on interpretation of landforms from areal photographs, was estimated to be north to northwest. The surficial map should be updated accordingly. However, ice flow during the early stages of deglaciation did, in fact, flow towards the northwest as indicated from both

Fig. 15. An example of a bullet-shaped boulder exposed in a section of basal lodgement till. Such features are measured to indicate the direction of glacial ice flow that aligned the boulder and deposited it within the till. This boulder is located southwest of the Khan anomaly.

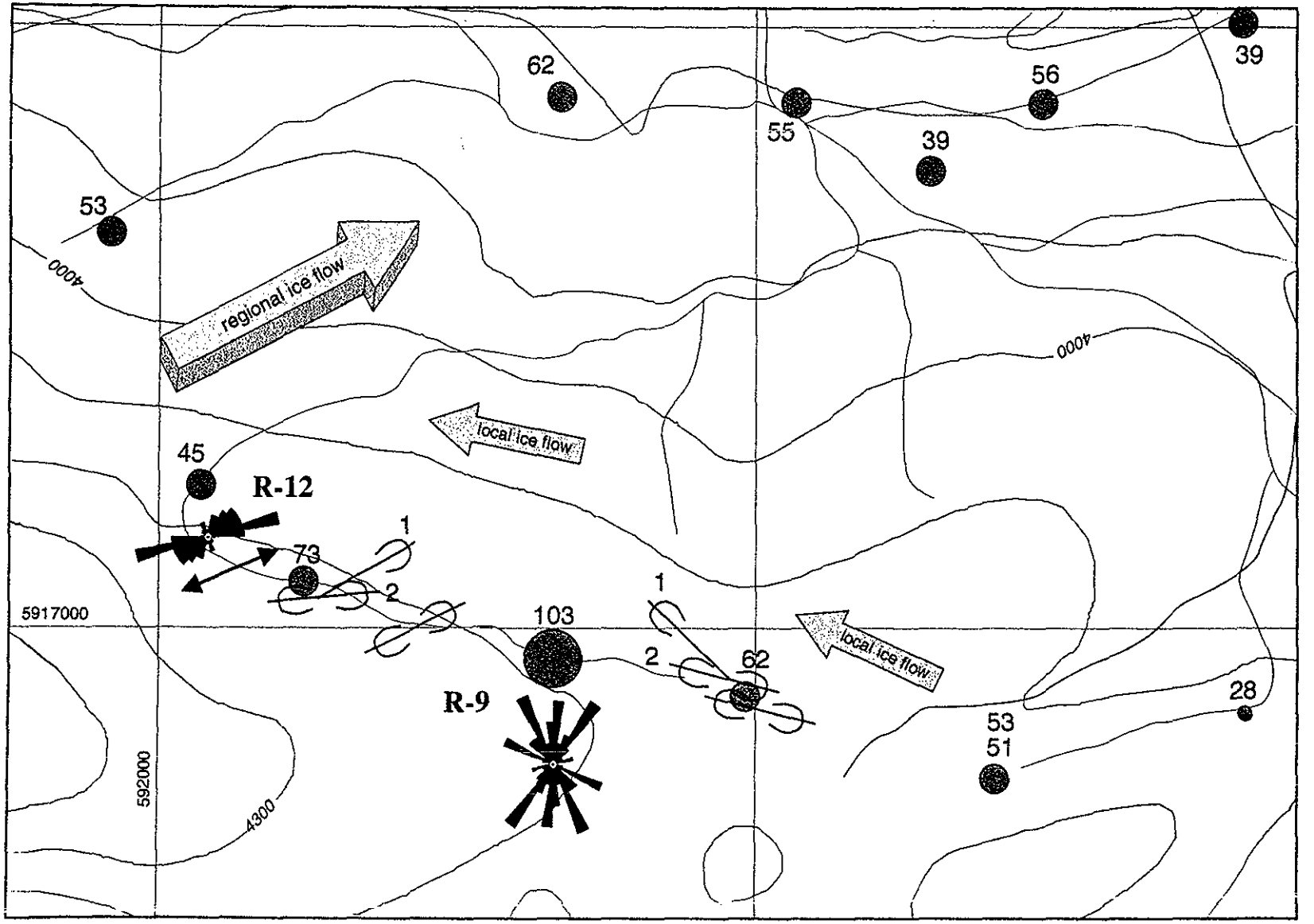


Fig. 16. The Neil anomaly, north of 14 Mile Lake, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. The bidirectional arrow indicates an observed bullet-shaped boulder. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

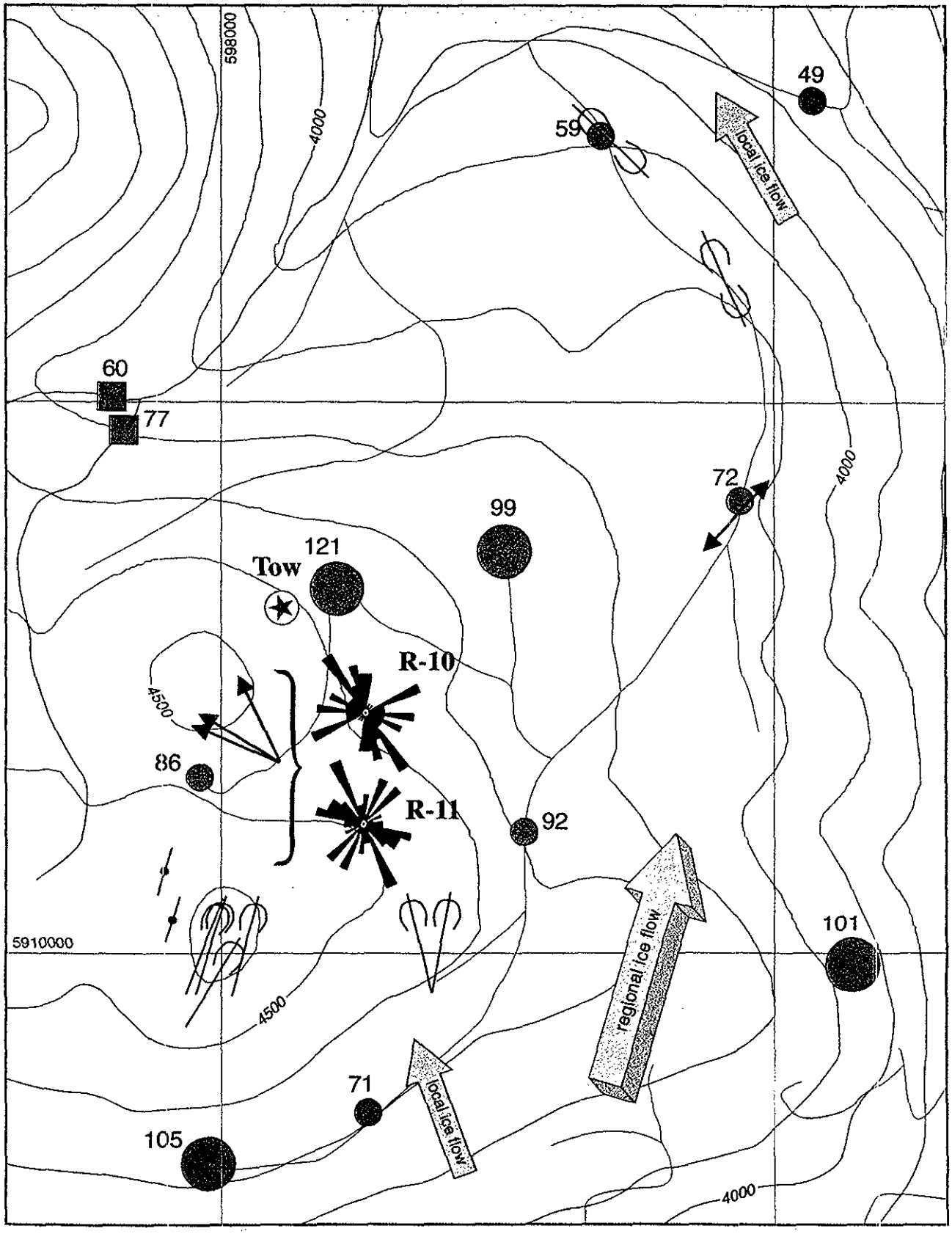


Fig. 17. The Tow anomaly, west of the Bowron River. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. The arrows indicate observed bullet-shaped boulders. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

bullet-shaped boulders and pebble fabrics measured adjacent to the Tow float (Fig. 18). Striae were also found at the edge of the plateau that parallel the Bowron River valley and these are considered to have formed from last glacial movement that affected the area. This site also represents the most eastern site of the northeast trending regional ice flow observed elsewhere on the property and in the Quesnel region by Clague (1988).

Boyce Creek Anomaly

This site was not visited by the author during the second phase of surficial work in the property. However, a few comments are made to aid in possible follow-up exploration. The elevated values of copper in till and moss mat samples confirms the anomalous values recorded in the region by Hoffman (1991). Striae were noted on top of the ridge between Boyce Creek and Slender Lake; these show a strong northeasterly regional ice flow. Sampling should continue up-ice, to the south and west. Well-developed terraces in the Boyce Creek valley indicate that the ideal sample medium, basal till, is only found above elevations of 1150 m (asl).

Lottie Area

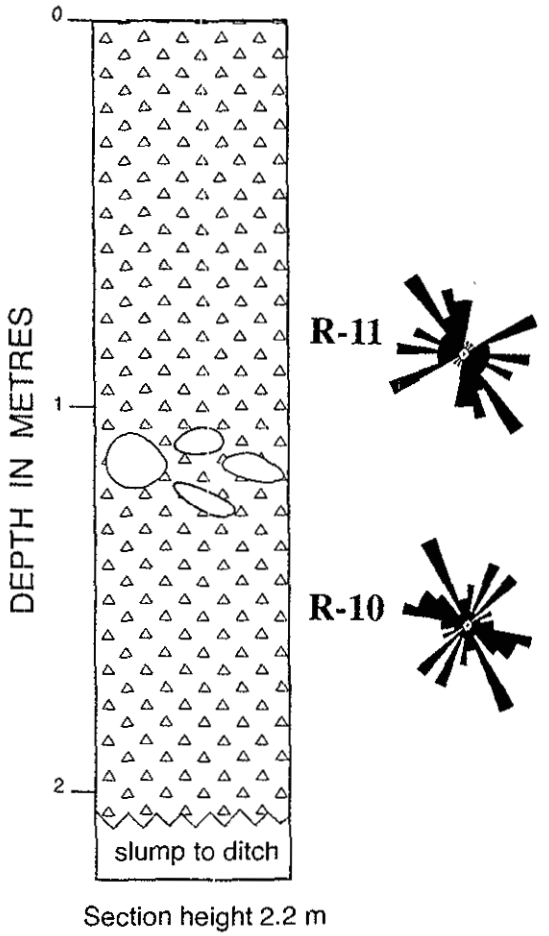
Additional striae sites observed elsewhere in the property, particularly those at the Khan and Tow anomalies, prompted a detailed look at the ice-flow indicators adjacent to the Lottie float site. Fabrics were measured in basal till to the west of the Lottie to compare earlier fabrics measured previously at the Lottie site (Paulen, 1999). Two fabrics were measured at a single section and are inconclusive with respect to the regional ice flow (Fig. 19). North of Lottie Lake, striation sites were revisited and mapped in detail (Fig. 20). Ages of ice flow events were established from cross-cutting relationships but no directional indicators were found on the flat cherty outcrops. There remains no absolute evidence of regional ice flow directions within the Lottie float area. All interpretations are inferred from nearby striation observations and the author retracts any previous interpretations of regional ice movement flowing towards the southwest. A tentative regional ice movement direction is speculated flowing towards the northeast.

TRENCHING

Trenching was carried out at the site of the initial discovery float south of Lottie Creek. The purpose was to document the nature of the massive sulphide boulders and describe their density within the overburden, their shape and their stratigraphic and sedimentological setting. Additional trenching was carried out in a section south of

Tow Anomaly

Till section up-ice from the Tow float. UTM Zone: 10, 598111E, 5910342N, 1355 m asl.



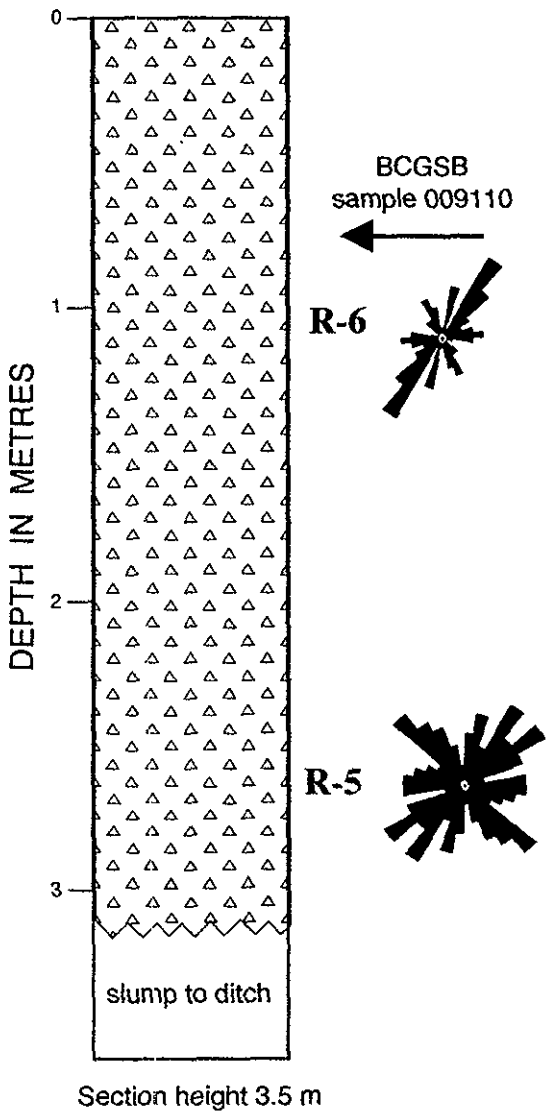
0.0 to 0.6 m B-horizon Till
- orange to orange-grey, sandy matrix, loose compaction and abundant rootlets
- 20% clast content, abundant striated and faceted clasts
- sharp oxidation boundary with C-horizon till

0.6 to 2.0 m Till
- compact, grey, fine silty sand matrix, strong fissility
- clast content 15%, mean clast size ≈ 2 cm with abundant striated and faceted clasts
- fabric R-10 measured at 1.5 m
- fabric R-11 measured at 0.9 m
- Several large cobbles and small boulders clustered at 1.2 m. Orientations range from 114° to 156° (dipping up-ice)

Fig. 18. The surficial geology profile up-ice of the Tow anomaly, west of the Bowron River.

West Lottie Profile

Fabrics measured in till in the clearcut west of the Lottie float, adjacent to the placer operation and at an elevation just above the transition zone where glaciofluvial and glaciolacustrine sediments onlap the glacial till.



0.0 to 1.5 m Till
- massive sandy till, moderate fissility and compaction, mottled oxidation, grades to B-horizon and soil at surface
- 25% clasts, clasts are subangular to subrounded, mean clast size ≈ 2 cm
- fabric R-6 measured at 1.2 m
- fabric R-5 measured at 2.8 m

Fig. 19. The surficial geology profile west of the Lottie showing, south of Lottie Creek.

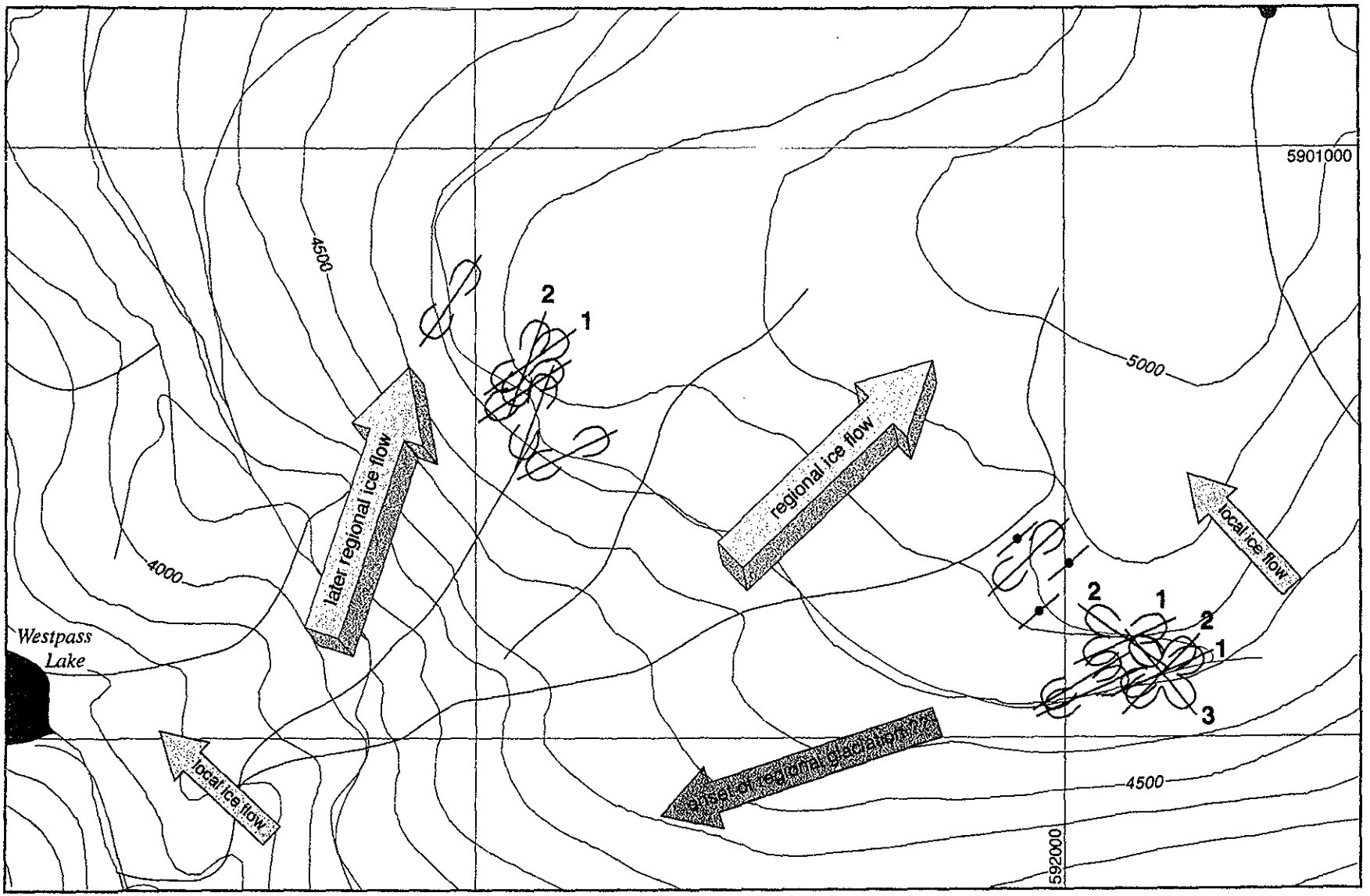


Fig. 20. Hilltop northeast of the Lottie float. Striae were observed from flat outcrops of cherty and/or felsic beds within the mafic volcanic unit. Age relationship of ice flow was established but no direct evidence of ice flow direction was observed. Ice flow directions here are inferred from regional surficial mapping. Scale 1:10 000.

Ketcham Creek, where initial interpretation was a possible cross-section of a proximal dispersal train. A quick summary of the trenching program is presented in Table 1.

Lottie Trenches

A total of 8 trenches were excavated at the Lottie site. Previous observations had noted that the Lottie float was situated in basal till, so the discovery site was excavated to confirm this and to take ice-flow observations. A large trench was dug to bedrock and massive sulphide cobbles and boulders were encountered in a partially cemented 'ferracrete' zone (Fig. 21). However, the large section exposed was characterized by poorly sorted beds of colluvium and colluviated till dipping towards Lottie Creek, subparallel to slope (Fig 22). The bedding and stratigraphy is quite subtle, due to the poorly sorted nature of the colluvium. The hosting sediment certainly changes the perspective of potential source directions, as an obvious downslope vector compounds the direction to a bedrock source.

The trench was extended to over 40 m in length and up to 10 m wide at one point in order to document the distribution of massive sulphide cobbles and pebbles within the colluvium (Fig. 23). Several profiles were described and sampled to put a geochemical perspective on the Cu distribution in the fine fraction (Fig. 24). At profile D, the overburden was the thinnest and the gossanous layers were concentrated in a 25 cm veneer directly overlying bedrock (Fig. 25). The sulphide cobbles in the gossanous layer were generally subangular in form, with a crust of iron-cemented colluvium around them (Fig. 26).

This led to two possible scenarios for potential sources: 1) the gossanous material directly overlying bedrock in trench 1 indicates a proximal mineralized bedrock source directly upslope of the underlying bedrock topography; 2) the sulphide cobbles were initially part of a dispersal train, and subsequently carried downslope following post-glacial erosion. Follow-up trenching was established based upon current drainage patterns (Fig. 27), to see if the sulphide-bearing clasts had derived from a bedrock source up-slope. Several drainage patterns were noted from airphoto analysis and the locations of subsequent trenching is shown in Fig. 28. The trenches were described in detail and several samples were taken from each trench to provide a vertical distribution profile of the geochemistry of the overburden. Trench descriptions and sample sites are shown in the appendices of this report. Unfortunately, no massive sulphide pebbles were found in any of the other trenches.

This still leads to two possible answers for the Lottie float: 1) the massive sulphide source is possibly very proximal to the initial discovery site and the other trenches are

Location	Trench #	Easting	Northing	Trench Depth (m)	Bedrock Lithology	Surface Material	Sulphides
Lottie	1 (east)	593002	5898989	5.5	intermediate volcanic	colluvium	yes
Lottie	1 (west)	592966	5898964	3.2	mafic subvolcanic	colluvium	yes
Lottie	2	593314	5898756	3.4	graphitic argillite	till	no
Lottie	3	593117	5898776	10.7	n/a	till	no
Lottie	4	593024	5898794	4.6	n/a	colluvium/till	no
Lottie	5	592980	5898815	4.25	n/a	colluvium/till	no
Lottie	6	592951	5898831	3.95	n/a	colluvium/till	no
Lottie	7	592927	5898885	3.5	n/a	colluvium/till	no
Lottie	8	592937	5898921	5.72	n/a	colluvium/till	no
Ketcham	1	590915	5902517	2.15	massive mafic volcanic	colluvium	yes
Ketcham	N1	590938	5902535	2.5	massive mafic volcanic	colluvium	trace
Ketcham	S1	590872	5902498	3	n/a	colluvium	no
Ketcham	S2	590891	5902507	3	n/a	colluvium	no

Table 1. Summary of trenching activity at the Lottie and Ketcham sites.

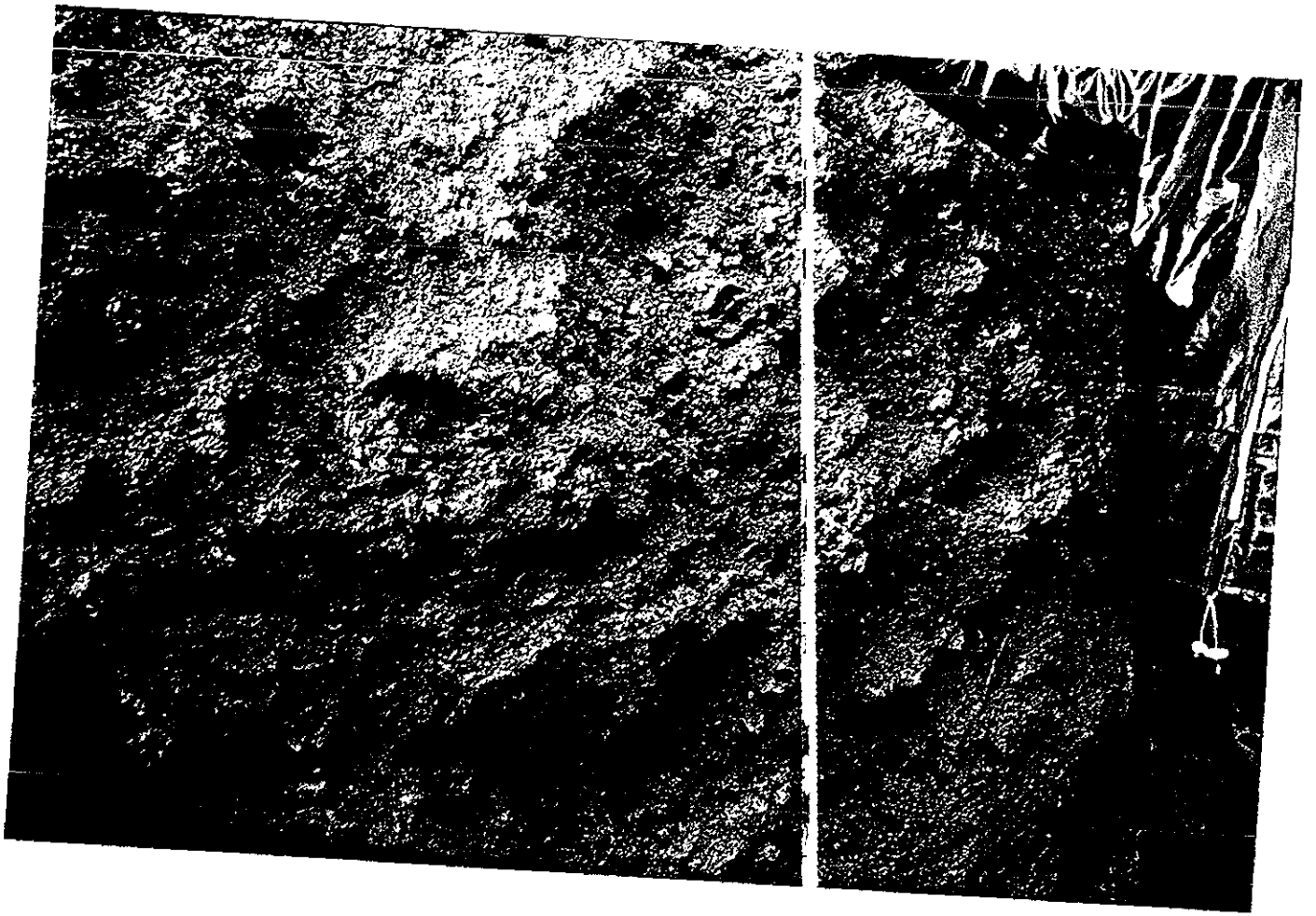


Fig. 21. Poorly sorted colluvium with cobbles and boulders of massive sulphide confined within a distinct orange gossanous zone at the original Lottie discovery site.

Fig. 22. View of Trench 1 at the Lottie site, looking towards the southeast. Note the poor sorting and the crude bedding of the colluvium, which comprises both shattered rock and colluviated basal till. The beds dip downslope towards Lottie Creek to the north, subparallel to slope topography.

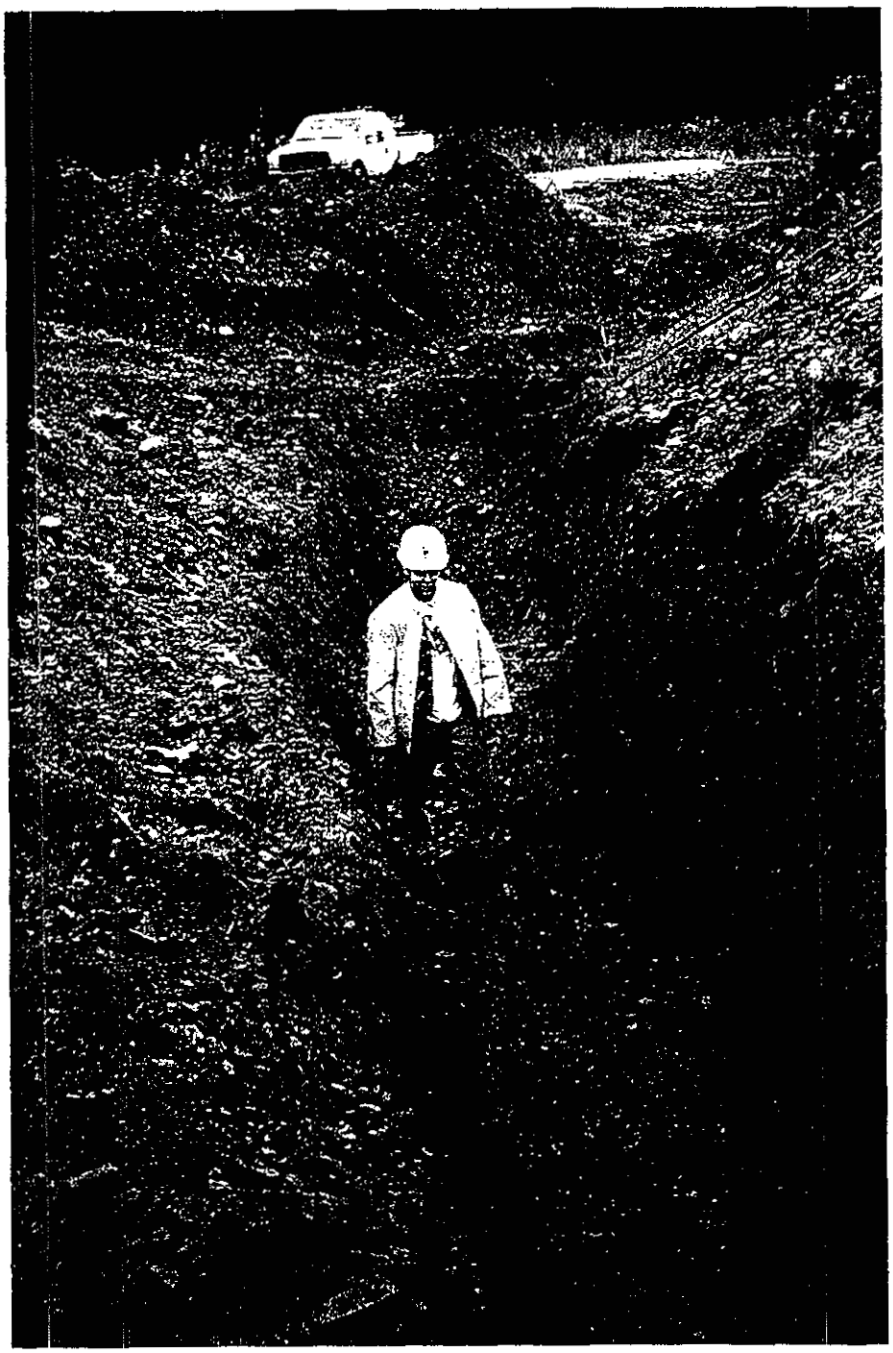


Fig. 23. View of Trench 1 from the west end, looking towards the east. Bedrock lies at the base of the trench with orange gossanous colluvium cemented to bedrock behind Geoff Mulligan.

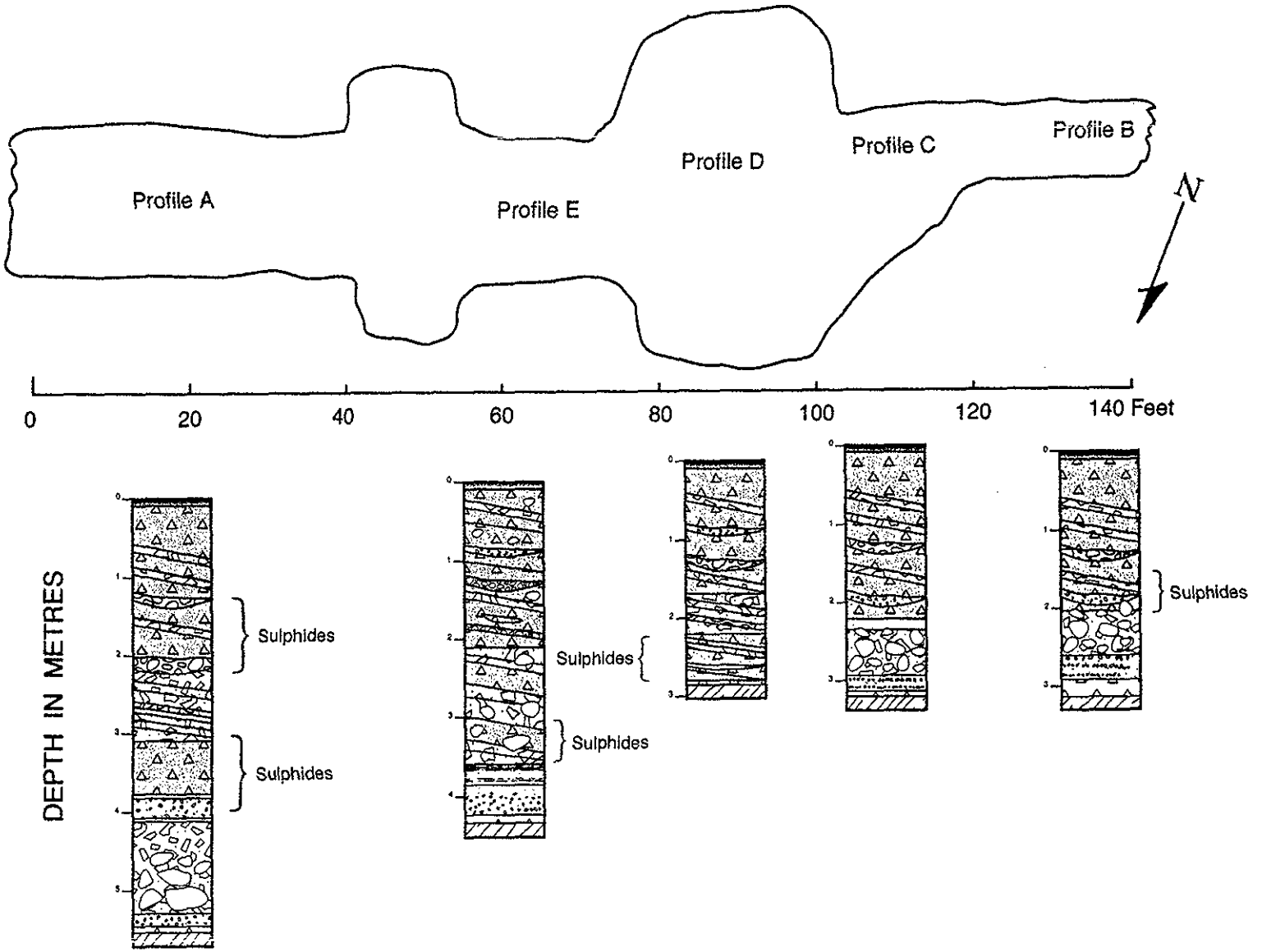


Fig. 24. Plan view of the Lottie #1 trench, with mapped overburden profiles. Detailed profile descriptions are provided within the appendices.

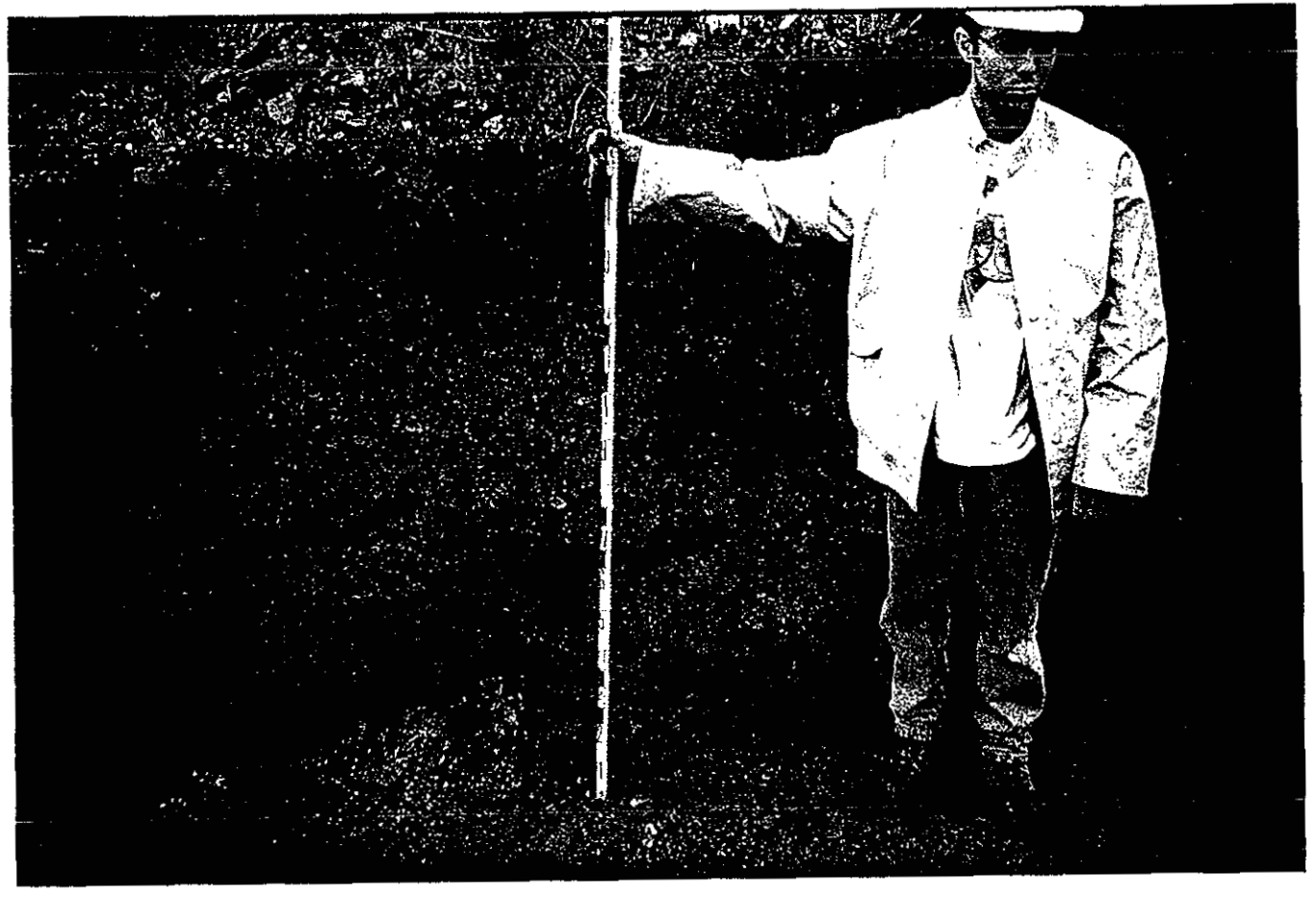


Fig. 25. Profile D, Trench 1 at the Lottie site. Note the orange gossanous veneer overlying bedrock in the base of the trench.

Fig. 26. Massive sulphide cobble in iron-cemented colluvium.

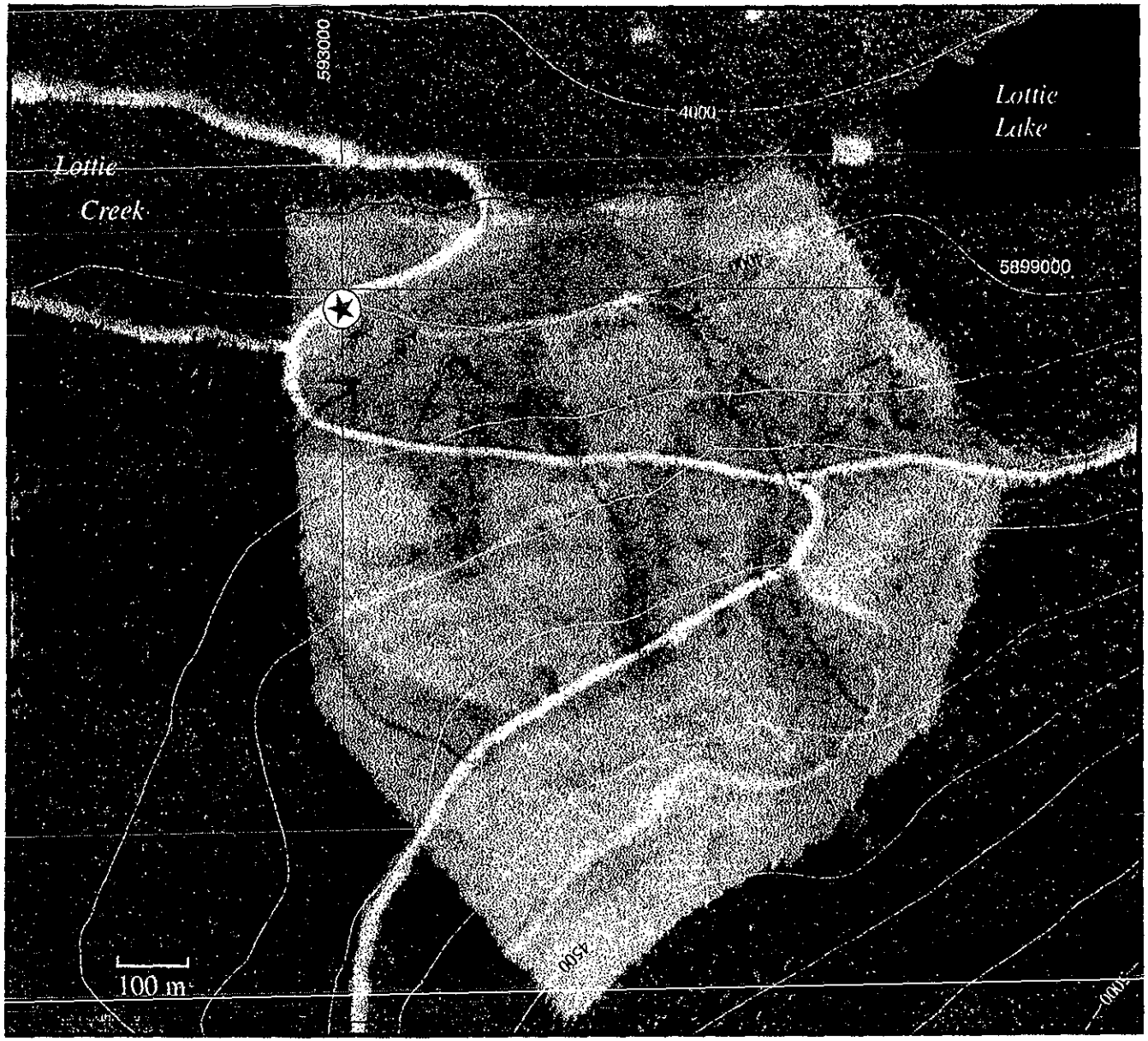


Fig. 27. An airphoto of the Lottie site showing modern drainage patterns. The star marks the site of the Lottie float which occurs within deposits of colluvium (consisting of moderate to poorly sorted colluviated till).

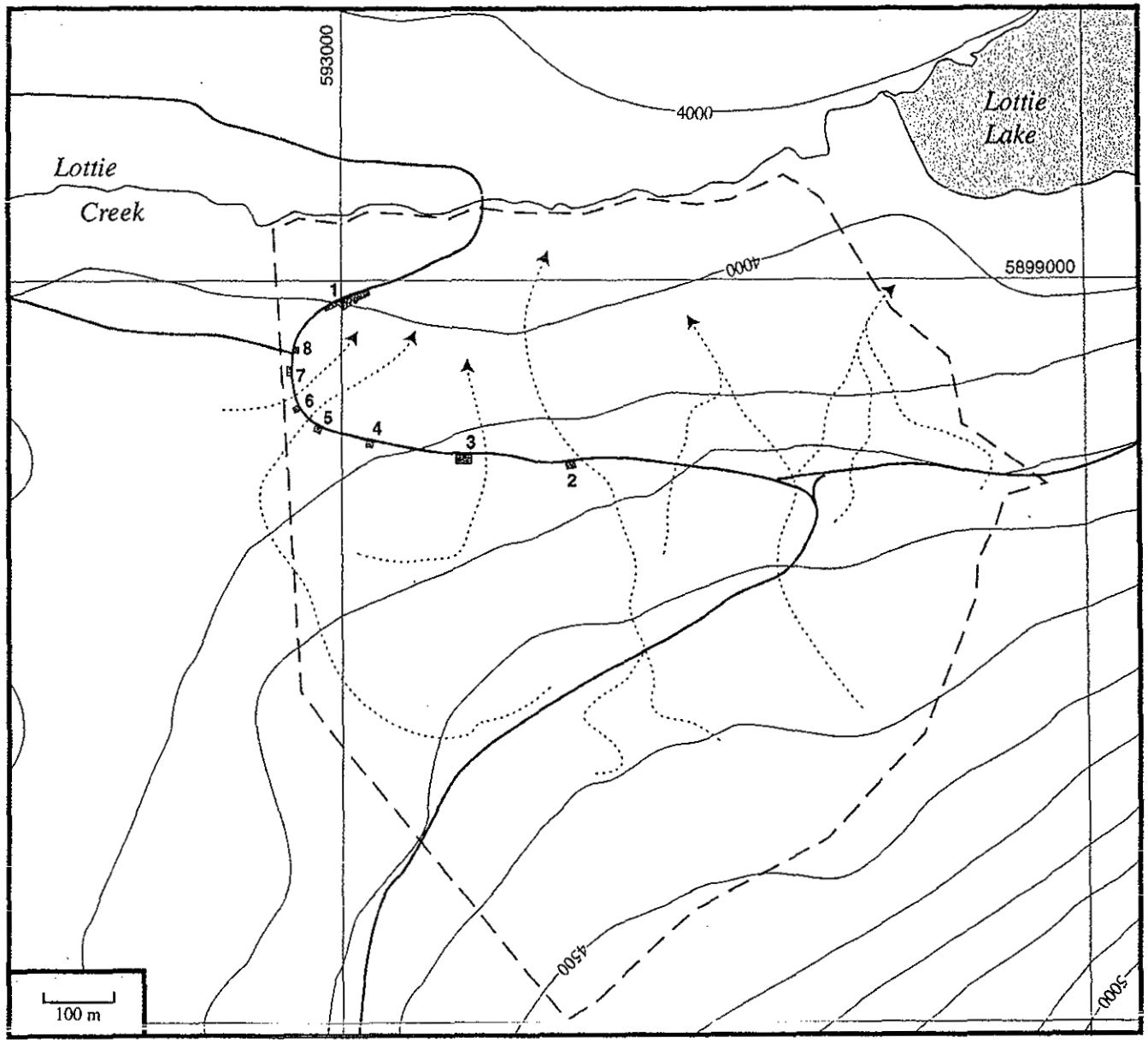


Fig. 28. Trenching sites at the Lottie float site. Trench numbers correspond to profile descriptions. Cut block boundary is shown as the dashed line. Minor modern drainage patterns are also shown.

upslope of the bedrock source. Drilling on the immediate site should verify if this is the case; 2) the mineralized source is several hundred metres to the southwest. The regional ice flow dispersed the sulphide-bearing rocks down-ice, placing them at surface some distance down-ice from the original source. Stagnant ice sitting in Lottie Creek would have melted during the latter stages of deglaciation, possibly during or after the glacial lake that occupied Big Valley Creek had drained. This would have caused oversteepening of the lower slopes of Lottie Creek valley and intense early Holocene erosion likely occurred depositing colluvial fans until vegetation was established in the region. This colluvial deposition would have washed the upper layer of the dispersal train first, carrying it downslope and depositing the sulphide-rich debris directly over bedrock in the bottom of Lottie Creek valley. Further erosion upslope continued to produce debris flows that were deposited in the lower valley. Subsequent downcutting of the colluvial fan by Lottie Creek and its tributaries occurred and is still occurring today. Figure 29 is a model that illustrates the potential two-vector dispersion that affected the Lottie float.

Ketcham Trench

An exposure of iron-cemented glacial sediments and a Cu value of 164 ppm provided the impetus for trenching within the Ketcham Creek area. The exposed section is about 40 m in length, with gossanous material confined along a zone about 1 m thick at various depths for about 30 m in length. The strongest iron-cementation occurs near the base of the section, and was the site of samples #17865 and 17867 (Fig. 30). The section was scraped clean by back-hoe to determine the nature of sulphide distribution in the overburden.

Initial mapping and sampling of the section determined the gossan was contained within a thick sequence of basal lodgement till. Excavation of the section shows otherwise. Although up to 8 m of overburden is exposed along the section face, vertical overburden thickness does not exceed 3 m. The surficial material is colluvium, comprising colluviated till and some sand layers. The iron-cemented gossan zone is, in fact, a wedge-shaped body that occurs within the colluvial stratigraphy, approximately 30 cm thick upslope and almost 45 cm thick near the base (Fig. 31). The sulphide-bearing pebbles are contained only within a single colluvium bed. Bedrock occurs at the base of the section and the colluvium blankets the bedrock, with bedding subparallel to slope.

Vertical sampling profiles were taken along the section face and are summarized in Table 2. This is redundant for finding this specific source, but defining a buried dispersal train in horizontal and vertical profiles is invaluable to tracking down other anomalies in areas with considerably less access to the surface materials. A vertical profile will help

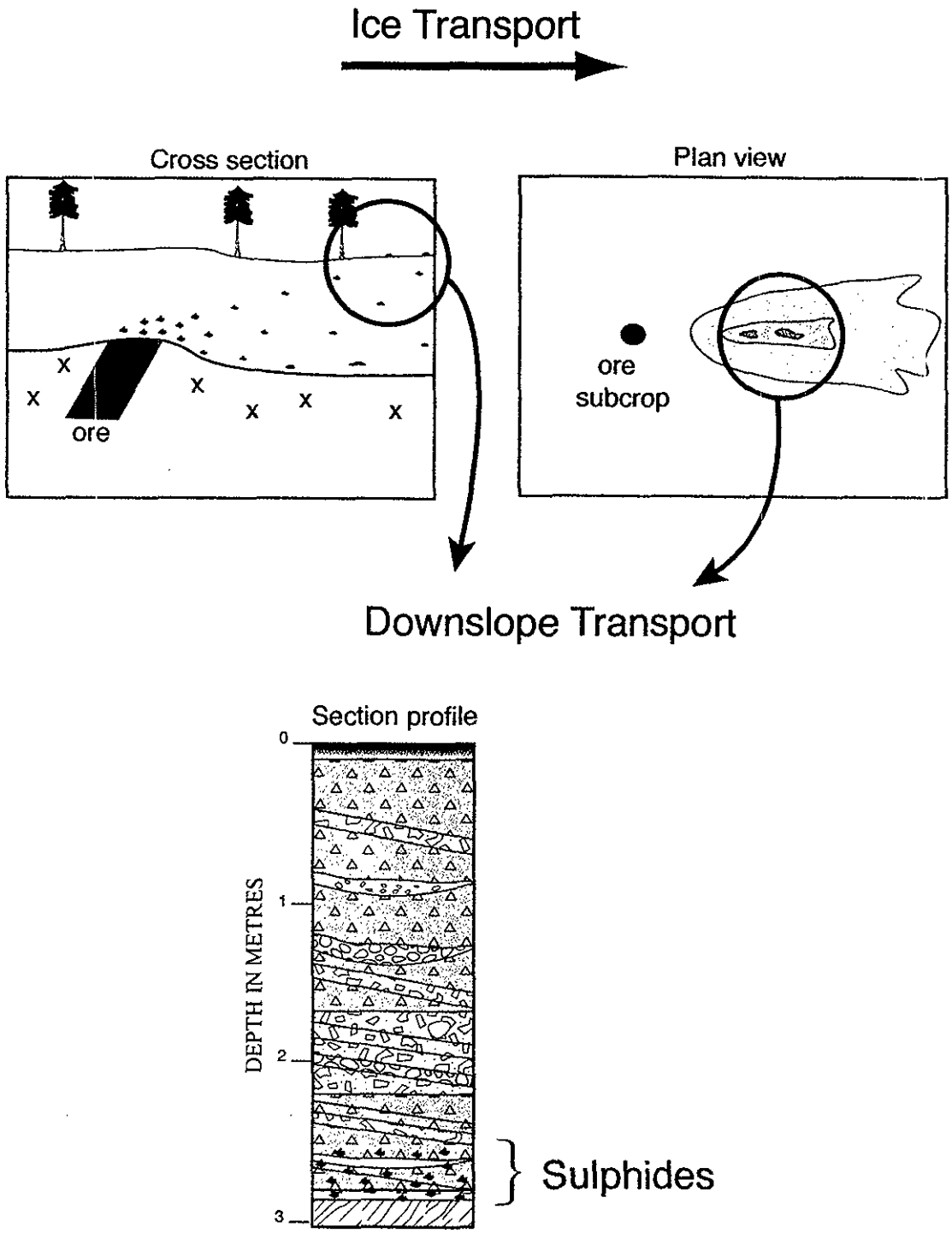


Fig. 29. Model illustrating the possible two-vector process displacing the surface component of a glacial dispersal train and placing them near the bottom portion of a colluvial fan which consists mainly of colluviated till. Glacial dispersal model from Paulen (In press).

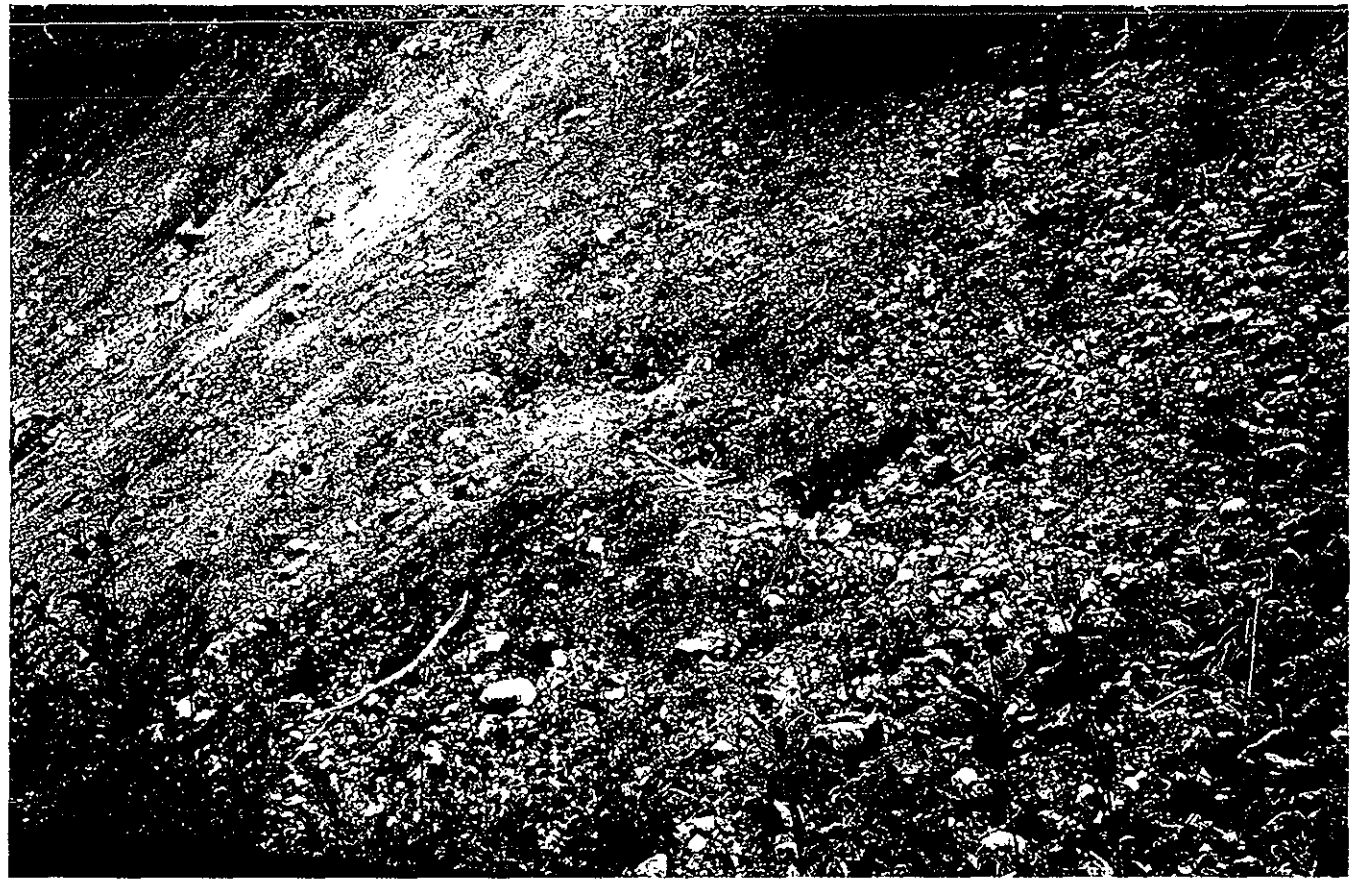


Fig. 30. Gossanous bed exposed in a section south of Ketcham Creek valley and site of the Ketcham anomaly trenching.

Ketcham Trench - Cross Section

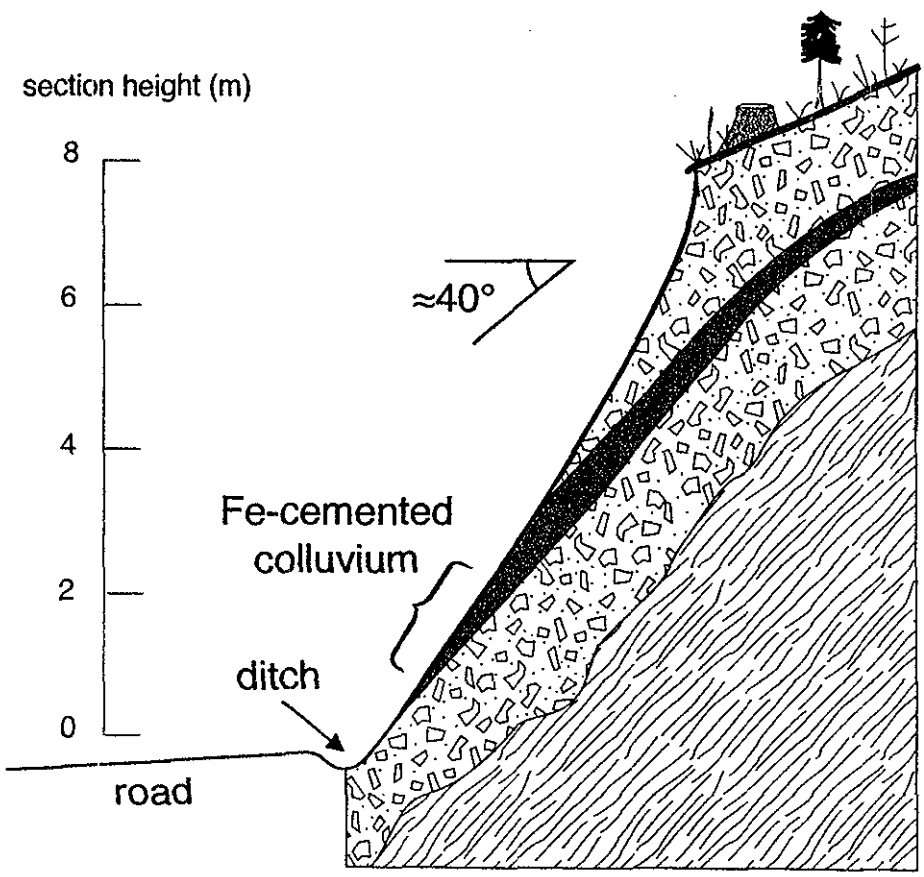


Fig. 31. Cross section of the 'ferracrete' Ketchum anomaly. The sulphide-bearing rocks are contained within a wedge-shaped bed subparallel to the slope and apparent bedrock topography.

establish the rate of diffusion from the mineralized subcrop to the section. A horizontal profile can be used to calculate diffusion rates and how they vary in cross section. Again, this information can be applied to perplexing surface anomalies in order to aid in estimation of local two-vector transport (glacial + hydromorphic) elsewhere in the Slide Mountain Terrane.

	Profile 1	Profile 2	Profile 3
location (footage)	20'	40'	70'
colluvium	14221/14222	18108	14224
gossan	14163	18107	14165
colluvium/till	14223	18106	14225
bedrock	14164	14103	14167

Table 2. Vertical sampling profiles and their respective sample numbers for the Ketcham trench. Footage is measured from the south end of the trench.

DISCUSSION

The additional data collected during the second phase of fieldwork was invaluable in sorting out the complicated ice flow history of the region. Detailed studies of outcrops and fabric data provide a new outlook on the relationship between glacial ice flowing from the Caribou Mountains and ice flowing in the Interior Plateau during peak glacial periods. Although there is absolute proof of northeasterly flowing ice at several sites throughout the property, the northeasterly regional flow interpreted to have affected the Lottie area is strictly speculative and is inferred from the aforementioned sites.

The Tow area is an example where detailed surficial work was necessary to document both the northeasterly regional ice flow and the later local ice flow. Initially, regional work convinced the author that the Tow float did not come from the spectrum target that lies to the southeast. However, fabric analysis and detailed striation measurements may indicate that indeed the spectrum target may be a potential source of the Tow float.

The Lottie float represents a true challenge for sorting out ice-flow and float transport directions. The Lottie is situated within a zone between ice accumulation in the Caribou mountains and regional ice flow from the Interior Plateau. Cirque glaciation on

Two sisters mountain to the south also may have obliterated or deflected a potential dispersal train as well. Detailed ice flow studies in several areas to the north and west provide evidence for a regional northeasterly ice flow direction. There is a possibility that there was an early westerly ice flow parallel to the Lottie Creek and Ketcham Creek valleys but the major ice flow event that scoured the outcrops and formed the landforms is considered to be one of a reverse direction (Fig. 32). This directly contradicts the author's earlier work in the area for Eureka Resources (Paulen, 1999) and provides an example that regional implications cannot be deciphered from a single detailed study area, such as the Lottie.

The Lottie is also an excellent example of the importance of sedimentological observations and the time necessary to make such observations. The fact that the Lottie float occurs within colluvium rather than basal till provides a sobering example of the importance of detailed observations of stratigraphy and sedimentology. Interpretation from a shallow hand dug pit and a quick glance at a backhoe pit in 1999 differs remarkably from the trenching that is described in this report.

RECOMMENDATIONS

As the author's field investigations were being carried out, follow-up sampling at 250 m spacing was being carried out at all the anomalies under the guidance of the author. No further recommendations are warranted until the results of the follow-up sampling are studied. However, the geochemistry for each anomalous area should be treated independently and individual background and threshold values should be calculated before the geochemistry is contour plotted. Vertical sampling profiles carried out during the trenching phase should also be compared to their respective stratigraphic setting, particularly those in trench 1 at the Lottie.

Future recommendations at the Lottie site depend greatly upon the initial drilling results. If the drill results are negative, then continued grid C-horizon till sampling and geophysics should continue to the southwest. The mapped Slide Mountain – Barkerville Terrane thrust contact occurs approximately 1 km to the southwest as well. If the Lottie float is indeed from a Slide Mountain Terrane source, it is from a source less than 1 km away. If the distance to source exceeds 400 m from the Lottie discovery site, then difficulties may be encountered in Big Valley Creek which has thick glaciofluvial and glaciolacustrine sequences that may have either obliterated or buried the glacial dispersal train. Low altitude airborne and/or ground geophysics may be necessary to find the bedrock source if it underlies low-lying surface topography (< 1230 m elevation).

Fig. 32. Streamlined landforms on the southern slope of Mount Tom highlighted by the snow lying in the troughs. The region was regionally glaciated by ice flowing towards the northeast. Mount Tom is situated between Big Valley and Ketcham creeks, just west of the current property boundary.

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Fig. 11. The Stephanie anomaly, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation data from follow-up studies. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

Fig. 12. Regional till sample pit #17834 where a value of 366 ppm Cu was obtained from the <63μm fraction (Sam anomaly). A thin sorted layer between the two till units is gossanous and iron-cemented.

Fig. 13. The surficial geology profile at the Sam anomaly, northwest of 14 Mile Lake.

Fig. 14. The Sam anomaly, northwest of 14 Mile Lake, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. The grey triangle marks an area where the basal till overlies several metres of advance outwash pebbly sand and gravels. Ice flow directions inferred from regional surficial mapping. Scale 1:10 000.

Fig. 15. An example of a bullet-shaped boulder exposed in a section of basal lodgement till. Such features are measured to indicate the direction of glacial ice flow that aligned the boulder and deposited it within the till. This boulder is located southwest of the Khan anomaly.

Fig. 16. The Neil anomaly, north of 14 Mile Lake, discovered by regional till sampling. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. The bidirectional arrow indicates an observed bullet-shaped boulder. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

Fig. 17. The Tow anomaly, west of the Bowron River. Cu geochemistry (ppm) plotted with striation and fabric data from follow-up studies. The arrows indicate observed bullet-shaped boulders. Ice flow directions from local striae and regional surficial mapping. Scale 1:10 000.

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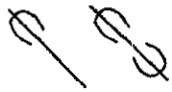
Map and Section Profile Legend


Striae (direction of ice flow known, unknown)

Cross striae (1=oldest)


Drumlinoid and streamlined features parallel to ice flow


Observed bullet-shaped boulders

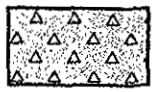
Pebble fabric


Cu (ppm) - till sample (high & low value)


Cu (ppm) - moss mat sample (high & low value)


Cu (ppm) - bedrock or float sample (high & low value)


organic material (A-horizon)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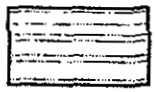
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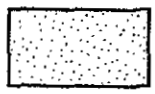
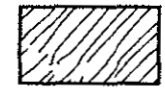

sand


gravel


colluvium


basal till


bedrock

Striation Data, Eureka Property 2000

Station	UTM ZONE	EASTING	NORTHING	ELEVATION (m)	SET 1 (OLDEST)	SET 2	SET 3
2000RCP-04	10U	591947	5900741	1449	210 or 030		
2000RCP-07	10U	590206	5901598	1183	290 or 110		
2000RCP-10	10U	582547	5901689	1453	055		
2000RCP-13	10U	590134	5903596	1098	315 or 135		
2000RCP-14	10U	587400	5902341	1299	035	220	
2000RCP-15	10U	587399	5902183	1311	065	40	
2000RCP-16	10U	587288	5902151	1324	240 or 060*	217 or 037*	
2000RCP-17	10U	586956	5901911	1363	045	195 or 015	
2000RCP-18	10U	586298	5901708	1420	242 or 062		
2000RCP-19	10U	591662	5899432	1142	230 or 050*	300 or 120*	
2000RCP-21	10U	589067	5907385	1184	040	356	
2000RCP-25	10U	590855	5918405	1187	236 or 056		
2000RCP-26	10U	590097	5918208	1207	300 or 120		
2000RCP-29	10U	583457	5920258	1060	240 or 060		
2000RCP-30	10U	588610	5915926	1099	052		
2000RCP-33	10U	586280	5901890	1442	230 or 050*	248*	
2000RCP-34	10U	583675	5918985	1427	060		
2000RCP-35	10U	583359	5918739	1417	060		
2000RCP-36	10U	582931	5918552	1333	060		
2000RCP-37	10U	582435	5918292	1284	310 or 130	60	
2000RCP-40	10U	593459	5914800	1073	318 or 138		
2000RCP-44	10U	592342	5902186	1364	215 or 035		
2000RCP-46	10U	591924	5901951	1389	210 or 030		
2000RCP-53	10U	592068	5903208	1264	212 or 032	285 or 105	
2000RCP-54	10U	583973	5901999	1426	041		
2000RCP-55	10U	583834	5902061	1432	046		
2000RCP-56	10U	583748	5902119	1448	335	45	
2000RCP-60	10U	592072	5903571	1097	305		
2000RCP-62	10U	586523	5901841	1400	046	30	245 or 065
2000RCP-63	10U	586711	5901936	1382	038		
2000RCP-64	10U	586819	5901939	1373	231 or 051		
2000RCP-66	10U	586999	5901913	1358	232 or 052		
2000RCP-67	10U	587029	5901916	1355	045		
2000RCP-68	10U	587179	5902006	1338	244 or 064		
2000RCP-69	10U	587261	5902135	1324	212 or 032		
2000RCP-71	10U	587328	5902159	1316	052		
2000RCP-72	10U	587389	5902170	1310	225 or 045		
2000RCP-74	10U	587395	5902348	1295	237 or 057	35	
2000RCP-78	10U	588065	5901390	1436	192 or 012	42	275 or 095
2000RCP-79	10U	588102	5901417	1439	195 or 015		
2000RCP-80	10U	588147	5901447	1434	220 or 040		
2000RCP-81	10U	588192	5901490	1417	222 or 042		
2000RCP-83	10U	589851	5901430	1297	235 or 055		
2000RCP-85	10U	590462	5900515	1248	230 or 050	275 or 095	
2000RCP-93	10U	589920	5907287	1220	255 or 075*	185 or 005*	
2000RCP-94	10U	589704	5907287	1218	253 or 073*	355 or 175*	
2000RCP-95	10U	589090	5907482	1213	003*	204 or 024*	

Striation Data, Eureka Property 2000

Station	UTM ZONE	EASTING	NORTHING	ELEVATION (m)	SET 1 (OLDEST)	SET 2	SET 3
2000RCP-96	10U	589060	5907503	1204	262		
2000RCP-99	10U	585919	5906410	1115	356 or 176		
2000RCP-101	10U	591151	5918004	1178	242 or 064		
2000RCP-104	10U	592981	5916889	1271	305 or 125		
2000RCP-105	10U	592948	596902	1267	315	285 or 105	
2000RCP-106	10U	592432	5916997	1272	242 or 062		
2000RCP-107	10U	592276	5917049	1290	060	265 or 085	
2000RCP-112	10U	598020	5909916	1395	015		
2000RCP-113	10U	597948	5909867	1391	025		
2000RCP-114	10U	597946	5909923	1398	020		
2000RCP-115	10U	597965	5909930	1399	015		
2000RCP-116	10U	595570	5917262	1136	315 or 135		
2000RCP-117	10U	592329	5913236	1338	285		
2000RCP-118	10U	598383	5909936	1344	011*	346*	
2000RCP-120	10U	598920	5911212	1239	335 or 155		
2000RCP-121	10U	598735	5911412	1216	315 or 135		
2000RCP-122	10U	592085	5900602	1458	237 or 057		
2000RCP-123	10U	592082	5900635	1471	235 or 055	197 or 017	
2000RCP-124	10U	592114	5900566	1463	200 or 020		
2000RCP-125	10U	592150	5900498	1471	245 or 065		
2000RCP-126	10U	593041	5900078	1432	241 or 061		
2000RCP-127	10U	593117	5900102	1449	245 or 065*	185 or 005*	
2000RCP-128	10U	593132	5900112	1449	245 or 065	224 or 044	323 or 140
2000RCP-129	10U	593104	5900154	1469	245 or 065	308 or 128	
2000RCP-130	10U	592939	5900312	1491	224 or 044		

* Age relationship between striae sets is unknown

FABRIC DATA

Site (anomaly)	Fabric	n	Mean Azimuth	Mean Plunge	E1	E3	K
Ketcham	R-1	50	226.2	0.9	0.707	0.061	0.84
Ketcham	R-2	50	284.3	3.5	0.744	0.066	1.27
Khan	R-3	106	033.6	7.9	0.560	0.104	0.44
FIP	R-4	50	012.9	11.2	0.765	0.181	1.18
West Lottie	R-5	100	047.9	0.4	0.451	0.144	0.10
West Lottie	R-6	50	040.4	11.6	0.634	0.038	0.31
Sam	R-7	50	033.7	6.2	0.531	0.115	0.36
Sam	R-8	50	263.7	1.2	0.628	0.076	0.55
Neil	R-9	50	174.0	0.6	0.606	0.071	0.42
Tow	R-10	50	132.0	6.8	0.541	0.117	0.43
Tow	R-11	50	138.0	7.6	0.528	0.089	0.22
Neil	R-12	50	055.3	8.5	0.673	0.074	0.79
Lottie Trench 3	R-13	51	060.0	9.9	0.584	0.115	0.68

Summary of statistics, fabric analysis sites. E1 and E3 are primary and tertiary eigenvectors, K is the clustering distribution.

Fabric R-1

Azimuth	Plunge
285	15
225	05
048	14
230	10
203	06
057	29
237	10
090	04
210	07
248	10
165	05
170	05
040	06
062	13
185	45
215	06
168	11
001	27
221	08
074	04
065	02
344	21
245	13
130	12
036	33
256	17
247	13
189	05
350	12
238	11
230	24
035	07
034	25
035	28
234	13
217	10
052	00
243	13
099	12
350	07
055	06
236	06
036	08
043	07
022	15
237	00
281	11
160	05
236	16
256	15

Fabric R-2

Azimuth	Plunge
132	07
086	20
094	08
260	09
255	16
242	21
304	05
110	10
063	16
072	11
295	05
115	06
286	04
275	14
287	14
116	06
145	13
255	09
260	10
236	09
080	04
114	12
105	10
159	07
077	12
143	02
328	10
097	06
299	22
126	02
130	09
272	21
275	03
263	09
312	16
315	17
315	42
302	23
319	24
300	05
092	06
220	01
223	13
290	25
270	15
108	46
281	05
191	16
120	23
288	19

Fabric R-4

Azimuth	Plunge
182	06
195	06
224	01
033	17
309	04
034	18
195	02
193	05
187	04
011	12
220	06
036	18
042	08
032	26
358	10
011	03
354	25
155	03
020	05
045	16
185	02
034	21
006	19
001	07
096	31
337	19
348	03
334	05
033	25
036	20
035	17
015	14
038	27
002	06
342	14
041	41
016	20
279	09
183	10
325	14
338	17
208	09
358	29
174	08
182	05
028	65
129	02
014	07
024	13
055	17

Fabric R-3

Azimuth	Plunge	Azimuth	Plunge
071	04	232	13
130	05	051	21
210	03	248	02
227	12	179	31
262	05	260	11
005	29	183	18
019	11	210	33
076	14	011	10
120	05	066	08
358	14	002	16
295	09	150	00
231	04	230	09
002	07	346	14
012	18	040	24
118	14	190	31
243	01	333	16
107	53	034	29
349	18	025	25
040	13	275	16
145	02	282	22
005	36	113	18
120	43	355	12
087	10	072	36
159	12	224	62
010	15	352	32
033	11	035	16
012	16	001	34
026	15	017	07
223	05	060	03
047	09	234	13
196	08	225	08
127	10	160	66
046	13	143	02
067	09	081	30
302	07	269	06
086	24	218	00
171	03	246	19
269	04	349	32
090	06	172	21
316	14	005	06
016	44	261	06
342	14	036	24
013	05	278	14
037	04	210	19
022	32	022	24
255	14	019	07
218	16	243	45
016	07	006	16
085	05	110	07
295	09	266	12
105	18	170	09
014	43	052	27
030	24	359	08

Fabric R-6

Azimuth	Plunge
223	01
074	15
196	02
017	10
330	05
344	19
066	08
031	13
019	16
331	06
349	19
079	13
085	07
155	04
344	24
357	04
250	06
012	20
084	11
092	06
271	02
086	10
043	12
041	11
081	08
180	
039	10
019	16
042	03
322	09
322	17
286	14
318	26
334	35
068	18
035	01
033	34
206	00
035	16
045	11
095	05
136	16
052	10
047	08
036	17
054	14
053	19
039	06
038	13
036	07

Fabric R-5

Azimuth	Plunge	Azimuth	Plunge
103	02	087	41
196	04	264	04
234	10	075	19
002	15	136	16
294	21	192	26
095	42	172	24
279	05	291	11
223	35	116	16
088	12	182	11
339	14	317	34
304	11	315	04
338	14	221	26
345	06	231	25
324	10	156	42
015	10	218	24
279	01	216	11
038	16	186	17
002	55	209	07
194	41	274	04
040	23	168	16
050	10	238	04
065	18	147	17
043	16	196	68
053	04	054	03
234	14	244	07
240	06	182	09
040	16	147	22
044	39	179	06
312	20	313	24
190	09	244	09
032	14	098	18
082	26	089	36
121	21	316	39
209	01	327	11
130	32	086	31
345	36	324	14
156	35	205	24
326	34	213	16
288	44	206	34
078	04	039	21
328	10	164	04
038	15	060	11
052	13	137	31
330	29	109	09
054	17	285	15
190	70	064	12
159	07	128	17
210	13	111	49
106	04	317	13
090	05	212	48

Fabric R-7

Azimuth	Plunge
158	02
082	04
300	25
350	65
088	30
271	21
014	10
322	28
236	13
200	06
334	22
169	14
094	11
099	08
077	34
008	45
194	10
241	10
036	08
317	25
242	13
239	10
184	03
019	09
078	31
135	00
165	04
028	57
198	01
033	31
019	25
067	14
204	22
196	03
069	06
260	07
098	10
223	11
343	24
200	45
142	05
059	08
064	14
178	00
167	03
315	14
027	35
177	11
229	12
252	10

Fabric R-8

Azimuth	Plunge
214	04
168	15
266	10
226	02
226	13
034	38
274	22
296	20
283	27
061	34
244	11
256	04
323	18
259	03
277	02
075	05
079	04
332	02
073	22
341	06
056	24
223	56
324	14
269	17
324	11
261	03
140	06
054	09
152	04
251	04
255	07
244	14
119	00
244	06
054	07
232	03
269	06
084	21
244	06
266	24
333	19
031	08
082	02
063	18
134	24
144	11
084	17
135	04
318	15
114	25

Fabric R-9

Azimuth	Plunge
223	35
039	05
165	10
117	04
218	11
221	10
212	12
243	11
156	11
174	32
218	09
350	15
200	07
328	10
232	23
335	03
148	05
139	11
184	12
251	22
003	10
010	17
352	14
322	36
183	18
290	20
190	22
218	18
173	10
340	25
023	47
296	23
280	40
210	30
290	29
158	16
338	24
330	20
155	16
294	19
185	21
250	12
315	06
032	05
020	19
309	11
330	08
003	15
130	06
183	11

Fabric R-10

Azimuth	Plunge
071	14
298	54
282	03
326	26
169	20
155	55
083	04
355	01
122	04
092	20
115	19
112	20
109	66
069	08
167	16
141	04
185	40
272	09
252	01
159	16
099	24
047	13
134	26
328	14
345	41
145	15
300	10
246	04
322	26
069	21
315	15
167	06
153	16
062	36
063	04
350	05
247	09
345	30
325	05
180	15
176	26
084	27
294	04
096	15
144	10
351	06
004	03
180	10
209	05
271	06

Fabric R-11

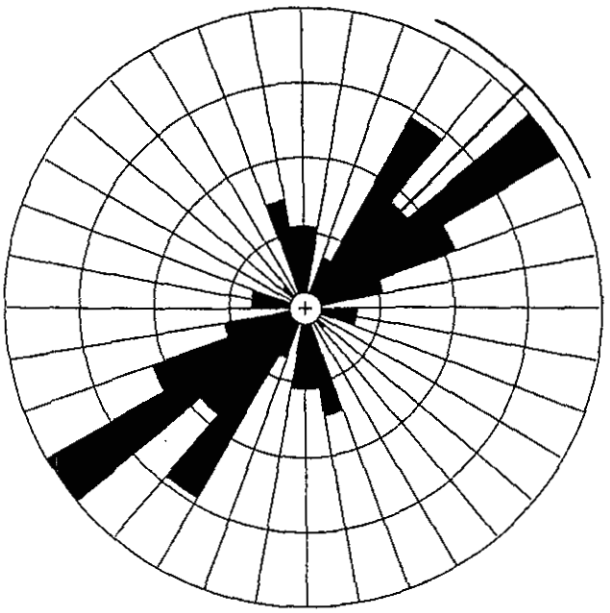
Azimuth	Plunge
004	14
149	10
105	16
022	25
308	10
129	30
090	29
194	43
086	28
350	04
118	21
202	11
310	12
115	22
332	01
303	21
043	25
229	00
218	13
290	10
224	14
102	08
105	26
093	25
358	00
182	09
045	31
296	08
075	24
335	16
332	07
343	01
160	20
023	23
244	08
182	22
125	12
047	23
087	40
106	28
339	01
024	09
029	34
155	45
283	07
155	12
332	14
240	08
315	05
132	00

Fabric R-12

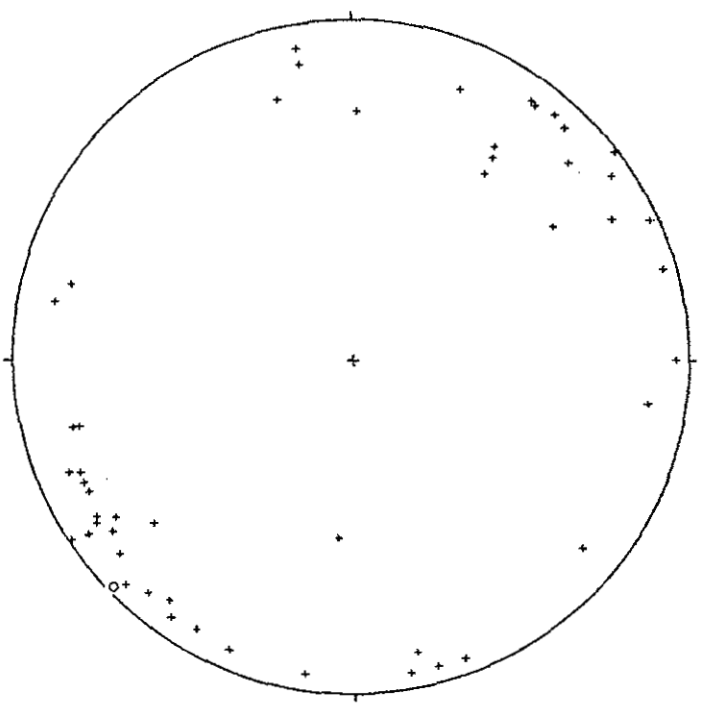
Azimuth	Plunge
258	17
262	11
254	09
219	07
085	10
126	01
054	05
081	05
205	21
074	10
190	11
010	14
145	19
074	50
040	30
064	10
220	01
160	03
336	08
251	11
079	06
259	06
072	14
022	07
239	09
006	11
091	12
080	29
211	08
130	32
065	15
248	17
350	10
014	15
033	11
081	09
065	24
242	15
228	04
076	19
075	29
342	34
331	10
040	34
059	25
031	34
020	10
046	11
050	00
057	09

Fabric R-13

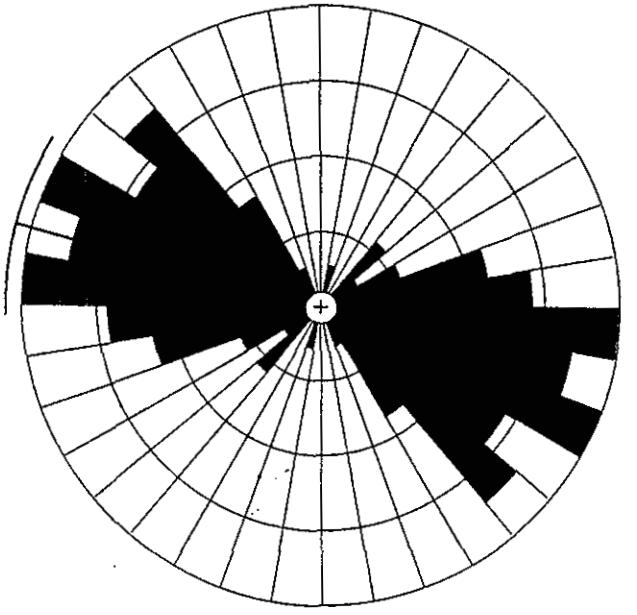
Azimuth	Plunge
293	54
092	09
219	14
043	33
271	39
169	11
331	46
168	03
080	31
045	24
020	36
006	06
083	13
060	44
042	36
210	22
329	14
075	11
258	04
116	09
214	19
044	16
075	11
068	20
224	06
034	11
035	01
051	10
325	15
061	29
079	11
102	26
292	07
262	00
014	81
025	01
280	05
076	09
316	20
031	34
210	22
082	04
286	14
004	21
294	06
270	01
221	08
049	09
028	19
174	14
100	17



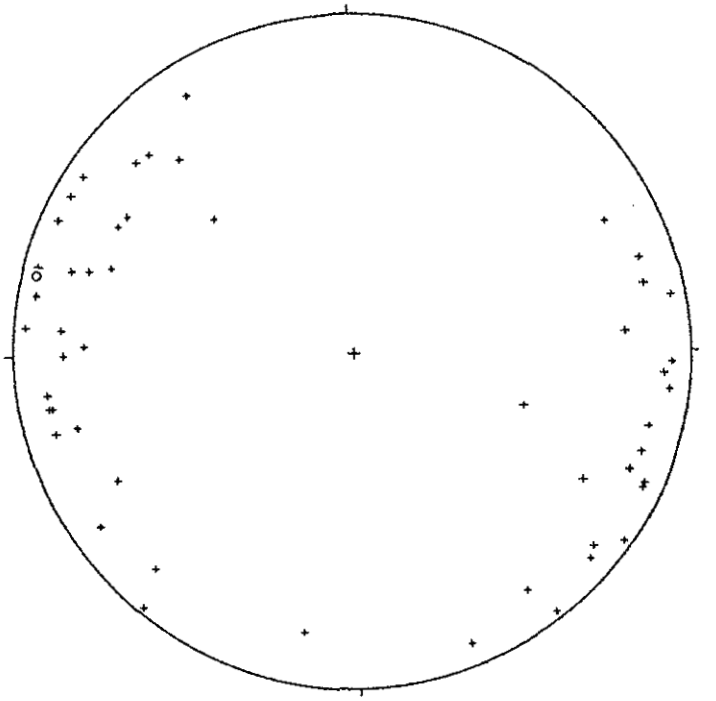
Fabric R-1 (sample 17553)	Statistics
N = 50	Vector Mean = 45.4
Class Interval = 10 degrees	Conf. Angle = 20.38
Maximum Percentage = 22.0	R Magnitude = 0.510
Mean Percentage = 8.33 Standard Deviation = 5.71	Rayleigh = 0.0000



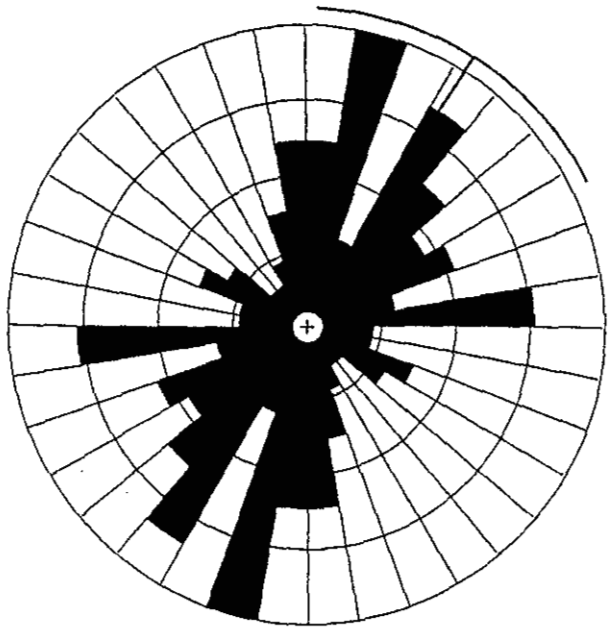
Data	Schmidt Equal Area Projection	Statistics
+ Ketcham Creek, Fabric R-1		o Mean Lineation Vector 226.2 0.9
		E1 = 0.707 E2 = 0.231 E3 = 0.061
		r1 = 1.12 r2 = 1.33 K = 0.84
	N = 50	s. var. = 0.764 Rbar = 0.236



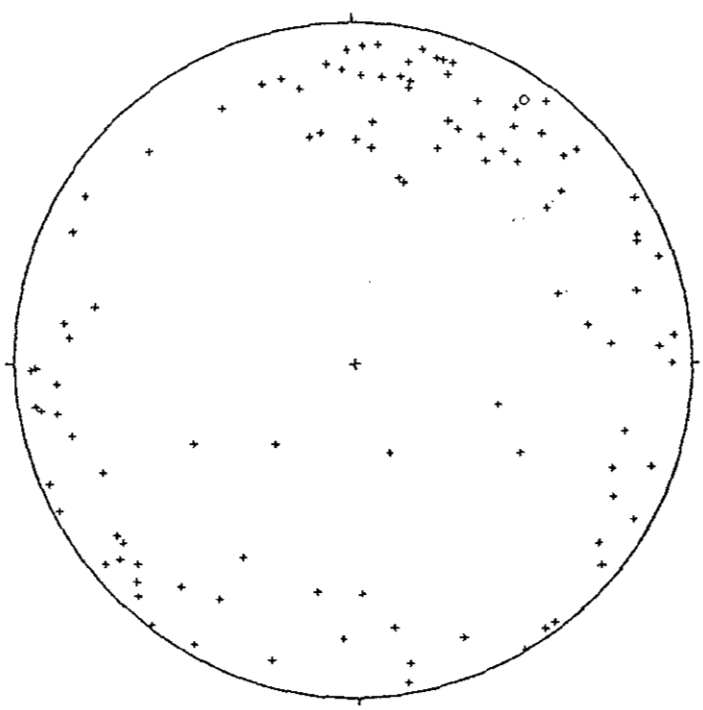
Fabric R-2 (sample 18048)	Statistics
N = 50	Vector Mean = 284.9
Class Interval = 10 degrees	Conf. Angle = 16.96
Maximum Percentage = 14.0	R Magnitude = 0.594
Mean Percentage = 7.69 Standard Deviation = 4.51	Rayleigh = 0.0000



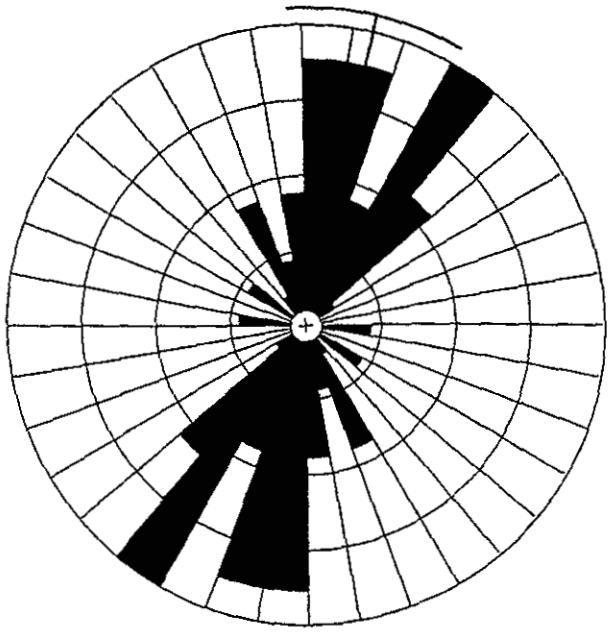
Data	Schmidt Equal Area Projection	Statistics
+ Fabric R-2, Ketcham Creek		○ Mean Lineation Vector 284.3 3.5 E1 = 0.744 E2 = 0.191 E3 = 0.066 r1 = 1.36 r2 = 1.07 K = 1.27 s. var. = 0.743 Rbar = 0.257
	N = 50	



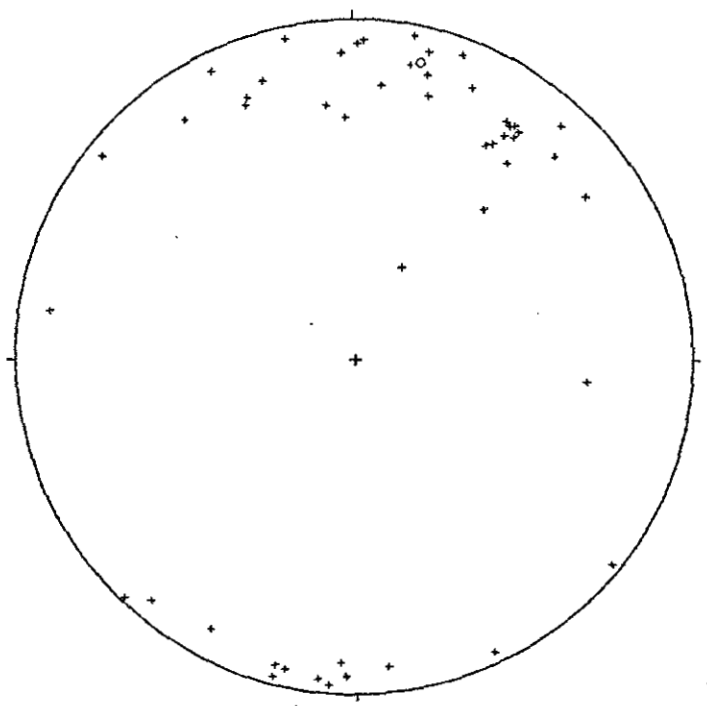
Khan Anomaly, Fabric R-3	Statistics
N = 106	Vector Mean = 32.3
Class Interval = 10 degrees	Conf. Angle = 30.32
Maximum Percentage = 12.3	R Magnitude = 0.251
Mean Percentage = 5.56 Standard Deviation = 2.99	Rayleigh = 0.0013



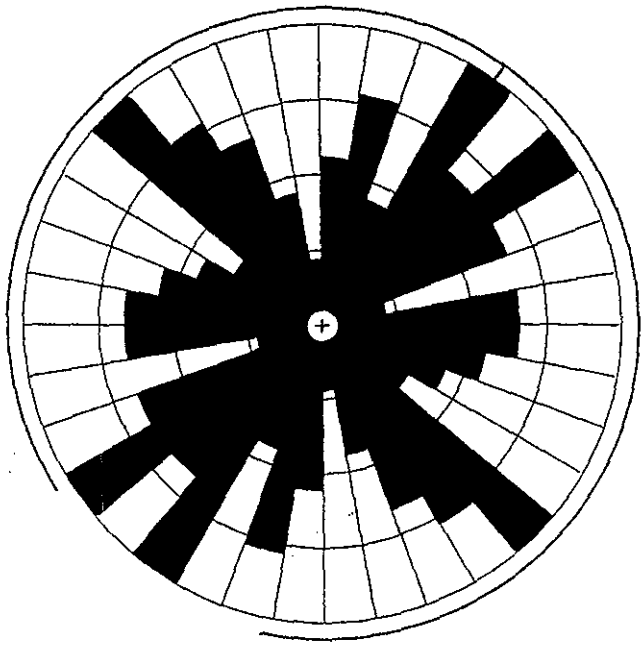
Data	Schmidt Equal Area Projection	Statistics
+ Khan Anomaly, Fabric R-3		○ Mean Lineation Vector 33.6 7.9
		E1 = 0.560 E2 = 0.336 E3 = 0.104
		r1 = 0.51 r2 = 1.17 K = 0.44
	N = 106	s. var. = 0.684 Rbar = 0.316



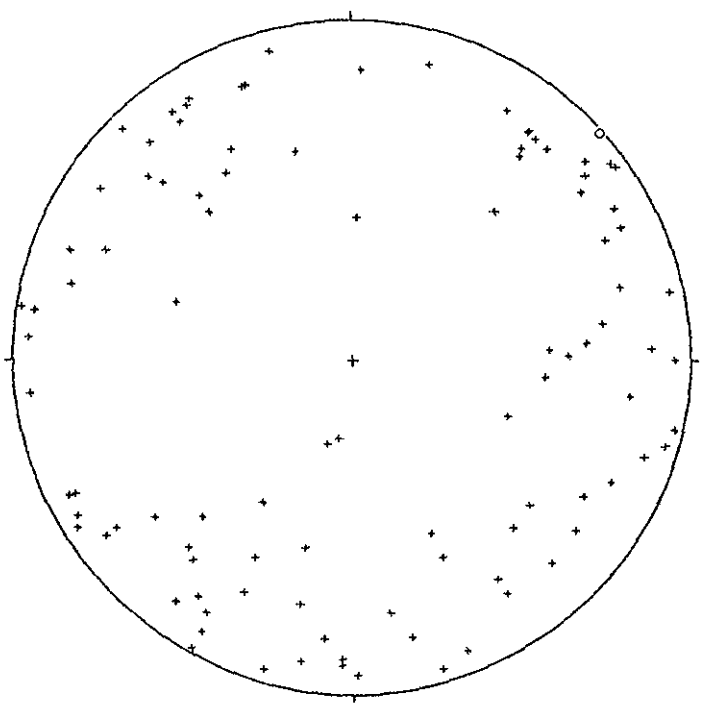
Fabric R-4 (sample 18001)	Statistics
N = 50	Vector Mean = 13.7
Class Interval = 10 degrees	Conf. Angle = 16.26
Maximum Percentage = 18.0	R Magnitude = 0.613
Mean Percentage = 8.33 Standard Deviation = 5.52	Rayleigh = 0.0000



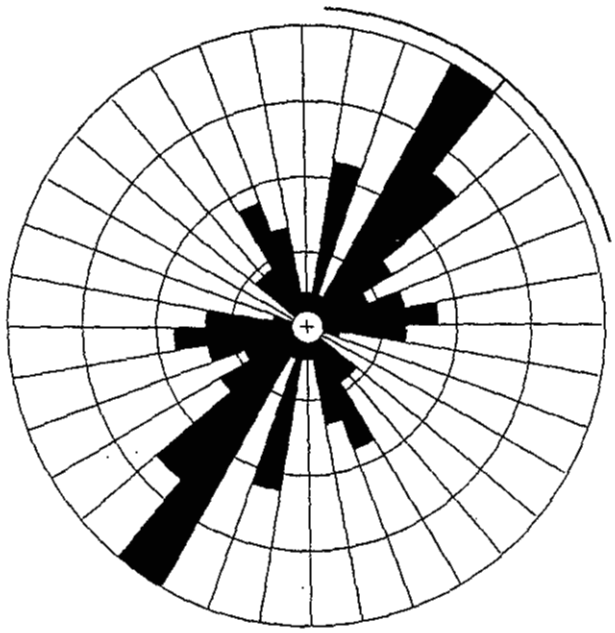
Data	Schmidt Equal Area Projection	Statistics
+ FIP Anomaly Fabric R-4		○ Mean Lineation Vector 12.9 11.2 E1 = 0.765 E2 = 0.181 E3 = 0.054 r1 = 1.44 r2 = 1.22 K = 1.18 s. var. = 0.603 Rbar = 0.397
	N = 50	



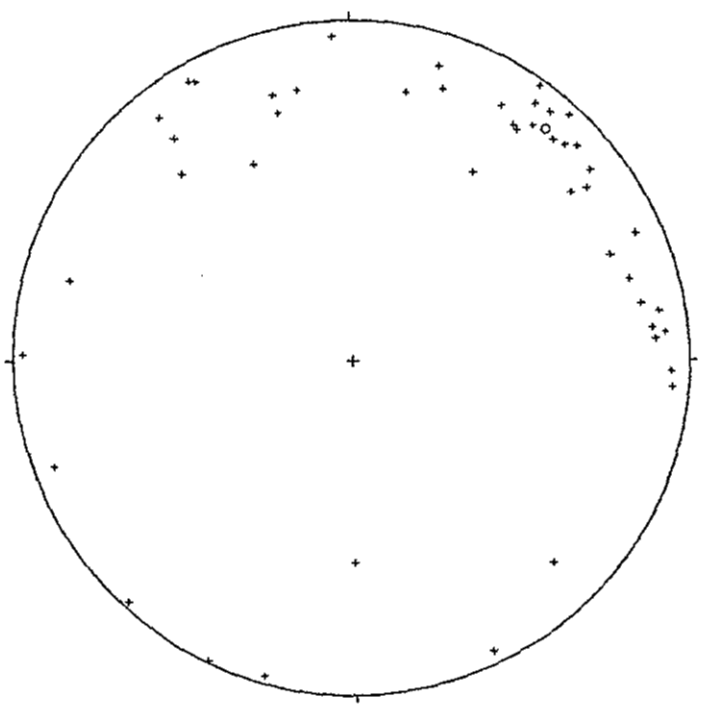
R-5 Fabric, lower till combined	Statistics
N = 100	Vector Mean = 35.7
Class Interval = 10 degrees	Conf. Angle = 157.23
Maximum Percentage = 9.0	R Magnitude = 0.051
Mean Percentage = 5.56 Standard Deviation = 2.14	Rayleigh = 0.7714



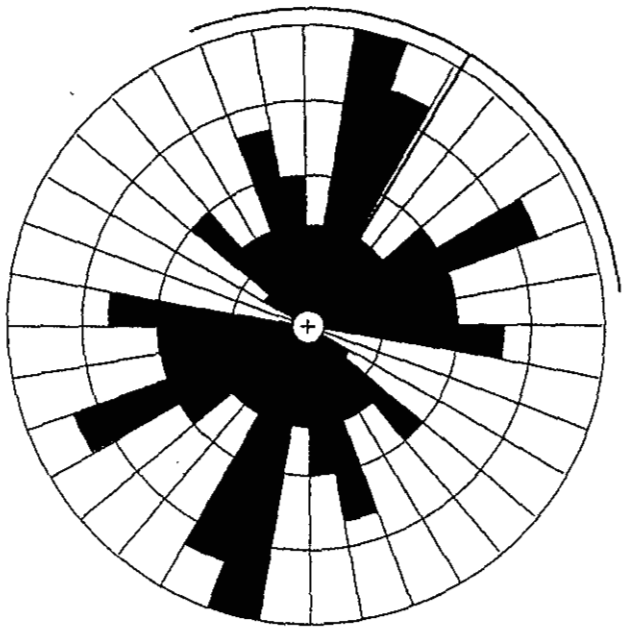
Data	Schmidt Equal Area Projection	Statistics
+ West Lottie, Fabric R-5		o Mean Lineation Vector 47.9 0.4
		E1 = 0.451 E2 = 0.405 E3 = 0.144
		r1 = 0.11 r2 = 1.04 K = 0.10
	N = 100	s. var. = 0.679 Rbar = 0.321



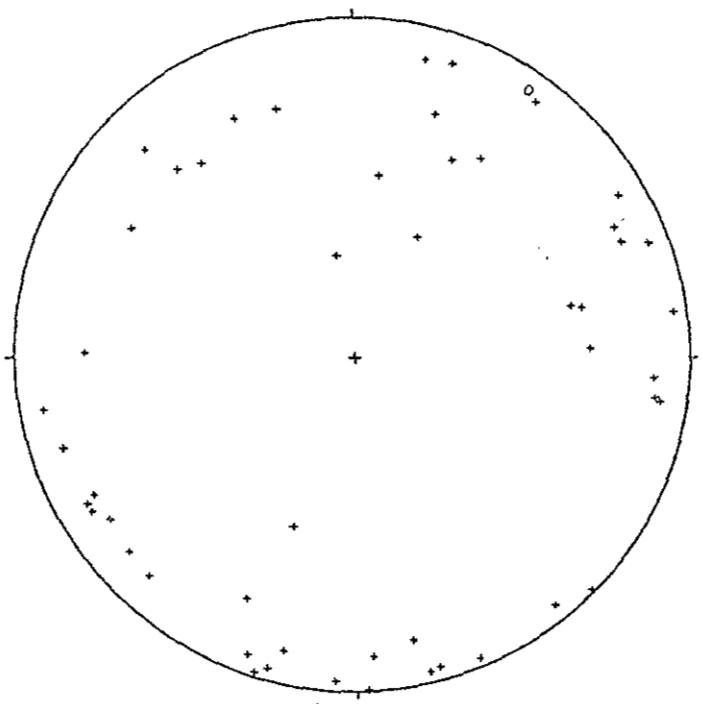
Fabric R-6 (sample 18155)	Statistics
N = 50	Vector Mean = 39.5
Class Interval = 10 degrees	Conf. Angle = 35.39
Maximum Percentage = 18.0	R Magnitude = 0.309
Mean Percentage = 6.25 Standard Deviation = 4.24	Rayleigh = 0.0085



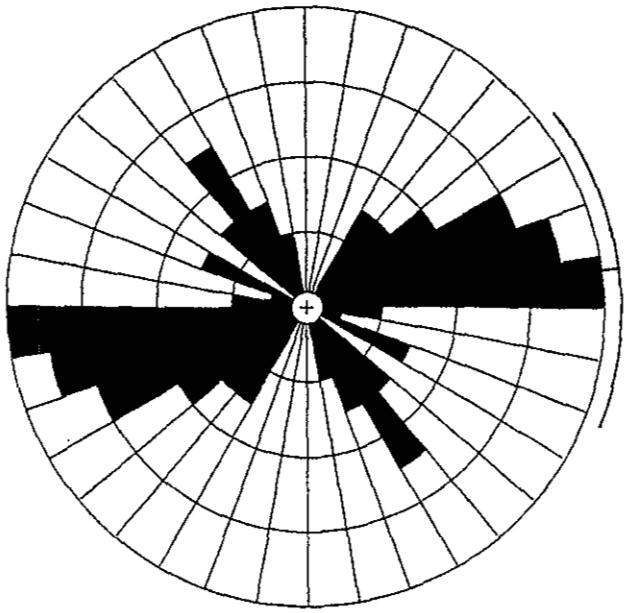
Data	Schmidt Equal Area Projection	Statistics
+ West Lottie, Fabric R-6		o Mean Lineation Vector 40.4 11.6 E1 = 0.634 E2 = 0.328 E3 = 0.038 r1 = 0.66 r2 = 2.15 K = 0.31 s. var. = 0.459 Rbar = 0.541
	N = 49	



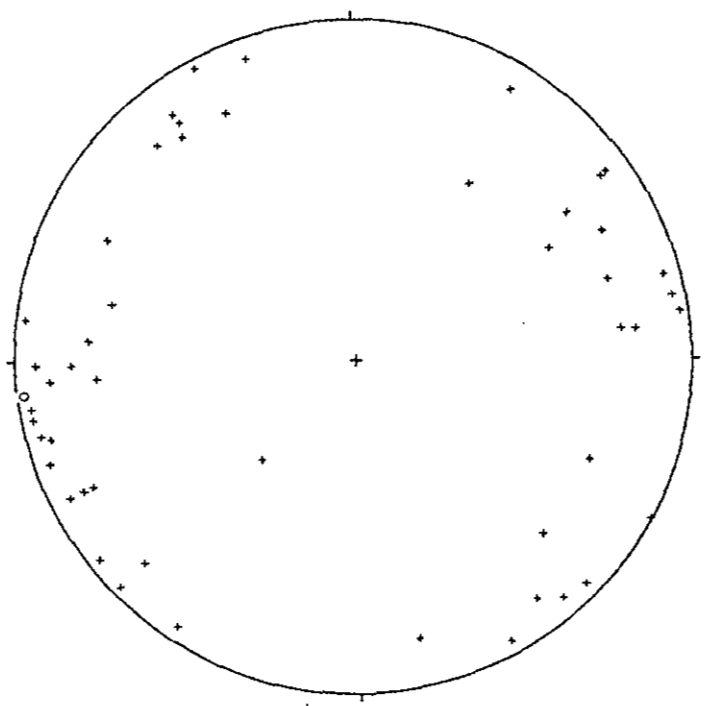
Fabric R-7 (sample 17834)	Statistics
N = 50	Vector Mean = 31.3
Class Interval = 10 degrees	Conf. Angle = 52.49
Maximum Percentage = 12.0	R Magnitude = 0.213
Mean Percentage = 6.25 Standard Deviation = 2.68	Rayleigh = 0.1033



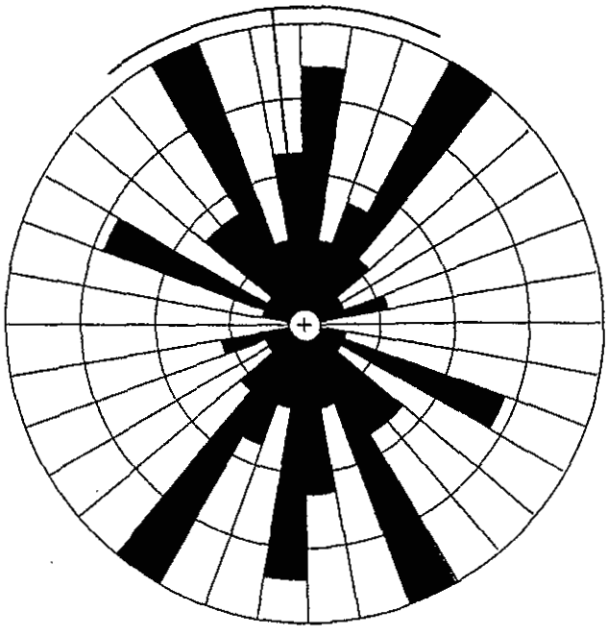
Data	Schmidt Equal Area Projection	Statistics
+ Fabric R-7 (lower till)		○ Mean Lineation Vector 33.7 6.2 E1 = 0.531 E2 = 0.353 E3 = 0.115 r1 = 0.41 r2 = 1.12 K = 0.36 s. var. = 0.707 Rbar = 0.293
	N = 50	



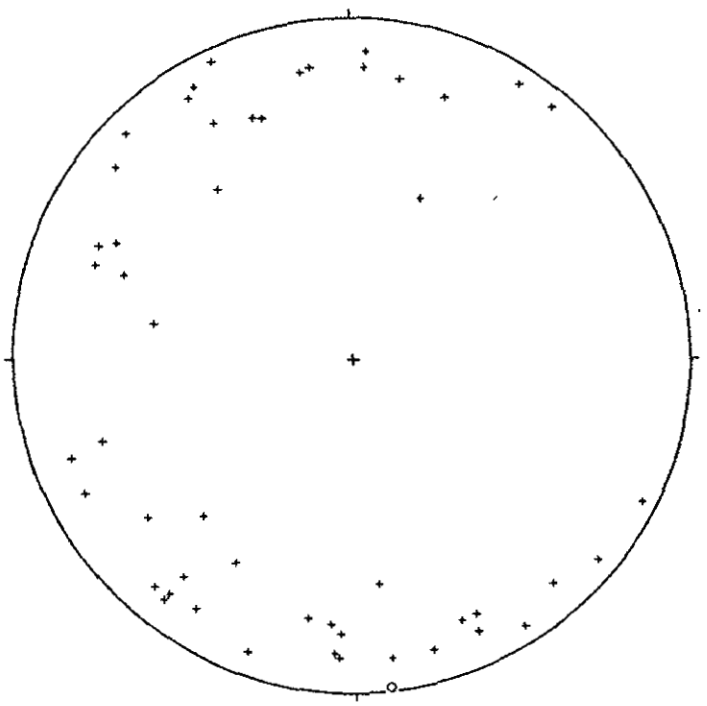
Fabric R-8 (upper till unit)	Statistics
N = 50	Vector Mean = 82.6
Class Interval = 10 degrees	Conf. Angle = 30.16
Maximum Percentage = 16.0	R Magnitude = 0.359
Mean Percentage = 7.69 Standard Deviation = 4.07	Rayleigh = 0.0016



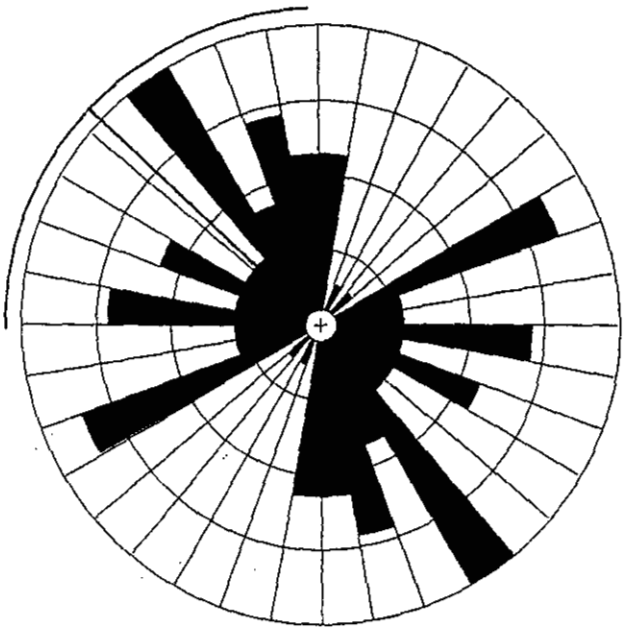
Data	Schmidt Equal Area Projection	Statistics
+ Fabric R-8 (upper till)		o Mean Lineation Vector 263.7 1.2 E1 = 0.628 E2 = 0.297 E3 = 0.076 r1 = 0.75 r2 = 1.37 K = 0.55 s. var. = 0.740 Rbar = 0.260
	N = 50	



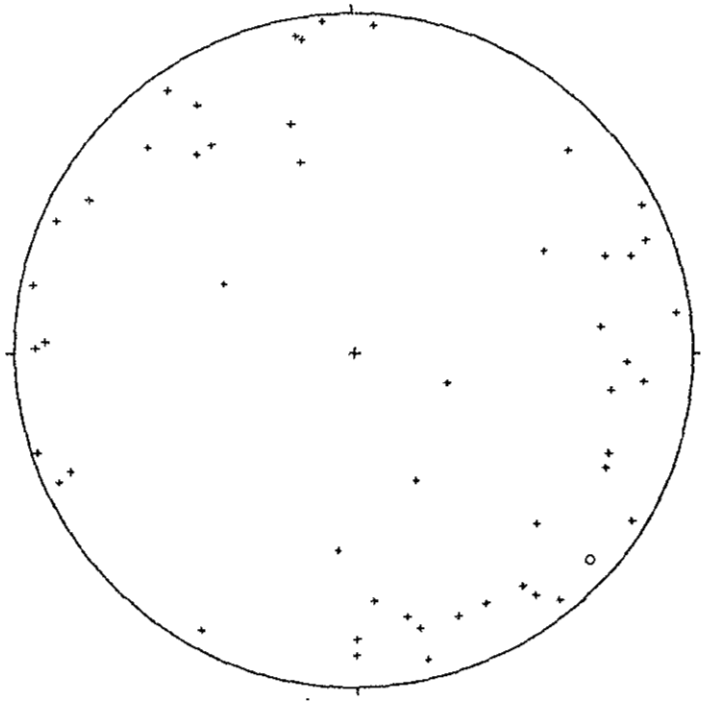
Fabric R-9 (sample 17819)	Statistics
N = 50	Vector Mean = 354.4
Class Interval = 10 degrees	Conf. Angle = 32.09
Maximum Percentage = 14.0	R Magnitude = 0.339
Mean Percentage = 6.25 Standard Deviation = 4.12	Rayleigh = 0.0032



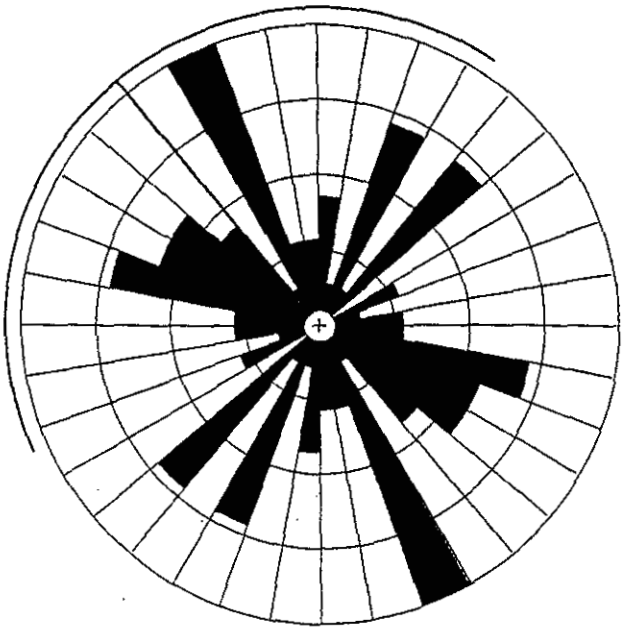
Data	Schmidt Equal Area Projection	Statistics
+ Neil Anomaly Fabric R-9		o Mean Lineation Vector 174.0 0.6
		E1 = 0.606 E2 = 0.323 E3 = 0.071
		r1 = 0.63 r2 = 1.51 K = 0.42
	N = 50	s. var. = 0.640 Rbar = 0.360



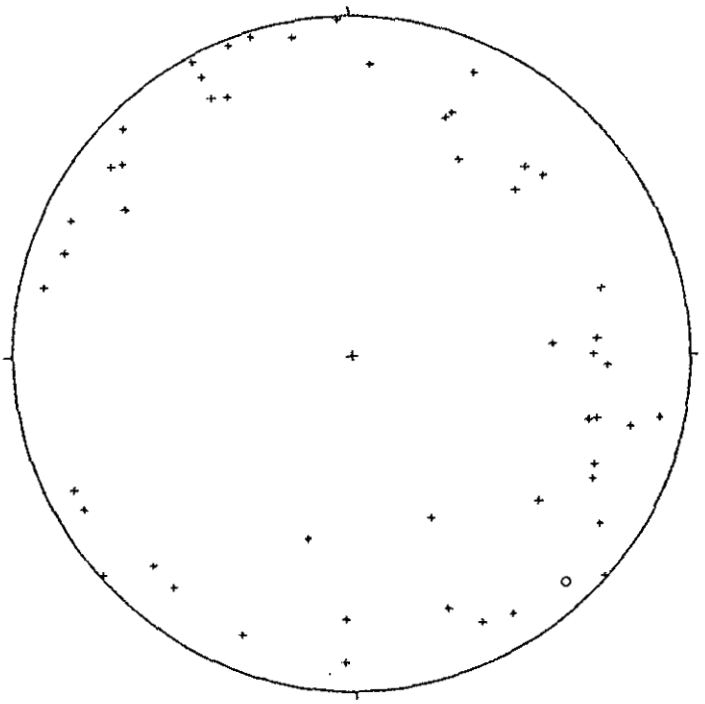
Tow Anomaly, Fabric R-10	Statistics
N = 50	Vector Mean = 313.3
Class Interval = 10 degrees	Conf. Angle = 44.47
Maximum Percentage = 14.0	R Magnitude = 0.247
Mean Percentage = 6.67 Standard Deviation = 3.61	Rayleigh = 0.0474



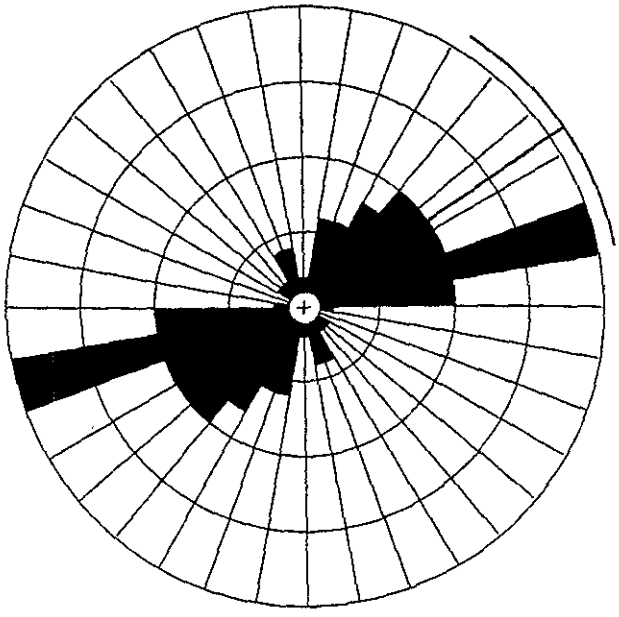
Data	Schmidt Equal Area Projection	Statistics
+ Tow Anomaly, Fabric R-10		○ Mean Lineation Vector 132.0 6.8
		E1 = 0.541 E2 = 0.342 E3 = 0.117
		r1 = 0.46 r2 = 1.07 K = 0.43
	N = 50	s. var. = 0.704 Rbar = 0.296



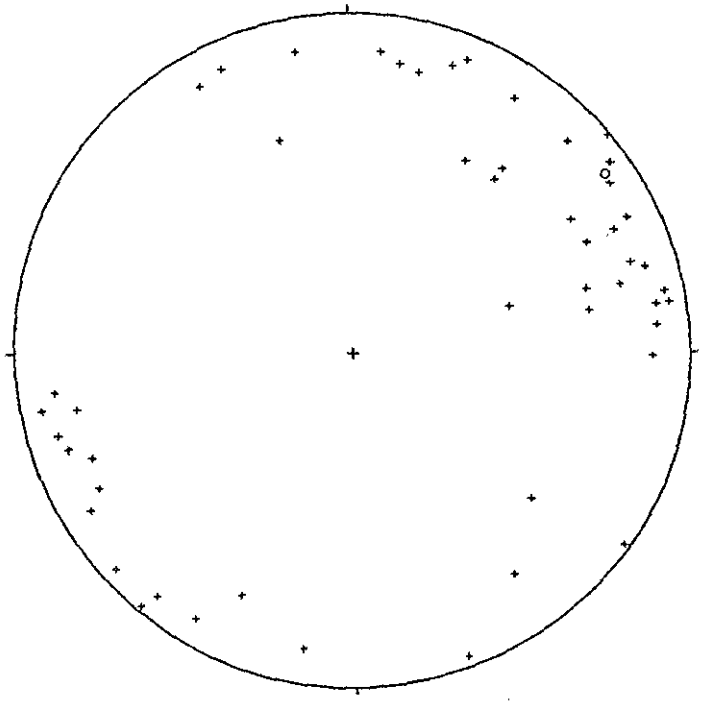
Fabric R-11 (Tow float)	Statistics
N = 50	Vector Mean = 319.9
Class Interval = 10 degrees	Conf. Angle = 74.22
Maximum Percentage = 14.0	R Magnitude = 0.151
Mean Percentage = 5.88 Standard Deviation = 3.51	Rayleigh = 0.3203



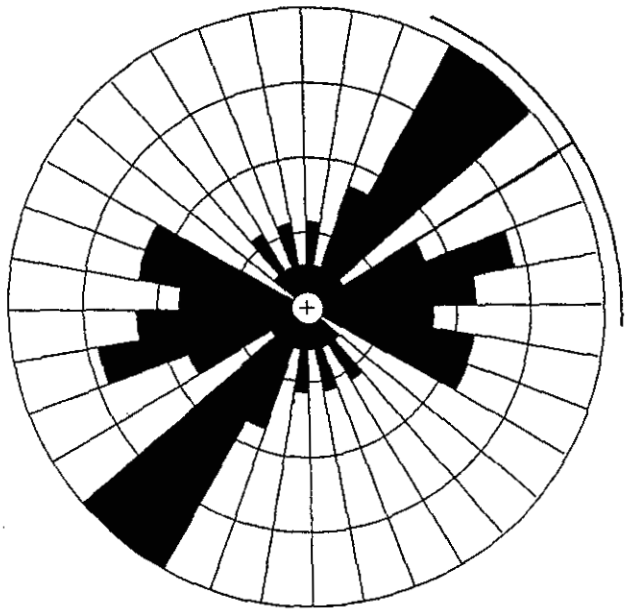
Data	Schmidt Equal Area Projection	Statistics
+ Tow Anomaly, Fabric R-11		○ Mean Lineation Vector 138.0 7.6
		E1 = 0.528
		E2 = 0.383
		E3 = 0.089
		r1 = 0.32 r2 = 1.46 K = 0.22
	N = 50	s. var. = 0.701 Rbar = 0.299



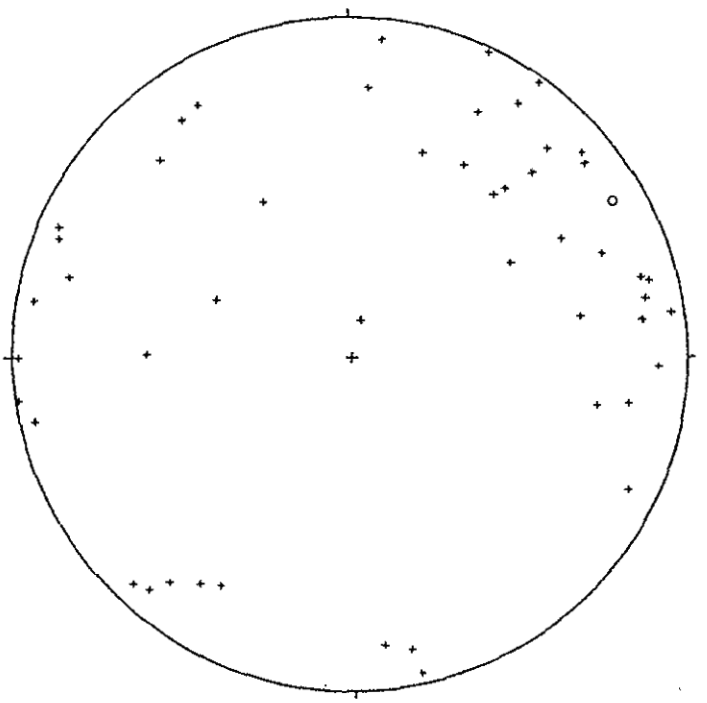
Fabric R-12 (14 mile Creek area)	Statistics
N = 50	Vector Mean = 55.6
Class Interval = 10 degrees	Conf. Angle = 23.66
Maximum Percentage = 20.0	R Magnitude = 0.446
Mean Percentage = 6.25 Standard Deviation = 4.87	Rayleigh = 0.0000



Data	Schmidt Equal Area Projection	Statistics
+ Neil Anomaly Fabric R-12		○ Mean Lineation Vector 55.3 8.5 E1 = 0.673 E2 = 0.253 E3 = 0.074 r1 = 0.98 r2 = 1.23 K = 0.79 s. var. = 0.651 Rbar = 0.349
	N = 50	



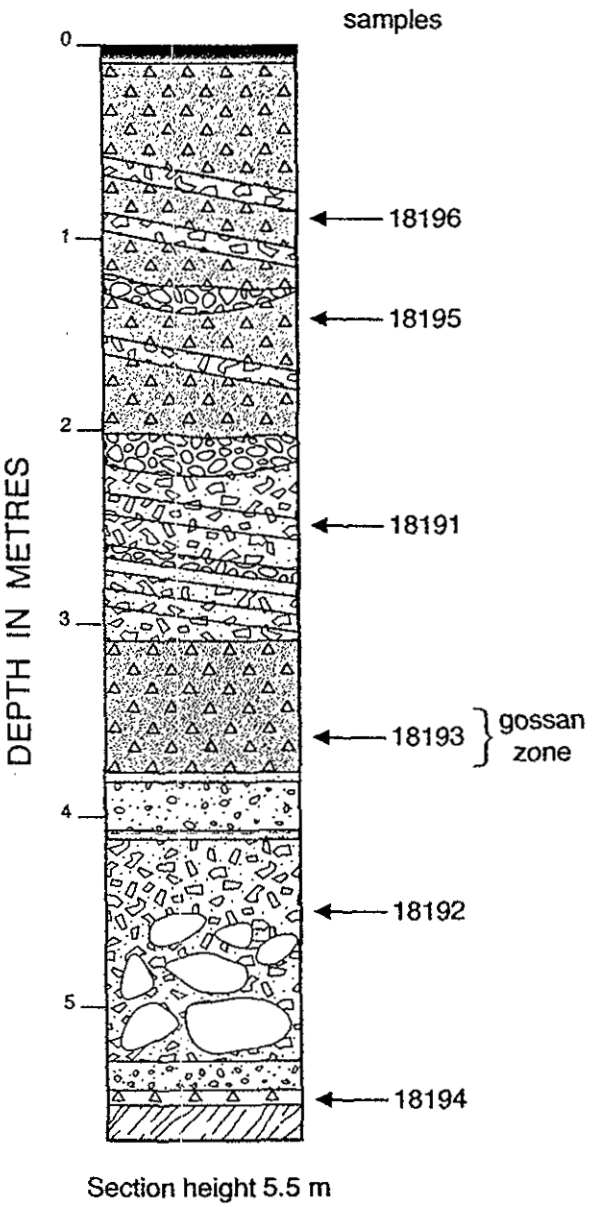
Lottie Trench 3	Statistics
N = 51 Class Interval = 10 degrees Maximum Percentage = 13.7 Mean Percentage = 5.88 Standard Deviation = 3.80	Vector Mean = 59.3 Conf. Angle = 35.00 R Magnitude = 0.309 Rayleigh = 0.0076



Data	Schmidt Equal Area Projection	Statistics
+ Trench 3, fabric R-13 N = 51		o Mean Lineation Vector 60.0 9.9 E1 = 0.584 E2 = 0.301 E3 = 0.115 r1 = 0.66 r2 = 0.97 K = 0.68 s. var. = 0.634 Rbar = 0.366

Trenching Profiles and Descriptions
Lottie and Ketcham Anomalies

Lottie Trench 1 - Profile A



0.1 to 2.20 m Colluviated till
- stratified beds of colluviated till, with planar to weaklyundulating sharp contacts; fine sandy matrix, moderately fissile with clasts showing weak imbrication parallel to slope; 30-40% clast content, A to R angularity, mean ≈ 2.5 cm
- two interbeds are 20 cm thick, clast-supported colluvium, monolithologic, VA to A angularity, 75- 80% clast content, mean ≈ 6 cm; beds are at base of unit and and 1.3 m depth.

2.20 to 3.10 m Colluvium
- pronounced stratification, several larger beds are ≈25 cm thick, beds dip 30° north-northwest, subparallel to surface slope
- beds consist of alternating clast-supported beds and poorly sorted sandy beds (colluviated till)

3.10 to 3.80 m Colluviated till
- weakly stratified mixture of matrix- and clast-supported beds; moderate fissility, clasts dip downslope.
- a 20 cm layer at base of unit is stained orange and partially cemented; contains cobbles and small boulders of massive sulphides, often with a ferracrete coating of cemented till

3.80 to 4.10 m Pebbly sand
- coarse sandy matrix, 15% clast content
- a thin continuous bed of fine sand and silt occurs at the upper and lower contacts

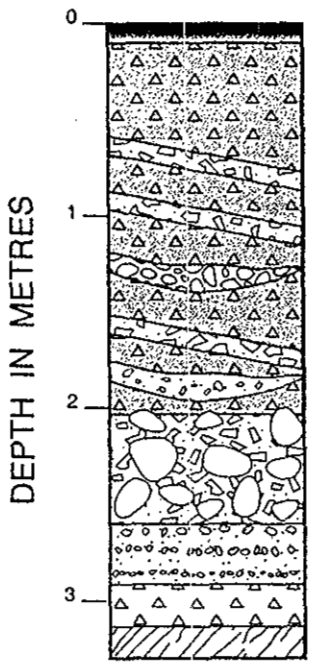
4.10 to 5.30 m Colluvium
- very poorly sorted, clast-supported, massive to crudely stratified; discontinuous sand lenses
- boulders up to 1 m diameter, angular and are mainly light-grey chert with black bands
- crude upward fining

5.30 to 5.45 m Pebbly sand
- coarse sandy matrix, 10% clast content

5.45 to 5.52 m Till
- basal lodgement till, olive grey silty sand matrix, 25% clast content, very compact and dense
- gradational upper contact over 10 cm

5.52 m Bedrock
- felsic to intermediate metavolcanicx

Lottie Trench 1 - Profile B



Section height 3.2 m

0.10 to 1.95 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 35-40% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of coarse sand and clast-supported gravel; interbeds are often less than 10 cm thick; beds dip northward (downslope)
- weakly gossanous at lower contact

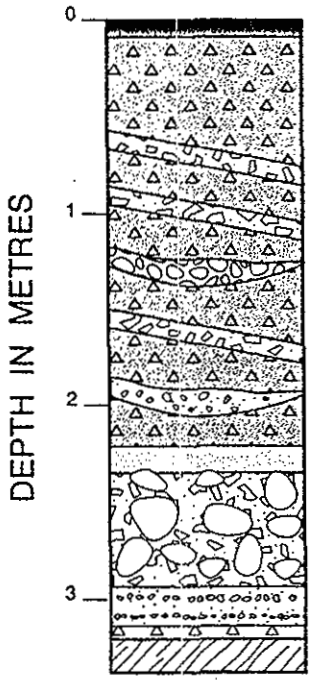
1.95 to 2.60 m Bouldery colluvium
- very poorly sorted, clast-supported with large cobbles and small boulders, occassional boulders exceed 1 m, most larger boulders are shattered *in situ*
- coarse sand matrix

2.60 to 2.90 m Pebbly sand
- pebbly stratified sand, moderately sorted; coarsening upwards from a coarse sand to pebbly gravel
- clasts are SA-SR with a 3 cm mean diameter

2.90 to 3.2 m Till
- basal lodgement till, of various thickness and contained within protected pockets in the bedrock surface; grey-brown colour, silty sand matrix, mean clast size ≈ 2 cm, 35% clast content
- upper contact grades upward over 10 cm into pebbly sand

3.2 m Bedrock
- mafic intrusive, possibly sub-volcanic

Lottie Trench 1 - Profile C



Section height 3.22 m

0.10 to 2.20 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 35-40% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of coarse sand and clast-supported gravel; interbeds are often less than 10 cm thick; beds dip northward (downslope)
- weakly gossanous at lower contact

2.20 to 2.32 m Sand
- coarse light grey sand, well-sorted, discontinuous for about 3 m in length

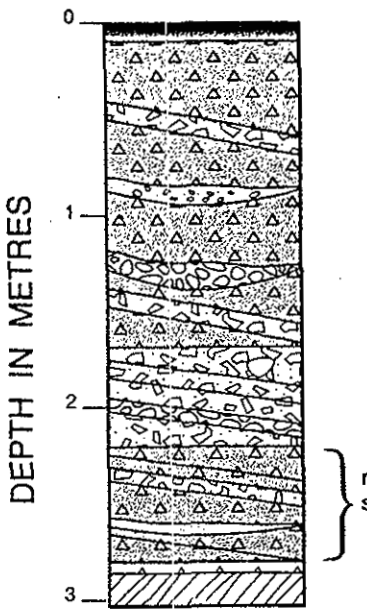
2.32 to 2.91 m Bouldery colluvium
- very poorly sorted, clast-supported with large cobbles and small boulders, occassional boulders exceed 1 m, most larger boulders are shattered *in situ*
- coarse sand matrix

2.91 to 3.09 m Pebbly sand
- pebbly stratified sand, moderately sorted; coarsening upwards from a coarse sand to pebbly gravel
- clasts are SA-SR with a 3 cm mean diameter

3.09 to 3.12 m Till
- basal lodgement till, very thin and discontinuous; preserved within low-lying pockets in the bedrock surface; grey-brown colour, silty sand matrix, mean clast size ≈ 2 cm, 35% clast content

3.12 m Bedrock
- mafic intrusive, possibly sub-volcanic

Lottie Trench 1 - Profile D



Section height 2.85 m

0.10 to 1.70 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 35-40% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of coarse sand and clast-supported gravel; interbeds are often less than 10 cm thick; beds dip northward (downslope)
- weakly gossanous at lower contact

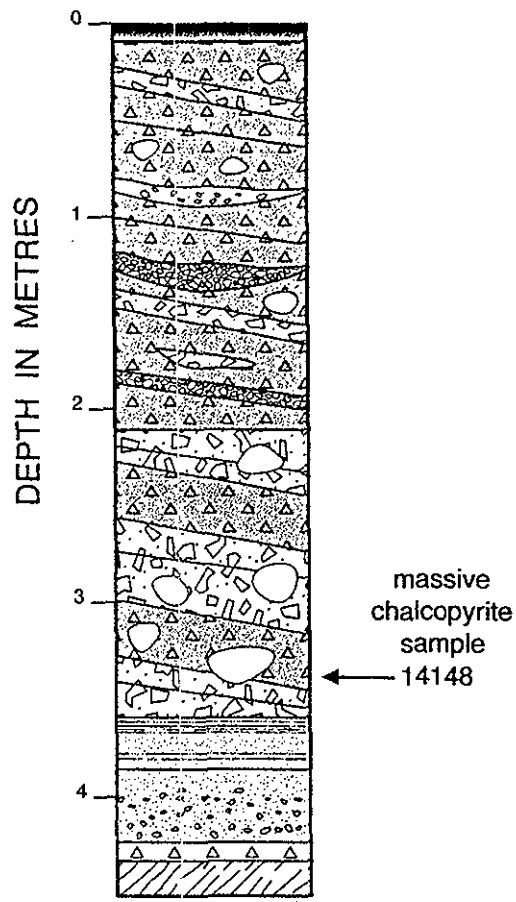
1.70 to 2.20 m Colluvium
- clast-supported, massive, clasts are angular, mean clast size ≈ 6 cm, max clast size ≈ 20cm

2.20 to 2.80 Colluviated till
- 2.20 to 2.28 m: lense of colluvium cemented to ferracrete, massive sulphide pebbles occur in a discontinuous lense.
- 2.28 to 2.51 m: colluviated till, same as above, no gossan or ferracrete
- 2.51 to 2.80 m: Iron cemented colluvium, massive sulphide clasts common; gossan layer is continuous and follows bedrock topography upslope; sulphide clasts are SA to SR and are up to 25 cm diameter

2.80 to 2.83 m Till
- basal lodgement till, of various thickness and contained within protected pockets in the bedrock surface; grey-brown colour, silty sand matrix, mean clast size ≈ 2 cm, 35% clast content
- till is often iron cemented, and also cemented to the bedrock surface

2.83 m Bedrock
- mafic subvolcanic; contact with felsic unit nearby

Lottie Trench 1 - Profile E



Section height 4.35 m

0.10 to 2.10 m Colluviated till
- stratified beds of colluviated till, with planar to weaklyundulating sharp contacts; fine sandy matrix, moderately fissile with clasts showing weak imbrication parallel to slope; 30-40% clast content, A to R angularity, mean ≈ 2.5 cm
- interbeds are 20 cm thick, clast-supported colluvium, monolithologic, VA to A angularity, 75- 80% clast content, mean ≈ 6 cm; beds are at base of unit and and 1.3 m depth.

2.20 to 3.60 m Colluvium
- pronounced stratification, several larger beds of colluviated till are ≈ 40 cm thick, beds dip 30° north-northwest, subparallel to surface slope
- beds consist of alternating clast-supported beds up to 20 cm thick, large boulders occur throughout unit
- a massive chalcopyrite cobble was observed at 0.2 m up from base of unit

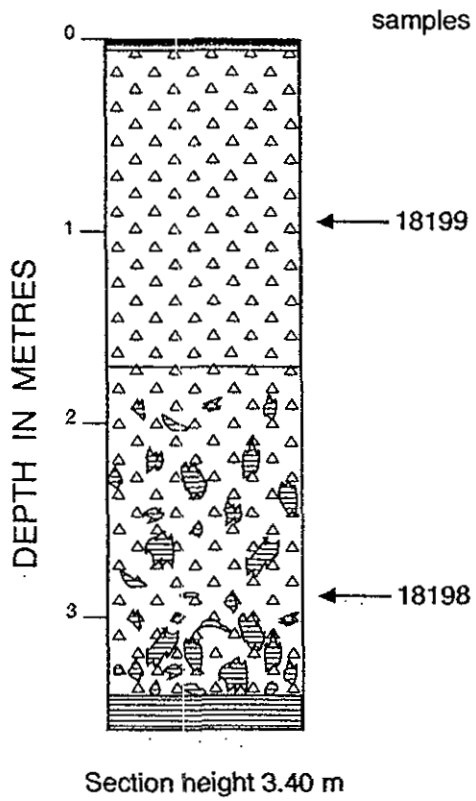
3.60 to 3.85 m Sand
- coarse to medium sand, well sorted and stratified/laminated with grey silty beds
- sharp upper and lower contacts

3.85 to 4.25 m Pebbly sand
- coarse sandy matrix, 15% clast content
- grades upward into well-sorted fine sand

4.25 to 4.35 m Till
- basal lodgement till, olive grey silty sand matrix, 25% clast content, very compact and dense

4.35 m Bedrock
- felsic to intermediate metavolcanics

Lottie Trench 2

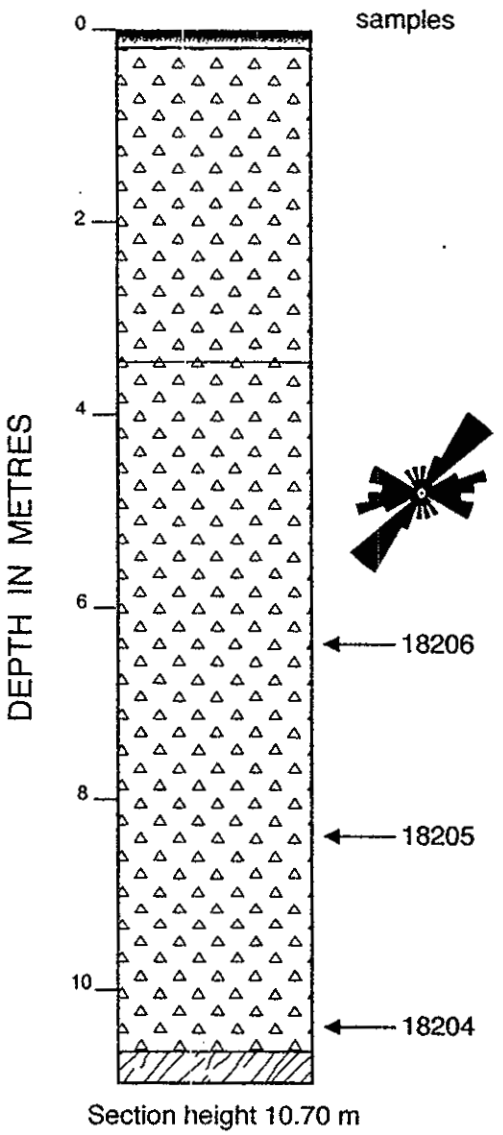


0.10 to 1.70 m Till
- massive, silty fine sand matrix, olive brown colour, weak fissility and compaction
- clast content ≈ 25%, mean size 2cm, SA-SR angularity, clasts are commonly striated and faceted
- larger bullet-shaped clasts are oriented 065°, dipping to the southwest

1.70 to 3.40 m Diamicton
- massive, dark grey colour, upper contact grading from matrix-rich (25% clasts) olive brown till to a clast-rich (60%) monolithologic diamicton at the base of unit with ≈ 80% of clasts reflecting the underlying bedrock.
- clast mean at base ≈ 10 cm, VA-A angularity

3.40 m Bedrock
- graphitic argillite

Lottie Trench 3

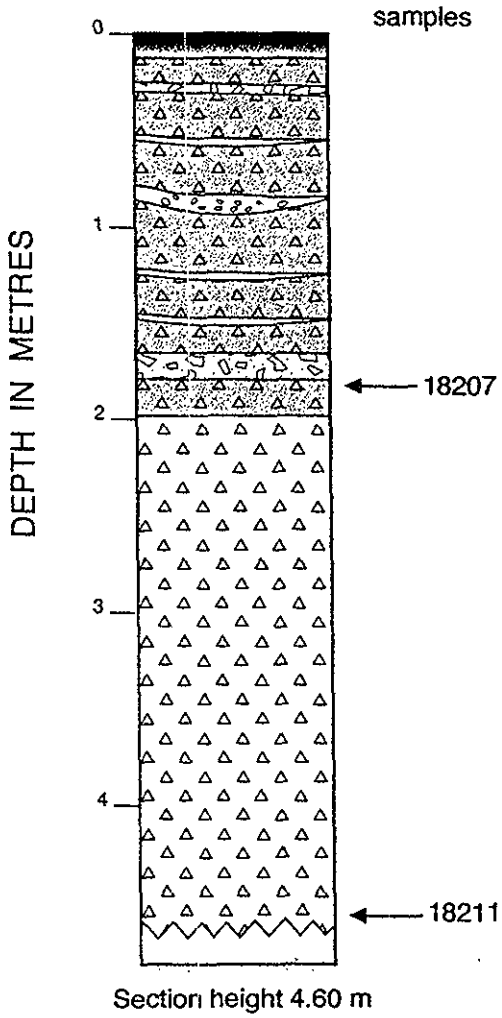


0.10 to 3.35 m Till
- light brown-grey silty sandy till, moderate fissility and compaction, sharp colour change with underlying till
- clast content 25%, mean roundness ≈ SA, mean clast size ≈ 3.5 cm, striated and faceted clasts common

3.35 to 10.70 m Till
- basal lodgement till, very compact and dense, blue-grey colour, moderately fissile
- clast content 15%, mean roundness ≈ SR, mean clast size ≈ 2 cm, several exotic lithologies
- clasts are highly polished, 90% are faceted and striated
- fabric R-13 measured at 5 m

3.2 m Bedrock
- intermediate tuffaceous metavolcanic

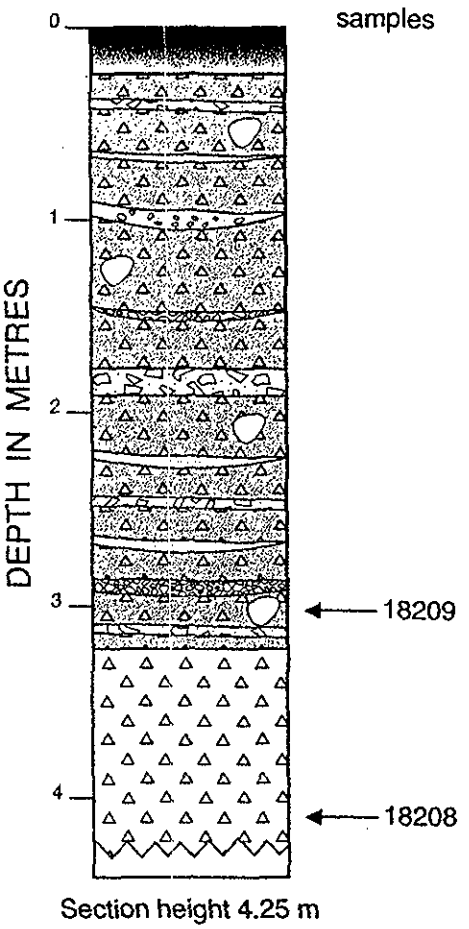
Lottie Trench 4



0.10 to 1.95 m Colluvium
- stratified, poorly-sorted, colluviated till; moderate fissility and compaction; silty sand matrix
- 40% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of well-sorted coarse sand and pebbly sand; interbeds are often less than 10 cm thick

1.95 to 4.60 m Till
- basal lodgement till, very compact and dense, grades from brown-grey near upper contact to blue-grey colour at depth; moderately fissile
- clast content 15%, mean roundness ≈ SR, mean clast size ≈ 2 cm, several exotic lithologies
- clasts are highly polished, 90% are faceted and striated

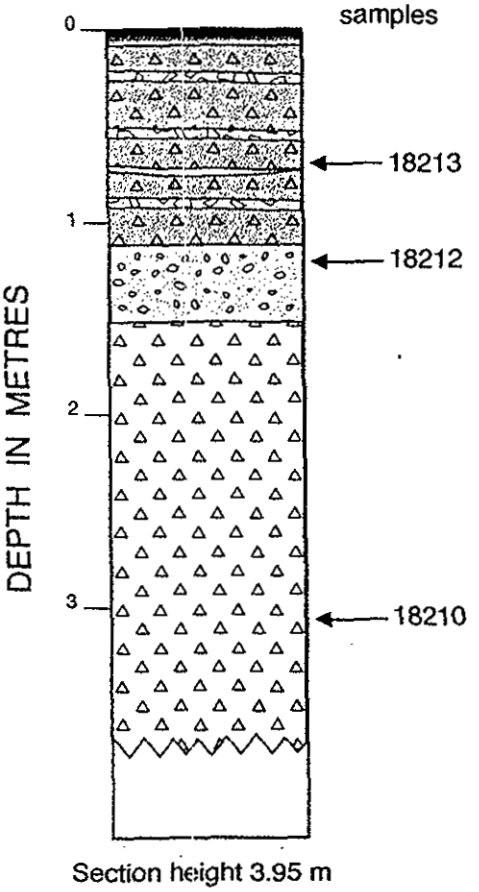
Lottie Trench 5



0.25 to 3.05 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 35-40% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of coarse sand and clast-supported gravel; interbeds are often less than 5 cm thick; beds dip northeastward (downslope)

3.05 to 4.25 m Till
- basal lodgement till, very compact and dense, grades from brown-grey near upper contact to blue-grey colour at depth; moderately fissile
- clast content 15%, mean roundness ≈ SR, mean clast size ≈ 2 cm, several exotic lithologies
- clasts are highly polished, 90% are faceted and striated

Lottie Trench 6

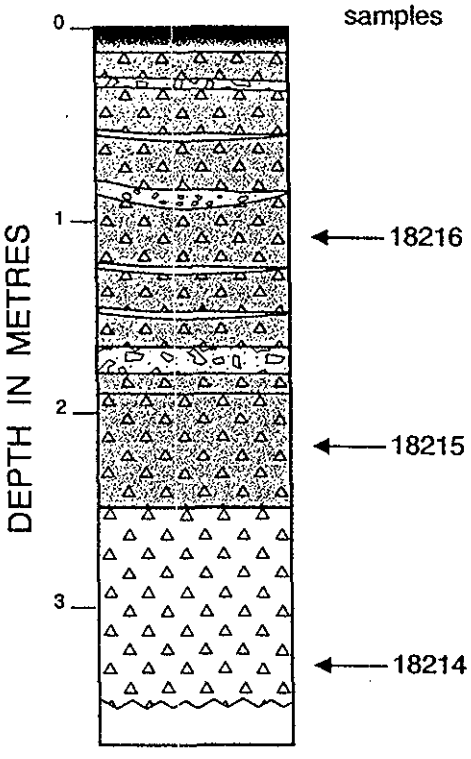


0.10 to 1.14 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 35-40% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of coarse sand and clast-supported gravel; interbeds are often less than 10 cm thick; beds dip northward (downslope)

1.14 to 1.52 m Pebbly sand
- pebbly stratified sand, olive-grey colour, moderately sorted with 20% clast content

1.52 to 3.65 m Till
- basal lodgement till, grey-brown colour, silty matrix, moderately compact, water table at upper contact
- mean clast size ≈ 3 cm, 25% clast content

Lottie Trench 7



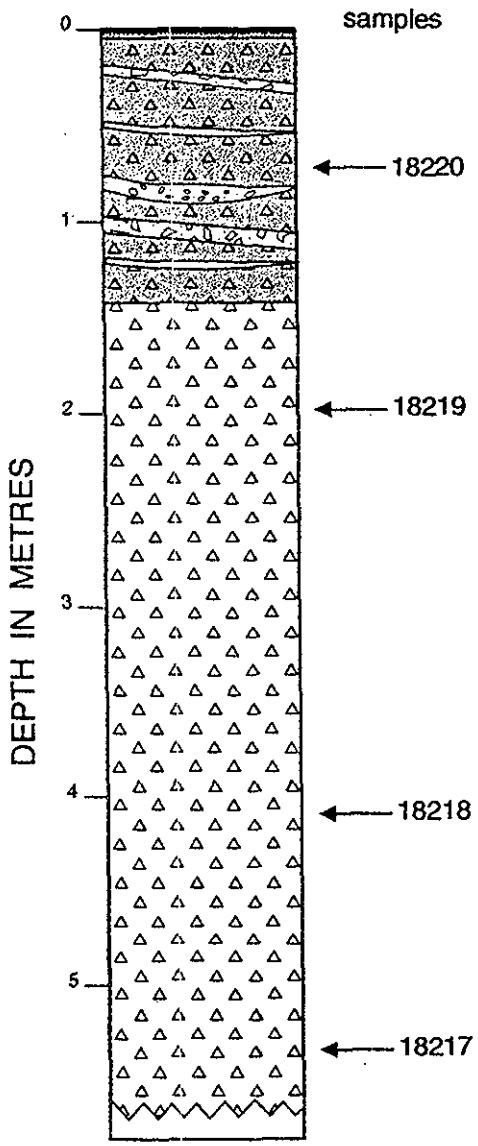
Section height 3.50 m

0.10 to 1.90 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 40-50% clast content, clasts have SA to SR angularity
- discontinuous lenses and interbeds of coarse sand; interbeds are often less than 10 cm thick; beds dip northwestward (downslope)

1.90 to 2.50 m Transition zone
- mixed layers of diamicton and sand, 40% clasts, mean angularity ≈ SA, mean clast size ≈ 4 cm
- wet, perched water table

2.50 to 3.50 m Till
- basal lodgement till, grey-brown colour in upper portion, grading to blue-grey colour at depth; silty matrix, strong fissility, mean clast size ≈ 0.5 cm, 15% clast content

Lottie Trench 8

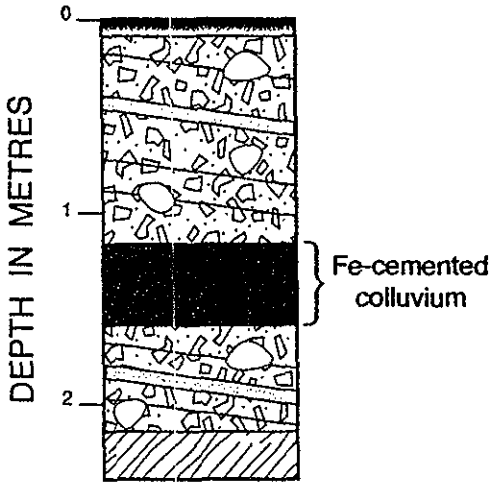


Section height 5.72 m

0.05 to 1.45 m Colluvium
- crudely stratified poor to very poorly sorted colluviated till; moderate fissility and compaction; 40% clast content, clasts have SR angularity
- discontinuous lenses and interbeds of coarse sand; interbeds are often less than 5 cm thick; beds dip northwestward (downslope)

1.45 to 5.72 m Till
- basal lodgement till, light olive-grey colour, silty sand matrix, moderate to strong fissility
- mean clast size ≈ 1 cm, 20% clast content, clasts are polished and faceted
- upper contact is sharp, erosional and undulating

Ketcham Trench



Section height 2.15 m

0.10 to 1.10 m Colluvium
- bedded colluvium and colluviated till; sandy matrix with 35-40% clasts, clast roundness ranges from A to R, mean clast size ≈ 4cm
- beds consist of alternating matrix- and clast-supported colluvium ranging in thickness from 10 to 20 cm, sand beds up to 5 cm thick also occur

1.10 to 1.50 m Iron cemented colluvium
- same as above, brightly stained red-orange and iron cemented, clast of massive sulphides and chalcopyrite-bearing basalt are common

1.50 to 2.15 m Colluvium
- bedded colluvium and colluviated till; sandy matrix with 35-40% clasts, clast roundness ranges from A to R, mean clast size ≈ 4cm
- beds consist of alternating matrix- and clast-supported colluvium ranging in thickness from 10 to 20 cm, sand beds up to 5 cm thick also occur

3.2 m Bedrock
- mafic metavolcanic, 'massive' basalt

Appendix VIII

PETROGRAPHIC REPORTS

Vancouver Petrographics Ltd.

8080 GLOVER ROAD, LANGLEY, B.C. V1M 3S3
PHONE (604) 888-1323 • FAX (604) 888-3642
email: vanpetro@vancouver.net

Report for: Hudson Bay Exploration & Development,
800 - 700 West Pender Street,
VANCOUVER, B.C.
V6C 1G8

Job 000347

July 17, 2000

SAMPLES:

7 rock samples, numbered as below, were submitted by Gerry Bidwell, with a request for sectioning and petrographic examination.

5

- R10149
- R10150
- R10151 - 593202 5878777
- R10155
- R10184
- R10187
- R10194

Typical portions of each sample were prepared as polished thin sections.

SUMMARY:

This suite is made up of two principal lithotypes.

a) Basalts:

R10150 is a typical basalt consisting essentially of a fine-grained intergrowth of plagioclase and accessory clinopyroxene. The latter occurs in distinctive mode as clusters of minute granules. Altered palagonite (original glass) is another accessory, in intersertal relation to the plagioclase aggregate.

R10187 is of similar character, but is porphyritic, containing about 20% of plagioclase and pyroxene phenocrysts ranging up to 1.5 mm in size.

R10194 is another non-porphyritic basalt, distinctive for its content of brown hornblende as a minor accessory.

b) Cherty/felsitic rocks:

R10149 is a probable fine-grained wacke, consisting of tiny grains of plagioclase scattered through a minutely felsitic matrix. XRD analysis suggests that it is composed of quartz and plagioclase in a ratio of about 3:1

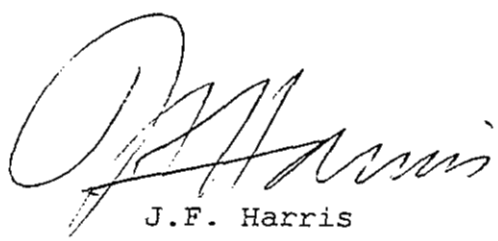
R10151 is also composed essentially of minutely felsitic material. XRD analysis suggests that it is composed of quartz and plagioclase is in a ratio of about 3:5 It is tentatively classified as a porcellanitic tuffite of dacitic composition.

R10155 is another minutely fine-grained, incipiently foliated rock composed of apparent felsitic material. XRD analysis suggests that, in this case, plagioclase is very minor (c.5%) relative to quartz, and the rock is most likely a cherty mudstone or tuffite.

c) Others:

Sample R10184 is a lithic arenite, or fine-grained conglomerate, composed of close-packed, vari-sized quartz grains and clasts of cherty/felsitic rocks similar to the samples of Group b) - and sericitic and carbonaceous variants thereof. The individual clasts are cemented by thin films of apparent carbonaceous material.

Individual petrographic decriptions are attached.



J.F. Harris

(929-5867)

SAMPLE: R10149 . FINE-GRAINED QUARTZO-FELDSPATHIC WACKE

Estimated mode

Quartz	64
Plagioclase	30
Biotite	1
Chlorite	1
Leucoxene)	
Epidote)	4
Clays)	

The off-cut representing the sectioned portion of this sample is of similar appearance to several others of the suite, being a minutely fine-grained, rather structureless rock, showing a more or less strong white etch (suggestive of plagioclase-rich or cherty character).

Thin section examination shows that it is a cryptoclastic felsitic (quartzo-feldspathic) aggregate, dominantly of grain size 10 - 100 microns. Scattered, individual grains of definite plagioclase, up to 150 microns in size, are distinguishable, and plagioclase is most likely a significant accessory component of the aggregate as a whole. This is confirmed by XRD analysis - which suggests that plagioclase may represent about 30% overall.

The principal accessory is minutely fine-grained, sub-opaque material, as disseminated tiny flecks, and as concentrations in multidirectional sinuous/anastomosing stylolite-like features. This is thought to be mainly leucoxene, plus a little intergrown epidote and possible clays. Very minor proportions of biotite and chlorite are also present, as tiny disseminated flecks.

This rock has the mineralogy and textural aspect of a fine-grained wacke of possible volcaniclastic affinities. The clumpy/streaky variations in the proportions of relatively coarser grains in a very fine felsitic matrix tend to suggest a clastic than a primary magmatic origin.

SAMPLE: R10150 **BASALT**

Estimated mode

Plagioclase	50
Clinopyroxene	30
Hornblende	2
Altered palagonite	12
Rutile)	4
Leucoxene)	
Mineral X	2

This sample is a meshwork-textured rock of basaltic affinities.

The three principal constituents are plagioclase, pyroxene and palagonite (original glass).

The plagioclase occurs as a randomly oriented aggregate of rather stumpy prismatic grains, typically 0.2 - 0.5 mm in length. It shows more or less strong turbidity, produced by a pervasive flecking of a fine-grained, colourless to pale green, low birefringent mineral of moderate to high relief (possibly a form of epdiote).

The pyroxene is a colourless variety - possibly augite. It occurs in distinctive textural mode, as small clumps of tiny, stumpy, prismatic grains 20 - 50 microns in size. Very rare, individual, coarser pyroxene grains, 0.1 - 0.3 mm in size, are also present.

The microgranular pyroxene clumps occur, interstitial to the plagioclase aggregate, in close association with pockets of yellowish brown palagonite - now almost entirely modified to felted masses of secondary products (probably serpentine and/or chlorite).

Minor constituents include rutile/leucoxene as randomly disseminated brown sub-opaque, skeletal grains 0.1 - 0.3 mm in size, and brown hornblende. The latter occurs in local pockety developments of a distinctive textural variant, in which tiny acicular hornblende grains are disseminated through a matrix of poorly crystalline plagioclase.

The rock is traversed by a few hairline zones of microbrecciation and alteration. The latter (Mineral X) is of varied appearance and uncertain mineralogy, ranging from brownish, sub-translucent, near isotropic material, to a colourless (locally pleochroic green) high relief, minutely microgranular variant.

This rock is a typical basalt exhibiting a well-developed intersertal texture. It is non-porphyritic and non-amygdaloidal.

SAMPLE: R10151 **DACITIC TUFFITE**

Estimated mode

Quartz	35
Plagioclase	55
Chlorite	3
Epidote)	4
Leucoxene)	
Amphibole	3
Carbonate	trace

The off-cut corresponding to the sectioned portion of this sample has a minutely fine-grained appearance, with an incipient sub-parallel foliation suggestive of bedded compositional and/or grain size variations. It takes a strong white etch (indicative of probable plagioclase-rich composition) and has the macroscopic aspect of a porcellanitic tuffite. The sectioned area is cut by a thin veinlet of unetched material.

In thin section the rock is found to consist of a rather homogenous, anhedral aggregate of felsitic material, of grain size 5 - 50 microns. The composition of this matrix, in terms of the ratio of plagioclase to quartz, is optically indeterminate. The modal percentages shown above are estimates based on an XRD scan of the sample.

Accessory constituents include a little chlorite as scattered small clumps intimately intergrown with the felsite; and sub-opaque material (possibly a mixture of epidote and leucoxene) as evenly dissemimated minute flecks, and "spongy" aggregates up to 50 microns in size. The same material concentrates in anastomosing/crenulate, stylolite-like hairline microfeatures.

The macroscopically prominent veinlet (0.5 mm in thickness) is composed of granular quartz with intergrown, colourless, prismatic amphibole. Traces of carbonate are also seen. The same colourless amphibole occurs as a minor constituent - along with sub-opaque material - of some of the sub-concordant wisps which define the incipient foliation.

The plagioclase-rich mineralogy of this rock invalidates the designation "chert" used in the covering letter. Its texture and mineralogy are consistent with a tuffite of dacitic composition. The minor amphibole could be a redistributed primary component, or a product of incipient skarnification.

SAMPLE: R10155 **CHERTY MUDSTONE OR TUFFITE**

Estimated mode

Quartz)	80
Plagioclase)	
Sericite	4
Epidote)	12
Leucoxene)	
Chlorite	1
Pyrite	3
Limonite	trace

The off-cut of this sample shows that it is a rather featureless, minutely fine-grained rock. An incipient, rather irregular/wispy foliation is locally discernable; this appears to be off-set by oblique hairline microfractures.

In thin setion the rock is found to consist dominantly of a matrix of cryptocrystalline felsitic material through which are scattered more or less abundant, tiny, sub-angular quartz grains, 10 - 50 microns in size, and minute flecks of sericite.

Another prominent accessory is a brownish, sub-translucent material as evenly disseminated, tiny granules 5 - 10 microns or more. The same (or similar) material concentrates in the system of sub-parallel/anastomosing hairline microfractures. It appears tc consist of a mixture of epidote and leucoxene - occasionally with minor associated chlorite.

The sectioned area includes two comparatively large (4 - 6 mm) individual, sharply euhedral grains of pyrite. These are sieved with tiny poikilitic inclusions of the silicate matrix, and outlined by thin selvedges of chlorite. They appear to have developed by growth in-situ.

The matrix is so fine as to be optically indeterminate. An XRD scan shows that it consists dominantly of quartz, with plagioclase as a very minor accessory (probably making up no more than 5% or so).

This very low ratio of plagioclase to quartz is contra-indicative of a felsite dyke (as suggested in your covering letter). The crypto-clastic textural appearance of this rock in thin section, and the indicated highly quartzose composition, appear more characteristic of a cherty mudstone or tuffite. The speckling of fine-grained epidote is possibly a product of mild metamorphism.

SAMPLE: R10184 **LITHIC ARENITE**

Estimated mode

Quartz	35
Felsite)	55
Chert)	
Sericite	2
Chlorite	trace
Carbonaceous material	8
Pyrite	trace

This sample differs in macroscopic appearance from all the others of the suite. The off-cut exhibits obvious fragmental character, incorporating well-defined, sub-angular to sub-rounded clasts of varied composition (more or less strongly white-etched, and black, shard-like) which range from 0.1 mm or less up to several mm in size.

Microscopic examination of the thin section shows that the clasts are dominantly of two types: individual monocrystalline quartz grains ranging up to 1 mm in size; and fragments of minutely microgranular chert or felsitic material - typically of grain size 5 - 20 microns. The latter cherts are mostly of similar size to the quartz grains, but a few reach as much as 3 mm.

The chert/felsite clasts (which are those showing a white etch in the off-cut) are very similar in petrographic appearance to the lithotypes represented by samples R10149, 10151 and 10155.

The present sample also contains clasts of variants of the felsite/chert lithotype which contain accessory proportions of fine-grained sericite flecks and/or micron-sized opaque or sub-opaque material (carbon or rutile/leucoxene?). These have the aspect of mudstones.

The scattered, elongate/shard-like, black clasts macroscopically prominent in the off-cut are found to be variants containing abundant opaque material - most likely of carbonaceous character. Some show finely laminar fabrics, and others are totally opaque, but speckled with carbon-free spheroids. They resemble typical carbonaceous mudstones and cherts.

The rock overall is made up of close-packed, vari-sized clasts of the types described, ranging in size down to about 0.05 mm. There is no fine matrix as such, but the clasts are cemented by thin intergranular films of opaque (probably carbonaceous) material. It is best described as a polylithic arenite or fine conglomerate.

Pumiceous material, obsidian or crystal tuff fragments (as suggested in the covering letter) were not found to be present, and the dominant clast lithologies are more of sedimentary than volcanic aspect.

SAMPLE: R10187 **PORPHYRITIC BASALT**

Estimated mode

Plagioclase	56
Clinopyroxene	20
Sphene	3
Altered palagonite	20
Secondary amphibole?	1
Pyrite	trace
Chalcopyrite	trace

This sample is another basalt, similar to R10150 in overall mineralogy, but texturally distinct.

The bulk of the rock is a groundmass intergrowth of slender laths of plagioclase 0.1 - 0.3 mm in length, and equant subhedra of pyroxene, 0.05 - 0.1 mm in size. Palagonite (original glass), now modified to minutely microgranular, low-birefringent secondary material (probably mainly serpentine), forms tiny interstitial pockets throughout the groundmass aggregate.

This rock differs from R10150 is being prominently porphyritic. It contains about 20% of prismatic phenocrysts of plagioclase and clinopyroxene, 0.4 - 1.5 mm in size. In contrast to the groundmass plagioclase, the plagioclase phenocrysts are turbid (minutely flecked with inclusions of probable chlorite and leucoxene). The pyroxene in both groundmass and phenocrysts is fresh.

Minutely microgranular sphene is a randomly distributed minor accessory throughout the groundmass.

The rock is traversed by a few hairline veinlets of a colourless fibro-acicular mineral, locally showing flecks of green pleochroism. This is most likely a form of secondary amphibole. Traces of pyrite and extremely rare chalcopyrite occur in association with this veinlet alteration, and also as sparse disseminations.

SAMPLE: R10194 **BASALT**

Estimated mode

Plagioclase	62
Pyroxene	22
Hornblende	8
Sphene	4
Chlorite	3
Pyrite	0.5
Chalcopyrite	trace
Limonite	trace

This rock is another variant of the basaltic lithotype exemplified by R10150 and 10187. It differs from those samples chiefly in that it contains hornblende as a significant accessory, along with the dominant pyroxene.

Plagioclase is the principal constituent, as an aggregate of somewhat turbid, elongate/prismatic grains, 0.1 - 0.3 mm in length. These show local parallel orientation of flow-related aspect, though without any consistency of direction over the section as a whole. There are also areas where the plagioclase shows acicular form, as slender laths reaching 1 or 1.5 cm in length - locally as sheaf-like aggregates.

The principal accesory is fresh clinopyroxene, as rather evenly disseminated, tiny, individual, euhedral grains, 10 - 100 microns in size (locally concentrated as small clumps).

Minor accessories are brown hornblende, as evenly scattered, tiny, individual prismatic grains similar in size to the pyroxene; chlorite as sporadic pockets, 50 - 300 microns in size, interstitial to the plagioclase aggregate; and sphene as an even dusting of minute granules 10 - 20 microns in size, locally coalescing as tiny laminae interstitial to the plagioclase laths.

Disseminated pyrite and very rare chalcopyrite occur as euhedral grains 20 - 100 microns in size - mainly concentrated as a single elongate cluster apparently associated with hairline zone of incipient fracturing. A few of the pyrite grains have partial rims of limonite.

The incipient flow textures and possible rare amygdules (of chlorite) in this rock suggest that it is most likely of extrusive character.

Vancouver Petrographics Ltd.

8080 GLOVER ROAD, LANGLEY, B.C. V1M 3S3
PHONE (604) 888-1323 • FAX (604) 888-3642
email: vanpetro@vancouver.net

Report for: Hudson Bay Exploration Ltd.,
800 - 700 West Pender Street,
Vancouver, B.C.
V6C 1G8

Job 000682

November 29, 2000

SAMPLES:

2 drill core samples, labelled LOT 001 47.10-47.23 and LOT 002 17.95-18.05 m., were submitted by Gerry Bidwell, with a request for sectioning and petrographic examination. Typical portions of each sample were prepared as standard thin sections.

SUMMARY:

LOT 001 is a diabase or microgabbro of minor intrusive aspect. It consists dominantly of an intergrowth of plagioclase and pyroxene, plus accessory amphibole. The rock shows mild to moderate pervasive saussuritization, and is cut by veinlets of carbonate and/or chlorite.

LOT 002 is a minutely porcellanitic rock which consists essentially of quartz, dusted with minute flecks of accessory chlorite and sericite. It is cut by veinlets of carbonate and/or quartz. This rock has the textural features of chert.

Individual sample descriptions are attached.

J. F. Harris Ph.D.

929-5867

LOT 001 47.10-47.23 m. DIABASE

Estimated mode

Plagioclase	45
Saussuritic alteration	9
Pyroxene	30
Amphibole	6
Chlorite	3
Biotite	1
Carbonate	4
Rutile) Leucoxene)	2

Thin section examination shows that this rock consists essentially of a meshwork/ophitic intergrowth of lath-like plagioclase and clinopyroxene, typically in the grain size range of 0.2 - 1.0 mm. Elongate prismatic grains of colourless amphibole are an accessory constituent of this assemblage. Plagioclase is also seen as scattered subhedral phenocrysts, 2.0 - 5.0 mm or so in size.

The plagioclase is rendered more or less turbid by pervasive saussuritization (specklings of fine-grained epidote), and the pyroxene shows partial modification to carbonate and unidentified brownish secondary products - especially in zones marginal to sharply defined, cross-cutting veinlets of carbonate.

The sectioned area includes two such veinlets, 1.0 mm and 0.2 mm in thickness. The thickest of these has envelopes of compact chlorite.

Chlorite also forms veinlets and sporadic pockets in its own right, and the sectioned area is, in addition, transected by a network of thinner hairline threads of carbonate and/or a brownish secondary mineral (probably biotite).

Sub-opaque material (probably altered sphene and/or rutile) occurs throughout the plagioclase/pyroxene aggregate as tiny disseminated flecks, intergranular networks, and discontinuous wisps.

This rock shows mineralogy and texture characteristic of a minor intrusive of mafic-intermediate composition, and is classifiable as a somewhat altered, sparsely porphyritic diabase or microgabbro.

LOT 002 17.95-18.05 m. CHERT

Estimated mode

Microgranular matrix	85
Sericite	10
Carbonate	5
Sulfides	trace

The off-cut of this rock is of grey, aphanitic appearance. It takes a weak whitish etch, and has the appearance of a chert or possibly a porcellanitic tuff.

In thin section the rock is found to consist of a homogenous, minutely fine-grained anhedral aggregate, of grain size 5 - 20 microns. This could be quartz or plagioclase - which are not reliably distinguishable by optical means at this particle size.

An XRD scan run on a small portion of the sample confirms that the microgranular matrix is, in fact, quartz, and the rock a form of chert.

The chert matrix incorporates a relatively abundant accessory constituent, in the form of tiny, individual, randomly oriented, elongated prismatic grains of a micaceous mineral or minerals. These locally coalesce to form hairline schlieren, 5 - 10 microns in thickness. Minute, individual, disseminated specks of carbonate are also seen.

The XRD trace shows that this accessory constituent is a mixture of chlorite and sericite.

The chert matrix is cut by veinlets of brown carbonate (with or without intergrown quartz), and of microgranular or comb-textured quartz. These veinlets range from 20 - 500 microns in thickness, and dominantly show a single sub-parallel orientation (though there are also a few strongly discordant examples). Traces of sulfides (pyrite?) occur in one or two of the veinlets.

Carbonate is also occasionally seen in the form of radiate/fibrous spherulites, and the microgranular quartz matrix itself incorporates tiny pellet-like bodies of slightly coarser grain size, which are distinguishable by virtue of being free of the ubiquitous, tiny, chlorite/sericite flecks. Such features are consistent with identification of the rock as chert.

Appendix IX

DRILL LOGS

North Face Geological Ltd.

North Face Geological Ltd.
15575 86 Avenue
Surrey, B.C. V3S 5C8

DRILL HOLE DESCRIPTION
DETAILED GRAPHIC LOG

Project: *2398*

Hole #: LOT001

Comments: HLEM geophysical anomaly

Northing:	5898852.000
Easting:	593120.000
Elevation:	1241.000
Field Location:	1+39S 1+00E

Casing Exposed:	18.7
Casing Size:	NQ
Contractor	Britton Brothers
Assay Lab:	ACME

Length:	134.30
Start Dip:	-45.0
Start Azimuth:	180

Project:	2398
Area:	Lottie
Property:	Eureka

Logged by:	GSM
Log date:	04/10/2000
Date Started:	02/10/2000
Date Finished:	03/10/2000

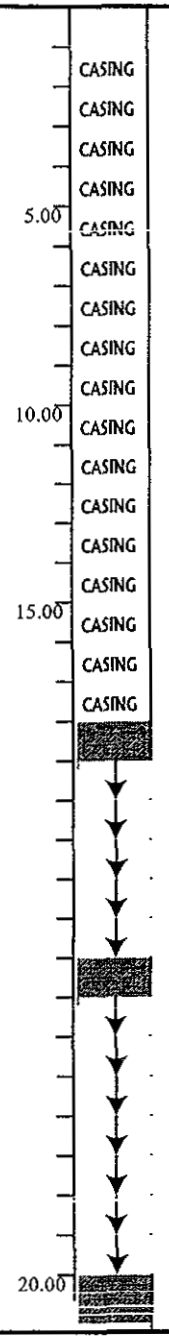
Map Reference:	093H/3
Claim:	Lottie4
Region:	Prince Georgee

Dip Tests

Hole #	Depth	Azimuth	Dip
LOT001	0.00	180.00	-45.00
LOT001	134.30	180.00	-44.00

From	To	Description
0.00	18.70	NW Casing *Through overburden (till+colluvium) and cored clasts of mainly gabbro and minor graphitic argillite*
18.70	19.80	Graphitic argillite *@19.00 S0/S1 50.00°* *Strongly foliated along S0/S1 foliation plane. Graphite on planes. Lighter coulored clasts are elongate and define primary bedding (evidence of soft sediment defm?)* *Conductive.*
19.80	20.54	Undifferentiated sediment *Altered sediment; patchy amoeboidal alteration of epidote-dolomite? White blotches no bigger than 3mm with cores of epidoite. Occurs in light grey altn patches. Grey matrix is alt'd argillite? while unaltered wallrock is graphitic argillte. Graphite on foliation planes. Thin minor black pressure solution stylolites. Minor dolomite and qtz veining. Gradational contact into underlying gf. argillites. Fairly competent in relation to underlying unit.*
20.54	37.50	Graphitic argillite

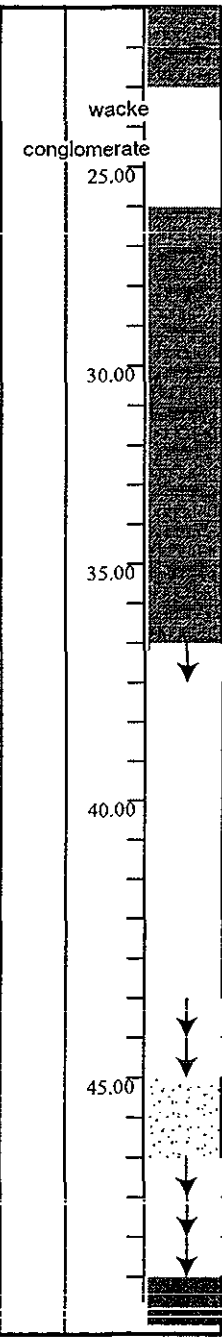
py



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

From	To	Description
		Strongly foliated blocky core with poor recovery. Graphite on almost every fracture/cleavage plane. Trace euhedral pyrite cubes disseminated along 1cm bed.
		Soft sediment defm: folding and boudinaging of lighter coloured clasts in a black gf. matrix . Clasts up to 3cm. Also folded are more calcareous beds (white).
		2-3% x-cutting calcite veins, 1% x-cutting qtz veins
		Fault @ 24.4m 20+ cm thick (black graphitic gouge)
		Lower contact is faulted, light grey gouge and calcite breccia with lithic clasts.
		23.00- 24.10 wacke intercalated medium grained wacke with trace diss. euhedral pyrite
		24.65- 25.35 conglomerate Clastic mudstone or matrix supported para-conglomerate. Clasts up to 3cm within a fg black graphitic argillaceous matrix. Rounded to sub angular, not deformed by soft sediment defm. Deposited as a matrix supported slurry.
		@37.00 S0 50.00°
37.50	45.33	**Altered basalt**
		Carbonate altered. Light to creamy grey, fairly massive, good recovery. Tiny 1mm very dense calcite amygdules @ 41m indicative of a basalt lithology.
		Pressure soln selvages, black and often graphitic, almost stylolitic (2-7%in places, overall 3-5%) Might be locally conductive? Intercalated with "rafts" or clasts of black clay. Remobilized by fluids and defm?
		Crosscut by cc-qtz veins up to 3cm thick. Beautiful euhedral cc crystals infilling fractures @ 44.46m.
45.33	47.00	**Tuff**
		Altered tuff. wispy laminations 1-10mm thick, very fine grained, soft. Light cream grey to white to light brown. Rare microfolding. Similar to subcrop near placer bus.
		@46.50 S0 55.00°
47.00	49.00	**Gabbro**

py



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
23.23	23.34	0.11						
36.50	36.60	0.10						
41.10	41.20	0.10						
46.50	46.50	0.00						
47.10	47.23	0.13						

From	To	Description
		Altered gabbro, dominantly plagioclase and clinopyroxene. Pervasive saussuritization (speckling of fg epidote) and altn of pyroxene to carbonate. minor veinlets of chlorite. See accompanying petrographic report.
49.00	54.80	**Siltstone para-conglomerate**
		Light grey siltstone (variably silicified) with tabular angular rip-up clasts. Locally highly silicified in the form of patches resembling chert. The clasts are dominantly angular and lithologies include: 1) black argillite/mudstone up to 4cm in length. Minor euhedral pyrite cubes within matrix and rare blebs of pyrite and chalcopyrite. There are minor (1%) cpy stringers <1mm throughout the clast parallel to crosscutting qtz-cc veinlets. Most likely mineralization occurred when the qtz-cc veinlets encountered the lithic clast (redox boundary) 2)angular qtz vein clasts @52.00 S0 42.00°
54.80	65.90	**Siltstone**
		Highly silicified siltstones with a distinct bleached look (light grey to white). Has an abundance of intense fracture fill veinlets (black and qtz) from 1-3mm thick forming an intense dense fracture network. Percentage of qtz veinlets increases downhole. Thin cc-chl 1-2mm thick veinlets Trace diss pyrite cubes Rhythmic primary bedding Lower contact is highly silicified crystalline qtz. Primary textures obliterated. Since contact is with gabbro intrusive, possibly this silicification is related to the gabbro? Wispy qtz and sillimanite? at lower contact with gabbro.
65.90	99.50	**Gabbro**
		Non-descript gabbro medium green, medium crystalline, trace py, good recovery

py

50.00

55.00

60.00

65.00

70.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
47.23	47.36	0.13	GSMC14182	65.17	0.61	40.70	24.00	338.40
50.98	51.13	0.15	GSMC14172	2249.72	18.22	88.00	809.00	217.70
51.55	51.67	0.12						
58.03	58.17	0.14						

From	To	Description
99.50	101.44	**Quartz, Quartz vein** *Transcluscent medium grey coarse crystalline qtz. Brecciated in part.* *Possibly a recrystallized sediment or fractionated gabbro.*
101.44	110.94	**Gabbro** *medium crystalline, medium green, tr py*

py

75.00
80.00
85.00
90.00
95.00
100.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
88.73	88.82	0.09						

From	To	Description

110.94 - 115.20 Siltstone

Locally silicified siltstone to cherty siltstone

primary bedding, red cherty beds 2-3mm thick.

light grey, soft and fg. in places, very siliceous in others (locally silicified). Not a typical chert fracture . Weakly calcareous. Minor pyrite along fractures

@113.00 S1 60.00°

115.20 - 124.50 Gabbro

Gabbro to diorite. Grades from m. green gabbro to m. grey diorite comp. Medium crystalline, good recovery. Local qtz+cc veining

124.50 - 131.85 Sediment package

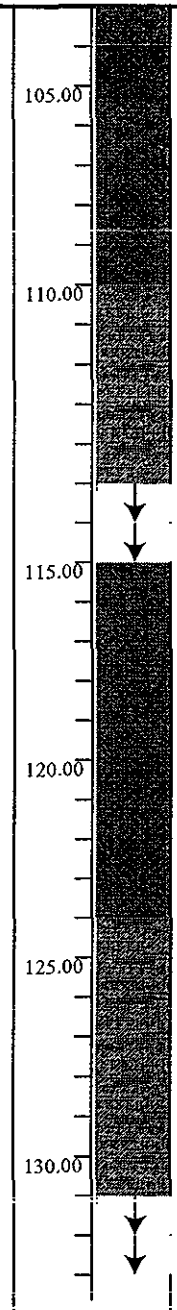
A sediment package of laminated and foliated medium grey siltstones and cherty (more siliceous) siltstones (approx 50/50). All very fine grained.

Several thin (approx 10cm) graphitic argillite beds, locally pyritic (tr diss)

Near contact with underlying qtz vein, the siltstones are highly silicified (30cm)

@130.00 S0 60.00°

131.85 - 134.30 Quartz, Quartz vein



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
111.50	111.60	0.10						
112.07	112.17	0.10	GSMC14181	10.99	2.96	13.80	19.00	954.70
117.80	117.90	0.10						
125.00	125.10	0.10						

From	To	Description	py
		Bull qtz vein, contains some entrained sediments	

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

Rocktype

PROJECT: *2398*

North Face Geological Ltd.

Hole ID: LOT001

From	To	Rocktype
0.00	18.70	NW Casing
18.70	19.80	Graphitic argillite
19.80	20.54	Undifferentiated sediment
20.54	37.50	Graphitic argillite
37.50	45.33	Altered basalt
45.33	47.00	Tuff
47.00	49.00	Gabbro
49.00	54.80	Siltstone para-conglomerate
54.80	65.90	Siltstone
65.90	99.50	Gabbro
99.50	101.44	Quartz, Quartz vein
101.44	110.94	Gabbro
110.94	115.20	Siltstone
115.20	124.50	Gabbro
124.50	131.85	Sediment package
131.85	134.30	Quartz, Quartz vein

Sample Summary with Assays

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT001

Sample	From	To	Width	Type	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
GSMC14182	47.23	47.36	0.13	geoch	65.17	0.61	40.70	24.00	338.40
GSMC14172	50.98	51.13	0.15	geoch	2249.72	18.22	88.00	809.00	217.70
GSMC14181	112.07	112.17	0.10	geoch	10.99	2.96	13.80	19.00	954.70

North Face Geological Ltd.

North Face Geological Ltd.
15575 86 Avenue
Surrey, B.C. V3S 5C8

DRILL HOLE DESCRIPTION
DETAILED GRAPHIC LOG

Project: *2398*

Hole #: LOT002

Comments: HLEM geophysical anomaly

Northing:	5898853.000
Easting:	592936.000
Elevation:	1234.000
Field Location:	1+34S 0+90W

Casing Exposed:	12.2
Casing Size:	NQ
Contractor	Britton Brothers
Assay Lab:	ACME

Length:	109.73
Start Dip:	-45.0
Start Azimuth:	180

Project:	2398
Area:	Lottie
Property:	Eureka

Logged by:	GSM
Log date:	09/10/2000
Date Started:	04/10/2000
Date Finished:	05/10/2000

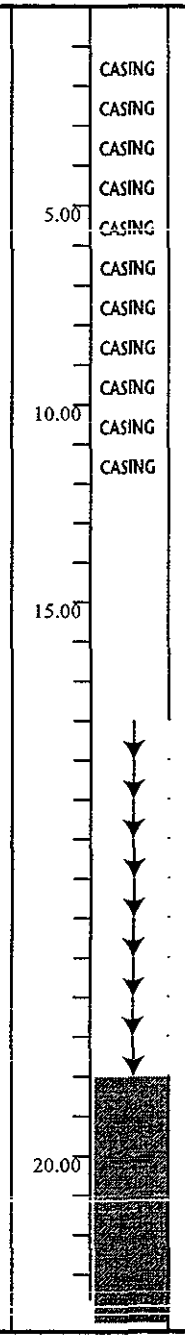
Map Reference:	093H/3
Claim:	Lottie?
Region:	Prince George

Dip Tests

Hole #	Depth	Azimuth	Dip
LOT002	0.00	180.00	-45.00
LOT002	109.73	180.00	-45.00

From	To	Description
0.00	12.19	**NW Casing** *through overburden*
12.19	18.29	**Chert** *light grey to light pink/purple chert. Massive very fine grained, structureless (no apparent bedding)* *Locally pyritic: 1-2%py disseminated euhedral cubes @ 17.50m* *Alteration: silicification, blotchy pale white and light pink/purple silica, locally brecciated by qtz-epidote altn.* *Chert displays radiate/fibrous spherulites (pellet-like bodies) See petrographic report.*
18.29	18.76	**Tuff** *tuffaceous horizon, light to medium green. Apparent rhythmic bedding defined by fg thin (1-4mm) discontinuous pink and green beds.* *Separated by grey to dark grey fine lapilli (?) tuff 1cm thick beds.* *Possibly graded spherical white grains (lapilli) or crystals?* *Disseminated minor trace pyrite.* *@0.00 S0 75.00°*
18.76	28.00	**Cherty Siltstone** *Purple green cherty siltstone. Minor qtz-epidote altn* *Minor graphitic interbeds @ 27m. Trace disseminated euhedral pyrite.* *Locally thin 1mm chlorite veinlets (20-30 degrees to CA)*

py



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
17.40	17.50	0.10	LOT00217.4	51.46	6.89	15.30	46.00	206.90
18.60	18.70	0.10	LOT00218.6	912.00	24.85	106.70	160.00	248.80

From	To	Description

28.00 - 33.40 Chert

Light grey chert (locally light purple-green)

Finely bedded in places. Trace-1% pyrite disseminated and along veins and fractures.

Minor qtz-epidote altn

@30.00 S0 70.00°

33.40 - 37.00 Cherty Siltstone

Siliceous siltstone-cherts. Fractured and sheared (probably flexural shearing along bedding planes). Containe 30-40% graphitic fracture fill and remobilized graphite. Finely diss. py along gf. bands. More sheared along bottom of interval

10cm of intercalated more competent sediment(?) alt'd with chl-sericite-carbonate.

37.00 - 40.60 Gabbro

Fine to medium crystalline, medium green

Qtz-cc veining up to 1cm thick. Near upper contact is altn zone (contact) ser-chl-sillimanite (wispy fg mineral)

40.60 - 49.40 Basalt

Fresh: light grey to olive green to creamy olive green. Massive, fg.

1% minor qtz-cc veining

1-2% chl veining, locally up to 1cm thick.

Fault gouge @47.14-47.28 (45 degrees to CA)

Below fault zone, basalt locally sericitized.

49.40 - 49.86 Tuff-Lapili Tuff

Light grey to purple, very fine grained. Overlies chert by draping over it and a basalt clast as a blanket. Average lapilli 3-4mm, ranges

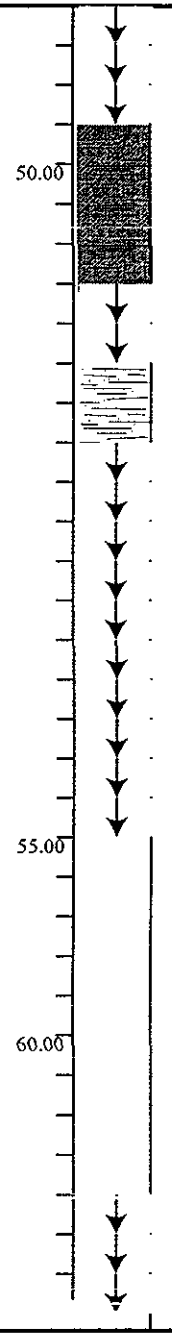
py

25.00
30.00
35.00
40.00
45.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
29.50	29.60	0.10	LOT00229.5	40.98	3.94	25.50	45.00	300.50
41.76	41.93	0.17	GSMC14183	94.13	0.40	74.90	40.00	1541.80

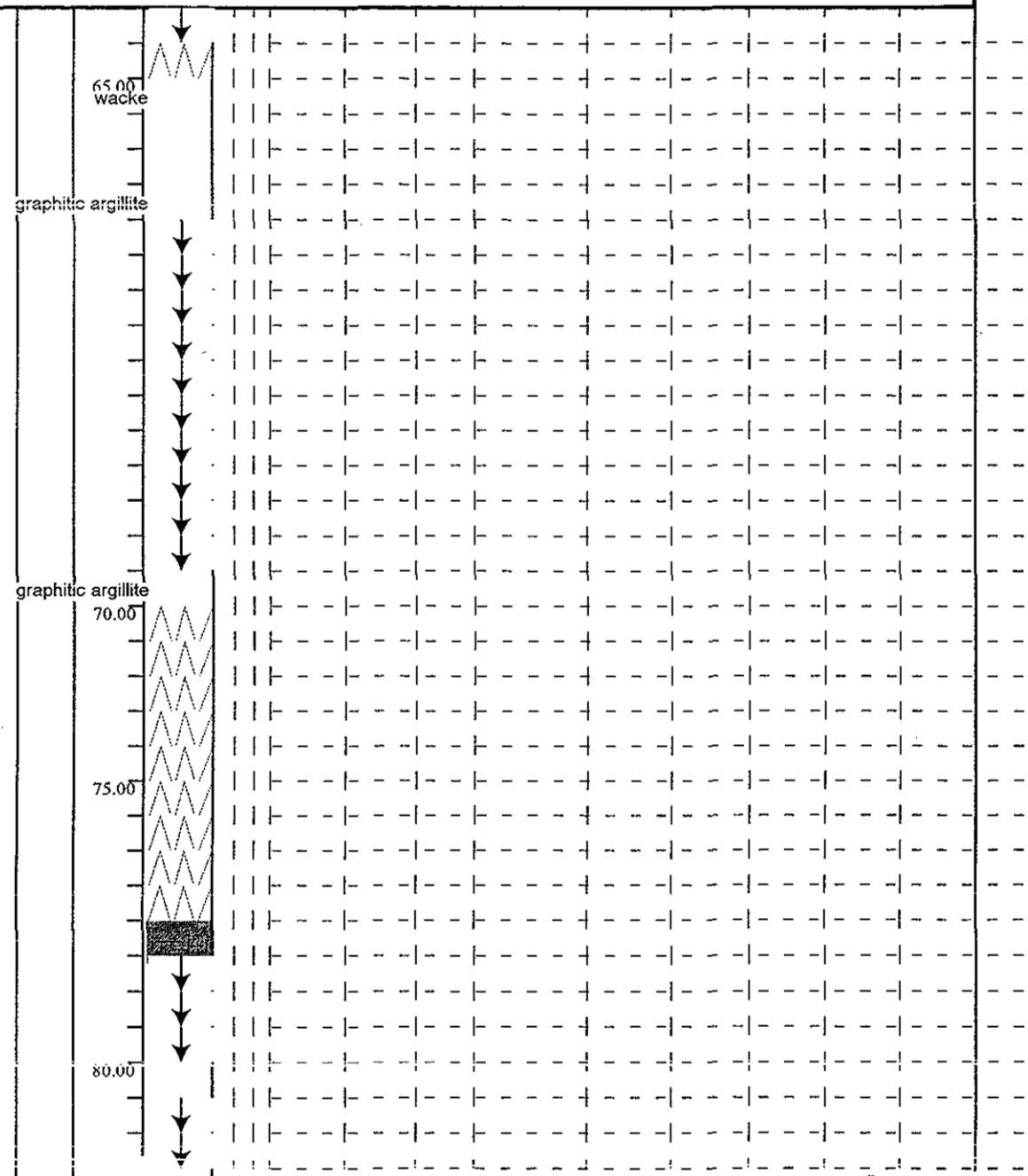
From	To	Description
		up to 1.5cm long. Lapilli of basalt and chert. Upper contact with basalt all broken up and hard to discern relationship. *@49.50 S0 90.00*
49.86	53.55	**Cherty siltstone and chert** *Medium grey cherty siltstones and cherts. Weakly foliated, graphitic fracture planes and possibly bedding planes. Trace blebs py. Intercalated m. grey mg. qtz wacke, fairly massive (51.13-51.33) Lower contact is 2cm thick fault gouge.* *@51.00 S0 70.00*
53.55	55.80	**lapilli tuff** *Light creamy green to purply green, multilayered package of finely bedded lapilli tuff and coarser interbedded epiclastic? units. Lapilli tuff: vfg. light green-purple matrix with elongate up to 5cm long lapilli. Aspect ratios of 5:1 and clasts tend to be dominantly qtz and chert. Interbedded units: roughly parallel to bedded lapilli tuff. 2-3 units the largest being 10cm thick. Matrix pale tan-green hardness of 4, with poorly sorted (1-10mm) clasts of qtz (subangular to subrounded). matrix supported, very weak alignment of clasts. Epiclastic syn-volcanic sediment (slurry-like).* *@54.00 S0 70.00°*
55.80	64.10	**Altered basalt** *Altered basalt. (55.80-60.96m): Medium green basalt with chlorite-sericite-carbonate alteration. Sericite is tan coloured, soft, and intergrown with green chlorite. Unit fizzes when scratched, carbonate alteration Minor cc-qtz veining. Mislatch at 58.30 meters (60.96-64.10): Altered basalt, sericite-carbonate-chlorite alteration. Medium grey-cream tan. Locally intense sericite alteration is mottled peachy-tan coloured blobs intergrown with dark green-brown chlorite. Minor black clay-chlorite fracture fill veinlets 2-3%. Average of this unit is medium grey-tan and soft as a result of ser carb altn. Locally grinds into fine talc-like powder between*

py



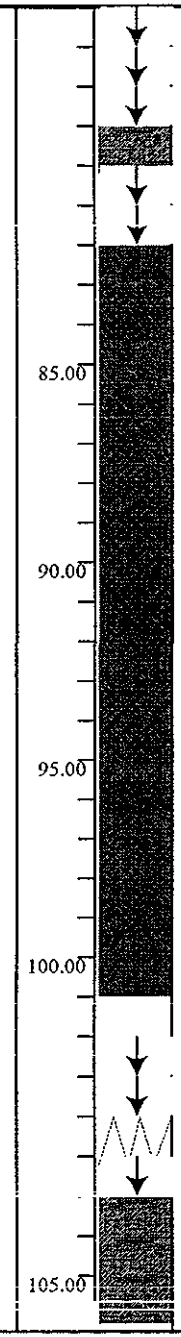
From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
57.94	58.02	0.08	GSMC14184	60.09	1.19	106.50	38.00	437.00
62.77	62.91	0.14	GSMC14185	73.88	1.67	96.50	54.00	44.40

From	To	Description
		fingers.
64.10	69.65	**Sheared Wackes & Argillites** *Upper contact fault gouge brecciated, cc veining, graphite and clay (64.10-65.00m)* *65.00- 66.35 wacke qtz wacke, medium green grey, medium grained, minor black argillite interbeds (1-6mm), contains 3 narrow 2-6cm fault gouge zones.* *66.35- 67.77 wacke coarse grained qtz wacke. Subangular to subrounded clasts of qtz up to 4cm diameter. Slight preferred orientation along S0. Chl-qtz matrix? Very close to being clast supported. Lower contact fault gouge (67.77-68.15)* *68.15- 69.65 graphitic argillite black gf argillite with interbeds of mg. green-grey qtz wackes. argillites contain primary tr py. Rip-ups of gf argillites in wackes.* *@68.00 Fault 40.00°* *@69.00 S0 40.00°*
69.65	79.25	**Graphitic Shear Zone** *Black fault gouge of clay and graphite. Semi-large entrained clasts up to 10+cm of:* *1) graphitic argillite* *2) wackes* *3) qtz and cc vein material* *(75.44-76.00): fault slice of intact cg. qtz wacke as seen above in hole.* *@75.00 S1 45.00°*
79.25	80.30	**Graphitic Argillite** *Intact (unsheared) equivalent of overlying sheared unit. Displays evidence of soft sediment defm. and primary brecciation, matrix supported (para-conglomerate). Similar to textures observed in LOT001.*
80.30	81.81	**Altered basalt** *Sericite-carbonate-chlortie alteration.* *Upper and lower contact are depositional. Light grey to creamy*



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

From	To	Description
		tan-green, soft, massive looking.
		Similar to previous alt'd basalt.
		@81.00 S0 55.00°
81.81	82.67	**Chert to cherty siltstone**
		Light to medium grey chert/cherty siltstone. Lower contact fault gouge zone 4cm thick, assoc with qtz-ser-chl veining.
82.67	101.80	**Gabbro**
		Medium crystalline, pale green with black to greeny brown clinopyroxene phenos (alt'd to chl locally?)
		@91m: qtz-cc vein 2 cm thick. Altn envelope 4-5 cm into wallrock.
		mafic phenos alt'd to pale green-tan (sericite-chl). Matrix slightly silicified.
		Fault gouge @ 84.00m, 85.8-86.8m, 94.1-95.3m, 101.3-101.8m (light green clay gouge)
101.80	102.60	**Chert**
		Highly fractured chert(?), very siliceous, 2-3% pyrite blebs along fractures. Upper and lower contacts are fault gouge.
102.60	103.70	**Graphitic fault gouge**
		Similar to thick fault unit above (69.65-79.25)
103.70	109.73	**siltstone**
		Dark grey argillite/siltstone
		possibly cross bedded @108.8m



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
92.86	92.99	0.13	GSMC14186	125.20	0.47	51.50	48.00	46.60
101.80	102.60	0.80	GSMC14187	89.72	0.90	65.90	39.00	2132.80

From	To	Description	py	From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
		Trace pyrite disseminated, ptygmatic 1-5mm qtz-cc veinlets										
		@107.00 55.00°										

Rocktype

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT002

From	To	Rocktype
0.00	12.19	NW Casing
12.19	18.29	Chert
18.29	18.76	Tuff
18.76	28.00	Cherty Siltstone
28.00	33.40	Chert
33.40	37.00	Cherty Siltstone
37.00	40.60	Gabbro
40.60	49.40	Basalt
49.40	49.86	Tuff-Lapili Tuff
49.86	53.55	Cherty siltstone and chert
53.55	55.80	lapilli tuff
55.80	64.10	Altered basalt
64.10	69.65	Sheared Wackes & Argillites
69.65	79.25	Graphitic Shear Zone
79.25	80.30	Graphitic Argillite
80.30	81.81	Altered basalt
81.81	82.67	Chert to cherty siltstone
82.67	101.80	Gabbro
101.80	102.60	Chert
102.60	103.70	Graphitic fault gouge
103.70	109.73	siltstone

Sample Summary with Assays

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT002

Sample	From	To	Width	Type	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
LOT00217.4M	17.40	17.50	0.10	geoch	51.46	6.89	15.30	46.00	206.90
LOT00218.6M	18.60	18.70	0.10	geoch	912.00	24.85	106.70	160.00	248.80
LOT00229.5M	29.50	29.60	0.10	geoch	40.98	3.94	25.50	45.00	300.50
GSMC14183	41.76	41.93	0.17	geoch	94.13	0.40	74.90	40.00	1541.30
GSMC14184	57.94	58.02	0.08	geoch	60.09	1.19	106.50	38.00	437.00
GSMC14185	62.77	62.91	0.14	geoch	73.88	1.67	96.50	54.00	44.40
GSMC14186	92.86	92.99	0.13	geoch	125.20	0.47	51.50	48.00	46.60
GSMC14187	101.80	102.60	0.80	geoch	89.72	0.90	65.90	39.00	2132.30

North Face Geological Ltd.

North Face Geological Ltd.
15575 86 Avenue
Surrey, B.C. V3S 5C8

DRILL HOLE DESCRIPTION
DETAILED GRAPHIC LOG

Project: *2398*

Hole #: LOT003

Comments: HLEM geophysical anomaly

Northing:	5898798.000
Easting:	592522.000
Elevation:	1187.000
Field Location:	2+00S 5+20W

Casing Exposed:	21.4
Casing Size:	NQ
Contractor	Britton Brothers
Assay Lab:	ACME

Length:	134.11
Start Dip:	-45.0
Start Azimuth:	180

Project:	2398
Area:	Lottie
Property:	Eureka

Logged by:	GSM
Log date:	18/10/2000
Date Started:	05/10/2000
Date Finished:	08/10/2000

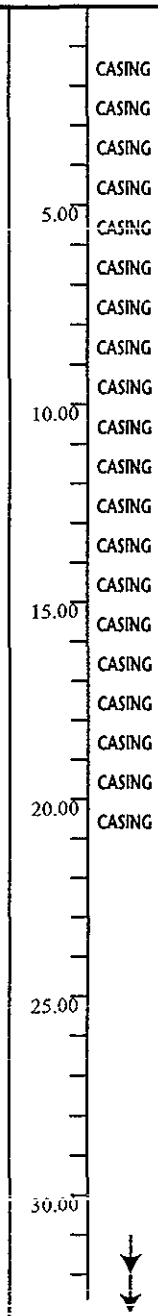
Map Reference:	093H/3
Claim:	Lottie?
Region:	Prince George

Dip Tests

Hole #	Depth	Azimuth	Dip
LOT003	0.00	180.00	-45.00
LOT003	134.00	180.00	-46.00

Hole ID: LOT003 | North Face Geological Ltd. | Project: 2398

From	To	Description
0.00	21.38	**NW Casing** *Through overburden. Cobbles/boulders of basalt+gabbro*
21.38	31.11	**Chert** *Medium grey-green highly fractured chert. Graphitic fracture planes probably reflect bedding surfaces, ie. ribbon chert-like. Lower contact is highly fractured and probably is a discreet fault contact. @25.00 S0 70.00°*
31.11	31.90	**Altered tuff** *Light grey green altered tuff*



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
17.39	17.48	0.09						
17.95	18.05	0.10						
18.53	18.64	0.11						
29.50	29.56	0.06						

From	To	Description
		Fractures in your hand, very soft H:1-2, clay and chl altn
		Locally you can see wisps and elongate lapilli clasts up to 3mm (in
		middle of unit). Massive alt'd section is probably a thicker well
		sorted alt'd ash unit, showing no evidence of bedding or foliation.
		@31.50 S0 67.00°
31.90	**33.00**	**Chert with interbedded tuff**
		Chert with interbedded lapill tuff.
		Chert is medium light grey, fairly massive, contains a discontinuous
		lens of light green tuff, probably a clast 1 cm thick. Minor qtz
		veinlets 1-2mm thick. Upper contact is depositional and looks
		depositional.
		32.36- 32.81 bedded T-LT lapilli tuff, light green, wispy,
		very fine grained. Beds and elongate d. grey clasts, some cherty up to
		3cm long. Wispy beds appear draped over clasts.
		@32.50 S0 85.00°
33.00	**36.33**	**Altered basalt**
		Altered volcanic flow, andesitic-basalt composition
		Light green-olive tan, fresh surface light grey green. Shot through by
		3-4mm qtz-cc veinlets parallel to CA. Faint white blebs approx 2mm
		diameter might represent amygdules. Fizzes when scratched, minor
		calcite locally (might be due to cc amygdules (36.25m)
		Fault gouge @ 34.91-34.97, 35.30-35.50m (minor qtz veining) Lower
		contact of unit is depositional.
		@36.33 S0 50.00°
36.33	**44.56**	**Lapilli tuff**
		Lapille tuff-volcaniclastic
		Pale light green, wispy vfg. beds of ash and very poorly sorted
		lapilli clasts ranging from:
		1)chert
		2)qtz-cc vein material
		3) basalt (alt'd variety)
		Aspect ratios of 5:1, very pale green siliceous tuff locally. Beds
		typically mm's thick but locally there are thicker 5-7cm more well

py

bedded T-LT

35.00

40.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
34.26	34.36	0.10	GSMC14187	89.72	0.90	65.90	39.00	2132.80
41.18	41.32	0.14	GSMC14188	117.53	0.88	71.10	49.00	42.30
41.66	41.76	0.10						
41.76	41.93	0.17	GSMC14183	94.13	0.40	74.90	40.00	1541.80
43.77	43.86	0.09						

From	To	Description

sorted beds.

Near bottom (42.67-44.56) the tuff is interbedded with thin beds of sediments. Light to medium grey chert (42.29-42.54) and minor 2-5 cm beds of cherty argillites and cherts (clasts in tuff are argillite)

Coarse pyrite on fracture faces (minor)

@37.00 S0 55.00°

@42.00 S0 70.00°

@43.00 S0 80.00°

44.56 - 50.31 Altered basalt

Olive green altered basalt. Upper contact is depositional with the tuff. There are thin tuff beds (1-3cm) within the first upper meter of the basalt flow.

Calcite amygdules @ 45.75m

Light-medium grey fresh surface, looks like intermediate volcanic. Weak carbonate alteration, reacts to acid when scratched, minor qtz-cc veinlets. Locally brecciated with chloritic veinlets and fracture fill. Mottled to specks of tan-cream sericite. Disseminated sericite altn up to 80% from 47.00-50.31. Similar to altered volcanics in LOT002.

50.31 - 73.15 Graphitic argillite and wackes

Intercalated package of black graphitic argillites and wackes. In general the sequence coarsens downhole. There is a greater proportion of argillites at the top and more wackes at the bottom. Upper contact with volcanics is discretely fractured with minor fault gouge.

50.60-51.20: bull qtz vein

51.30-52.20: grey limestone with graphitic interbeds and riddled with qtz-cc veining (30%)

52.00-58.22: Intercalated gf. argillite with clasts of m-cg. wacke (20%). Clasts up to 5cm. Shearing is common along gf. rich beds and in some places it is purely graphitic fault gouge similar to conductor in LOT002. Interbeds of m-cg. wacke up to 10cm thick. Soft sediment defm between gf. argillites and slightly more competent wacke beds. Wacke "floating" in black argillite, like load structures from dewatering of

py

45.00

50.00

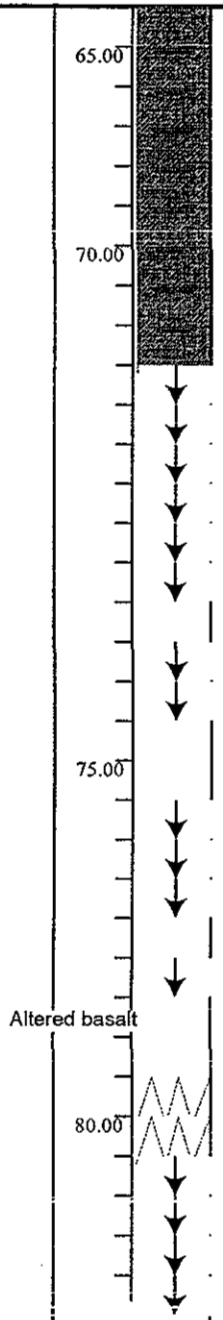
55.00

60.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
49.50	49.69	0.19	GSMC14190	59.62	2.01	86.60	48.00	99.70
53.74	53.85	0.11						
57.00	57.10	0.10						
57.74	58.84	1.10	GSMC14184	60.09	1.19	106.50	38.00	437.00

From	To	Description
		a sediment pile(?). Unit highly sheared. minor tr py as clasts an in matrix.
		58.22-73.15: dominantly m-cg. wacke, medium to dark grey. Clasts up to 7mm in certain beds. Clasts of qtz, argillite dominantly. matrix qtz-chl? Soft sediment defm evident at argillite/wacke contacts. Associated with graphitic argillite is clastic breccia. Rare thin primary beds of pyrite parallel to foliation. (67.50-68.60): graphitic argillite bed with boudinaged (transposed qtz-cc veinlets). Movement along planes.
		Fault gouge @ 65.36-65.51, 69.7-69.79m
		Minor pyrite (tr) as euhedral cubes in wacke and as rare stringers (2mm thick)
		@53.00 S0 55.00°
		@56.00 S0 65.00°
		@68.00 S0 35.00°
73.15	74.63	**Quartz, Quartz vein**
		Quartz vein with graphitic to chloritic selvages. Trace pyrite within selvages.
74.63	76.20	**Altered basalt**
		Highly fractured and altered basalt(?)
		light grey to light green, fairly soft (H:3)
		weak carbonate altn, reacts to HCl when scratched
		Sericite-chlorite altn, graphitic fracture fill, Upper contact faulted
76.20	77.70	**Quartz, Quartz vein**
		qtz vein, chloritic selvages (tr py)
77.70	81.58	**Shear zone**
		77.70- 78.40 Altered basalt sheared and brecciated olive green altered basalt (similar to 74.63-76.2) in a graphitic matrix.
		Qtz-cc vein material present (30%)
		Shear foliation at 50-60 degrees to CA.
		Gradational contact from sheared volcanics and vein material down into qtz+sheared gf. argillite into gf. fault gouge. (similar to LOT002 conductor)

py



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

From	To	Description
		79.56-79.83: qtz vein, highly sheared and fractured
		@78.00 SI 55.00°
81.58	**94.90**	**Gabbro**
		Gabbro, medium green, fairly non-descript, tr py., medium crystalline.
		Variably altered, mafics to chl+ser? (olive green and pink specks)
		5% qtz veins 0.1-2cm thick
94.90	**123.60**	**Chert**
		light grey siliceous sediment (chert-cherty argillite)
		Fairly massive and structureless. Very shallow dip, drilling down-dip.
		Highly fractured, bleached appearance on drilled surface (more sugary gray on fresh surface).
		@100.00 S0 5.00°
		Pressure soln black stylolites, minor chlorite (2-5% fracture fill).
		Minor interbedded siltstone units H<5

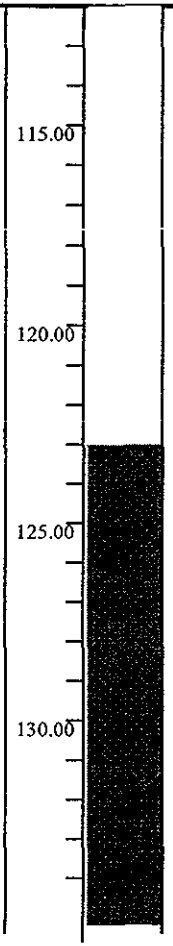
py

85.00 90.00 95.00 100.00 105.00 110.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
89.00	89.20	0.20	GSMC14191	57.72	3.32	51.20	58.00	152.60
91.00	91.10	0.10						
92.86	92.99	0.13	GSMC14186	125.20	0.47	51.50	48.00	46.60
101.80	102.60	0.80	GSMC14173	3.59	1.75	6.20	9.00	185.90
108.00	108.10	0.10						
108.45	108.57	0.12	GSMC14192	3.66	2.17	5.30	12.00	108.90

From	To	Description
123.60	134.11	**Gabbro** *Medium green, medium crystalline gabbro.* *123.6 - 124.2: altn zone (contact metam.) Mafic phenos in pristine gabbro are blobby mottled light green and light pink (olivine-epidote + sericite?)* *2-3% qtz-cc veins* *minor sericite altn.*

py



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

Rocktype

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT003

From	To	Rocktype
0.00	21.38	NW Casing
21.38	31.11	Chert
31.11	31.90	Altered tuff
31.90	33.00	Chert with interbedded tuff
33.00	36.33	Altered basalt
36.33	44.56	Lapilli tuff
44.56	50.31	Altered basalt
50.31	73.15	Graphitic argillite and wackes
73.15	74.63	Quartz, Quartz vein
74.63	76.20	Altered basalt
76.20	77.70	Quartz, Quartz vein
77.70	81.58	Shear zone
81.58	94.90	Gabbro
94.90	123.60	Chert
123.60	134.11	Gabbro

Sample Summary with Assays

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT003

Sample	From	To	Width	Type	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
GSMC14187	34.26	34.36	0.10	geoch	89.72	0.90	65.90	39.00	2132.80
GSMC14188	41.18	41.32	0.14	geoch	117.53	0.88	71.10	49.00	42.30
GSMC14183	41.76	41.93	0.17	geoch	94.13	0.40	74.90	40.00	1541.80
GSMC14190	49.50	49.69	0.19	geoch	59.62	2.01	86.60	48.00	99.70
GSMC14184	57.74	58.84	1.10	geoch	60.09	1.19	106.50	38.00	437.00
GSMC14191	89.00	89.20	0.20	geoch	57.72	3.32	51.20	58.00	152.60
GSMC14186	92.86	92.99	0.13	geoch	125.20	0.47	51.50	48.00	46.30
GSMC14173	101.80	102.60	0.80	assay	3.59	1.75	6.20	9.00	185.90
GSMC14192	108.45	108.57	0.12	geoch	3.66	2.17	5.30	12.00	108.90

North Face Geological Ltd.

North Face Geological Ltd.
15575 86 Avenue
Surrey, B.C. V3S 5C8

DRILL HOLE DESCRIPTION
DETAILED GRAPHIC LOG

Project: *2398*

Hole #: LOT004

Comments: geology

Northing:	5899076.000
Easting:	593017.000
Elevation:	1219.000
Field Location:	1+50N 0+00E

Casing Exposed:	22.9
Casing Size:	NQ
Contractor	Britton Brothers
Assay Lab:	ACME

Length:	176.78
Start Dip:	-45.0
Start Azimuth:	180

Project:	2398
Area:	Lottie
Property:	Eureka

Logged by:	GSM
Log date:	19/10/2000
Date Started:	08/10/2000
Date Finished:	09/10/2000

Map Reference:	093H/3
Claim:	Lottie?
Region:	Prince George

Dip Tests

Hole #	Depth	Azimuth	Dip
LOT004	0.00	180.00	-45.00
LOT004	176.70	180.00	-42.00

From	To	Description
0.00	22.86	**NW Casing** *Through till/colluvium*
22.86	31.55	**Highly fractured zone** *Highly fractured zone* *22.86-24.0: re-cored boulders of gabbro, basalt* *24.00-31.55: highly fractured, altered cherty sediment or fg volcanic?* *Light grey-green, chl altered, 5-10% qtz veining*
31.55	33.70	**Chert** *Pale green chert*

py

CASING

5.00 10.00 15.00 20.00 25.00 30.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

From	To	Description
		Thin 3-4mm purple jasper-like bands, minor brecciation, chl fracture coating, upper and lower contact fractured @33.00 S0 75.00°
33.70	61.00	**basalt**
		Massive, excellent recovery, medium green-grey, local carbonate altn. Fine to medium crystalline (approaching a micro-gabbro appearance locally)
		37.85- 39.62 Chert interbedded chert, light grey green. Upper and lower contact fractured.
		Chlorite fracture coating. Qtz-cc veining up to 4cm thick (overall 2-3%)
		55.78-56.10: qtz-cc-graphite breccia (fault zone) @38.00 S0 70.00°
61.00	71.33	**Intermediate volcanic**
		Medium grey-green volcanic (alt'd intermediate?)

py

Chert

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
49.64	49.82	0.18	GSMC14193	29.16	0.95	69.10	19.00	24.70
54.67	54.78	0.11						

From	To	Description
		Massive, structureless, blocky fracturing habit. Minor carbonate alteration. Minor sericite flecks (2-3% locally) looks similar to rocks found in Lottie trench. 68.25-68.75: medium to dark grey silicification, associated patchy epidote alteration. Minor silicification at 71.0-71.33m
71.33	79.00	**Basalt** *Basalt with minor intercalated tuff(?) unit. Medium to dark green, medium crystalline, locally brecciated and silicified. Minor chl altn, chl and gf. fracture coating. minor carbonate alteration 76.73- 77.11 Ť Siliceous tuff horizon (felsic?). Finely bedded, dark to light grey. Wispy beds up to 4mm thick. @77.00 S0 60.00°*
79.00	100.58	**Gabbro** *Non-descript gabbro, medium green, medium crystalline cpx(?) phenos Fault @ 97.20m (chl-gf fracture fill)*

py

65.00 70.00 75.00 80.00 85.00 90.00 95.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
68.85	69.03	0.18	GSMC14194	81.85	1.97	58.60	18.00	96.80
69.37	69.50	0.13						
69.40	69.50	0.10	LOT00469.4	21.24	6.30	30.30	13.00	85.70
76.98	77.04	0.06						
77.00	77.10	0.10	LOT00477M	32.68	0.69	22.00	9.00	9.80
89.37	89.45	0.08						
95.07	95.26	0.19	GSMC14195	21.66	0.40	68.40	23.00	44.50

From	To	Description

100.58 - 105.28 Cherty siltstone

light to dark grey cherty siltstone. highly fractured with qtz and chl or black clay infill. Fairly massive, no obvious bedding. 2-3% qtz veins approx 5mm thick.

Locally highly silicified and brecciated.

105.28 - 119.78 Gabbro

Gabbro, similar to previously described unit

117.30-119.74m either microgabbro or medium crystalline basalt.

119.78 - 152.00 Siltstone & Argillites

Interbedded cherts, siltstones, argillites

119.74-131.00: pale green massive cherty siltstone (siliceous siltstone) with minor argillite clasts (1-4cm). Grades downward into light to medium grey chert (smallest beds approx 1cm thick). minor py coated fractures (smeared py). Minor qtz veins.

@126.00 S0 53.00°

@130.50 S0 55.00°

131.00-151.20: finely bedded grey chert and black argillite, beds from 1-10mm, grades down into dominantly black argillite with minor chert.

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

From	To	Description
		Minor folding and crenulations. Minor qtz-cc veins (1% overall). Lower contact cherty argillite grades into massive light grey chert.
		151.20-152.0: light grey massive chert (intruded by following weakly mineralized mafic dyke)
		@132.00 S0 65.00°
		@135.00 S0 35.00°
		@141.00 S0 60.00°
		@146.00 S0 40.00°
		@151.00 S0 50.00°
		folding @ 146.5m
152.00	**155.70**	**Mafic Dyke (weakly mineralized**
		Weakly mineralized mafic dyke?, Characterized by brecciated alt'd upper contact
		152-153.5: highly brecciated, intrusive dykelet contacts. Fe-chl veins filling matrix. Pale olive green altn vfg. H>5
		Later py coming in along 1cm qtz-cc veins. Trace chalcopyrite in breccia matrix. Trace-1% pyrrhotite in breccia matrix and remobilized in qtz veintets.
		153.5-155.36: Medium grey green diabase dyke, 2-3% qtz-cc veining, weak sericite diss. altn 2-3%.

py

130.00
135.00
140.00
145.00
150.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
130.00	130.10	0.10	LOT004130	49.54	3.63	78.30	23.00	556.00
130.10	130.26	0.16	GSMC14196	72.75	0.51	61.80	28.00	9.40
140.70	140.85	0.15						
152.00	152.95	0.95	GSMC14174	32.75	0.56	39.10	38.00	530.20
152.95	153.70	0.75	GSMC14175	71.37	1.14	69.90	42.00	802.90
153.00	153.10	0.10						

From	To	Description
		Lower contact qtz-cc breccia vein 2cm thick.
		155.36-155.70: Alteration contact, light grey fresh, chl+qtz veins.
155.70	176.78	**Siltstone & Argillite**
		Monotonous section of interbedded cherts and argillite/siltstones.
		Light-dark grey cherts interbedded with dark grey-black
		argillite/siltstones
		Largest chert beds 3 cm thick (1-2cm average)
		Trace diss py along bedding planes
		Locally chert beds contain pin prick sphereulites.
		@162.00 S0 65.00°
		@168.00 S0 62.00°
		@173.30 S0 75.00°
		@174.00 S0 73.00°

py

155.00
160.00
165.00
170.00
175.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
173.70	173.80	0.10						

Rocktype

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT004

From	To	Rocktype
0.00	22.86	NW Casing
22.86	31.55	Highly fractured zone
31.55	33.70	Chert
33.70	61.00	basalt
61.00	71.33	Intermediate volcanic
71.33	79.00	Basalt
79.00	100.58	Gabbro
100.58	105.28	Cherty siltstone
105.28	119.78	Gabbro
119.78	152.00	Siltstone & Argillites
152.00	155.70	Mafic Dyke (weakly mineralized
155.70	176.78	Siltstone & Argillite

Sample Summary with Assays

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT004

Sample	From	To	Width	Type	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
GSMC14193	49.64	49.82	0.18	geoch	29.16	0.95	69.10	19.00	24.70
GSMC14194	68.85	69.03	0.18	geoch	81.85	1.97	58.60	18.00	96.80
LOT00469.4M	69.40	69.50	0.10	geoch	21.24	6.30	30.30	13.00	85.70
LOT00477M	77.00	77.10	0.10	geoch	32.68	0.69	22.00	9.00	9.80
GSMC14195	95.07	95.26	0.19	geoch	21.66	0.40	68.40	23.00	44.50
LOT004130M	130.00	130.10	0.10	geoch	49.54	3.63	78.30	23.00	556.00
GSMC14196	130.10	130.26	0.16	rep	72.75	0.51	61.80	28.00	9.40
GSMC14174	152.00	152.95	0.95	Assay	32.75	0.56	39.10	38.00	530.20
GSMC14175	152.95	153.70	0.75	Assay	71.37	1.14	69.90	42.00	802.90

North Face Geological Ltd.

North Face Geological Ltd.
15575 86 Avenue
Surrey, B.C. V3S 5C8

DRILL HOLE DESCRIPTION
DETAILED GRAPHIC LOG

Project: *2398*

Hole #: LOT005

Comments:

Northing:	5910120.000
Easting:	599545.000
Elevation:	1067.000
Field Location:	5+50N 0+00W

Casing Exposed:	35.0
Casing Size:	NQ
Contractor	
Assay Lab:	

Length:	35.10
Start Dip:	-50.0
Start Azimuth:	220

Project:	
Area:	
Property:	

Logged by:	
Log date:	/ /
Date Started:	/ /
Date Finished:	/ /

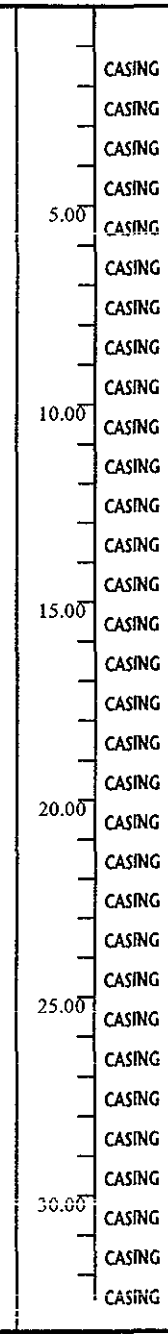
Map Reference:	
Claim:	
Region:	

Dip Tests

Hole #	Depth	Azimuth	Dip
LOT005	0.00	220.00	-50.00
LOT005	35.00	220.00	-50.00

From	To	Description
0.00 -	35.10	Casing
Glacial Overburden		

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm



From	To	Description	py
		CASING	
		CASING	
		CASING	

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

Rocktype

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT005

From	To	Rocktype
0.00	35.10	Casing

North Face Geological Ltd.

North Face Geological Ltd.
15575 86 Avenue
Surrey, B.C. V3S 5C8

DRILL HOLE DESCRIPTION
DETAILED GRAPHIC LOG

Project: *2398*

Hole #: LOT006

Comments: HLEM geophysical anomaly

Northing:	5916427.000
Easting:	596306.000
Elevation:	1076.000
Field Location:	2+37N 0+20W

Casing Exposed:	51.0
Casing Size:	NQ
Contractor	Britton Brothers
Assay Lab:	ACME

Length:	102.72
Start Dip:	-50.0
Start Azimuth:	240

Project:	2398
Area:	Lottie
Property:	Eureka

Logged by:	GSM
Log date:	21/10/2000
Date Started:	15/10/2000
Date Finished:	21/10/2000

Map Reference:	
Claim:	Bow?
Region:	Prince George

Dip Tests

Hole #	Depth	Azimuth	Dip
LOT006	0.00	240.00	-50.00

Hole ID: LOT006 North Face Geological Ltd. Project: 2398

From	To	Description
0.00 -	51.00	HW+NW Casing

Through overburden and clay. Recorded clay lenses @

1) 20.4-21.4m

2)43.8-44.8m

3)47.9-49.9m

Probable conductors

py

CASING

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm

From	To	Description
		CASING
		CASING
	35.00	CASING
		CASING
		CASING
		CASING
		CASING
	40.00	CASING
		CASING
		CASING
		CASING
		CASING
		CASING
	45.00	CASING
		CASING
		CASING
		CASING
		CASING
	50.00	CASING
51.00	61.60	**Basalt (amygdaloidal)**
		Highly fractured near top 3m of unit, dark grey to green, minor qtz-cc veining.
		Amygdules are common (5-7%), 3-8mm in diameter, lighter grey, H:4-6, locvally chl altered.
		58.86-60.20: Alteration zone-breccia, qtz+cc breccia, discontinuous.
		Clasts angular up to 1cm, dominantly chl alt'd basalt?
	55.00	
	60.00	
61.60	70.00	**Altered basalt**
		Altered basalt, highly fractures, poor recovery, no amygdules, dark gree to black, relatively higher mag susc reading compared to overlying unit.
		Fresh surfaces are medium green to light grey depending on altn
	65.00	

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
60.29	60.46	0.17	GSMC14196	72.75	0.51	61.80	28.00	9.40

From	To	Description
		composition.
		Mn-oxide black altn product coating all fracture surfaces, forming dendritic fracture networks an as blotchy altn locally. Associated with chlorite.
70.00	72.60	**Gabbro dyke**
		Medium crystalline medium green gabbro dyke.
72.60	77.45	**Altered basalt**
		Altered basalt, medium green grey, massive, chlorite fracture coating, minor Mn-oxide veining/fracture fill.
77.45	79.75	**Intermediate volcanic**
		Light grey intermediate volcanic(?)
		3-5% mafic phenos (1-2mm), up to 10% calcite crystals/blebs. Possibly a porphyritic volcanic flow or a crystal tuff? !?
		75.5-79.4: qtz-cc vein with selvages/clasts of wallrock.
		79.4-79.5: clay fault gouge
		Lower contact with thinly bedded chert looks depositional.
		@79.50 S0 80.00°
79.75	82.20	**Chert**
		Medium grey and purple chert. Thin 2-3mm beds of green chert define S0. Conchoidal fracture
		80.75-81.95: 50% qtz-cc veining parallel to CA
		81.95-82.20: dark grey rehealed fault breccia and recored pebbles.
		@80.00 S0 60.00°
82.20	84.43	**Volcanic/dyke?**
		Medium grey fine grained volcanic or dyke.
		H>5, intermediate or rhyolitic composition. Lacks the conchoidal fracture of overlying chert. Maybe recrystallized chert?
		More of a sugary fracture indicating a volcanic.
		Qtz-cc-chl veining 1-2%. Too many veins to get good geochem sample.
84.43	87.48	**Basalt**
		Basalt with minor amygdules, moderately altered (chl, qtz-cc)

py

70.00

75.00

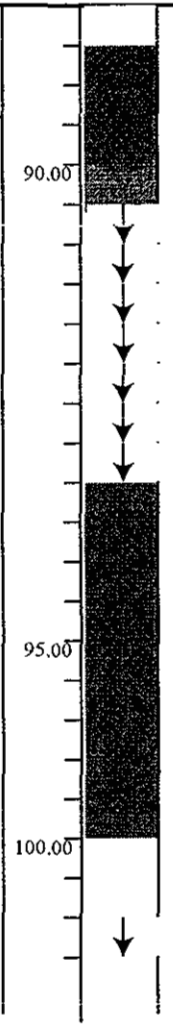
80.00

85.00

From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
68.35	68.46	0.11						
77.70	77.80	0.10						
79.50	79.68	0.18	GSMC14197	58.27	0.82	75.30	48.00	70.60
79.75	79.85	0.10						
83.00	83.10	0.10						

From	To	Description
87.48	90.80	**Gabbro** *Medium green gabbro, fine to medium crystalline. Similar to above gabbro.*
90.80	91.77	**Undifferentiated sediments** *Sediments:* *Massive fg. light grey siltstone grading down into purple to medium grey chert (1-2cm beds)* *Interbedded clastic lithic wackes (2cm beds)* *Lower contact faulted.* *@91.00 S0 77.00°* *@91.50 S0 85.00°*
91.77	100.40	**Gabbro** *Fine to medium crystalline microgabbro, grey green, variably altered (chl-cc), qtz veining, Possibly a medium crystalline mafic volcanic.* *91.77-92.0: vfg. light grey volcanic (similar to underlying unit)*
100.40	102.72	**Intermediate volcanic** *Carbonate altered intermediate volcanic. Light grey, soft, fizzes to acid when scratched.*

py



From	To	Width	Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
99.20	99.45	0.25	GSMC14198	64.38	0.82	63.90	34.00	40.70
102.00	102.10	0.10						

Rocktype

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT006

From	To	Rocktype
0.00	51.00	HW+NW Casing
51.00	61.60	Basalt (amygdaloidal)
61.60	70.00	Altered basalt
70.00	72.60	Gabbro dyke
72.60	77.45	Altered basalt
77.45	79.75	Intermediate volcanic
79.75	82.20	Chert
82.20	84.43	Volcanic/dyke?
84.43	87.48	Basalt
87.48	90.80	Gabbro
90.80	91.77	Undifferentiated sediments
91.77	100.40	Gabbro
100.40	102.72	Intermediate volcanic

Sample Summary with Assays

North Face Geological Ltd.

PROJECT: *2398*

Hole ID: LOT006

Sample	From	To	Width	Type	Cu ppm	Pb ppm	Zn ppm	Ag ppb	Ba ppm
GSMC14196	60.29	60.46	0.17	geoch	72.75	0.51	61.80	28.00	9.40
GSMC14197	79.50	79.68	0.18	geoch	58.27	0.82	75.30	48.00	70.60
GSMC14198	99.20	99.45	0.25	geoch	64.38	0.82	63.90	34.00	40.70

Appendix X

PROJECT EXPENDITURES

&

ASSESSMENT DATA

Work Type	Total Cost	Eureka %	Eureka Portion	with O/H
Tills	160,066	72.19	115,552	127,107
Moss Mats	54,083	35.19	19,032	20,935
Bedrock Mapping	78,078	100	78,078	85,886
Surficial Mapping	30,531	100	30,531	33,584
Airborne Geophysics	27,335	0	0	-
Ground Geophysics	49,813	100	49,813	54,794
Staking	22,610	0	0	-
Linecutting	117,870	100	117,870	129,657
Trenching	16,165	100	16,165	17,782
Diamond Drilling	97,003	100	97,003	106,703
Total	653,554		524,043	576,448
		Overhead (10%)	52,404	
		Total	576,448	

assessment required *	622,000
	576,448
from Eureka PA	45,552
assessment fees	37,560

* *brings all claims up to January 31, 2005*

FILED January 30, 2001

HUDSON BAY EXPLORATION & DEVELOPMENT Co. Ltd. - PROJECT EXPENDITURES 2000

PROJECT: EUREKA OPTION (2398)

	January	February	March	April	May	June	July	August	Sept	October	Nov	Dec	Total	Recce	TOTAL
Office - salaries, permanent			505			2,900	1,500	300		291	869	1,659	8,024	field costs	8,024
- salaries, casuals			1,058	434						5,300	14,080	10,883	31,755	only	31,755
- contractors				5,590	5,495	150	1,100				5,350	8,700	26,385		26,385
- communication	4		52									212	268		268
- supplies				148		78				105		203	533		533
- data	118			921	168		32			76		56	1,371		1,371
- assessment fees				6,500								37,560	44,060		44,060
- general charges												2,116	2,116		2,116
Office Total	122	0	1,615	13,593	5,663	3,128	2,632	300	0	5,772	20,299	61,388	114,512		114,512
Option Payments									40,000				40,000		40,000
Field - salaries, permanent					2,781	16,343	2,609	954					22,687	1,107	23,794
- salaries, casuals					7,861	37,872	26,743	23,235	27,814	14,938			138,463	16,710	155,173
- contract work					4,000	12,040	12,900	10,320		17,710			56,970		56,970
- geology, bedrock						137	1,056					302	1,495		1,495
- geology, surficial						94	70						165		165
- geochem, tills					200	545	267						1,012		1,012
- geochem, moss mats													0		0
- airborne geophysics												26,000	26,000		26,000
- linecutting										69,304			69,304		69,304
- ground EM/magnetics												38,759	38,759		38,759
- trenching										5,792			5,792		5,792
- drilling										46,858	12,376		59,234		59,234
- road & bridge work										462	5,399		5,861		5,861
- assays							16,191	9,818	9,520	5,968	1,049	14,179	56,725	4,377	61,102
- administration				278	250		450	181	13	305			1,477		1,477
- safety					656		100			24			780		780
- field supplies					4,291	1,728	1,034	152	179	1,039	73		8,495	1,171	9,666
- camp (cooking)													0		0
- accommodation			1,500		1,240	3,298	3,022	2,405	1,289	2,174	3,337	598	18,862	1,515	20,377
- groceries,meals					422	5,943	4,226	1,962	39	10,066	-54		22,604	13	22,617
- camp supplies					2,482			1,025					3,507		3,507
- communication					2,445	669	1,825	1,178		2,197	282		8,596		8,596
- freight					610	1,005	1,187	276	340	969	274		4,662		4,662
- transport, air fares						2,730	2,310	688	5	487			6,220	241	6,461
- transport, air charters							3,627						3,627		3,627
- transport, ground					1,068	4,209	8,437	6,709	671	14,510	7,209	1,673	44,487	25	44,512
- staking (incl. Fees)		6,460			3,060		5,780	2,720	4,590				22,610		22,610
Field Total	0	6,460	1,500	278	31,366	86,614	91,835	61,622	44,460	192,803	29,946	81,511	628,394	25,159	653,553
TOTAL	122	6,460	3,115	13,871	37,029	89,742	94,467	61,922	84,460	198,575	50,245	142,899	782,906	25,159	808,065

Eureka Project - Mandays of Work

	May	June	July	August	September	October	TOTAL
Bidwell	14	28	30	24	20	20	**136**
Heaton	8	23	31	21	29		**112**
Mulligan	10	28	23	22	24	25	**132**
de Wit		10	6		11	26	**53**
Hefferan		16					**16**
Richardson	7	22					**29**
Spooner	7	22					**29**
Paulen	5	16		24	1		**46**
Parsi	9	27	26	23	23	26	**134**
McMillan	8	23					**31**
Brown	8	30	29	22	30	25	**144**
Total	**76**	**245**	**145**	**136**	**138**	**122**	**862**

HBED SALARIES - breakdown by work type

	Estimated Costs	Actual Costs
Till Sampling	63,807	67,806
Moss Mat Sampling	17,766	18,879
Bedrock Mapping	32,751	34,804
Surficial Mapping	16,142	17,154
Airborne Evaluation	700	744
Ground Geophysics	310	329
Linecutting	10,370	11,020
Trenching	5,416	5,755
Drilling	9,150	9,723
Administration	10,190	10,829
Camp (General)	13,582	14,433
Camp (Cook)	29,580	31,434
Travel	12,258	13,026
TOTAL	**222,022**	**235,937**

Field estimate of total field wages was $222,022
Actual field wages was $235,937
Therefore estimated field wages by work type was increased by 6.27% to get actual field wages by work type.

Eureka Project (2000) - Expenditures by Work Type

Work Types (support costs redistributed)	number of Units	number of Man-days (incl. Contractors	Direct Costs		Camp Costs		Travel Costs		TOTAL COST	Cost per unit
			Salaries	Supplies Services	Food	Accommod	Salaries	Supplies Services		
Till Sampling	807	255	70,806	38,404	8,142	15,765	5,290	21,659	160,066	198.35 / sample
Moss Mat Sampling	449	63	19,879	19,159	2,011	3,895	1,202	7,936	54,083	120.45 / sample
Bedrock Mapping	122	122	37,804	13,095	3,898	7,544	2,328	13,410	78,078	639.98 / day
Surficial Mapping	50	50	18,154	1,206	1,603	3,094	954	5,521	30,531	610.63 / day
Airborne Geophysics	343	1	744	26,021	32	62	19	458	27,335	79.70 / line-kilometre
Ground Geophysics	71.6	70	829	40,216	2,232	4,325		2,210	49,813	695.71 / line-kilometre
Staking	214	60	22,610						22,610	105.65 / claim-unit
Linecutting	70.414	271	11,520	74,944	8,613	16,736	-	6,057	117,870	1,673.95 / line-kilometre
Trenching	796	18	5,755	7,200	565	1,108	343	1,194	16,165	20.31 / metre3
Diamond Drilling	709.4	136	11,552	63,139	4,338	8,405	2,890	6,678	97,003	136.74 / metre
Total		1046	199,654	283,382	31,434	60,934	13,026	65,123	653,553	

in addition to above man-days there were also 27 man-days of admin, 60 man-days for general camp work, 143 man-days of cooking and 40 man-days of travel.

EUREKA PROJECT - DISTRIBUTION OF SUPPORT COSTS

		Tills	Moss Mats	Bedrock Map	Surficial Map	Airborne EM	Ground EM	Linecutting	Trenching	Diamond Drill	Total
of item (based on work days)		25.86	6.39	12.37	5.07	0.10	7.10	27.48	1.83	13.79	100.00
Road	5,861	1,515.78	374.49	725.19	297.21	5.94	416.10	1,610.88	107.00	808.41	**5,861**
Administration	1,477	381.98	94.37	182.75	74.90	1.50	104.86	405.95	26.96	203.72	**1,477**
Safety	780	201.72	49.84	96.51	39.55	0.79	55.38	214.38	14.24	107.59	**780**
Field Supplies	9,666	2,499.83	617.60	1,196.00	490.16	9.80	686.23	2,656.68	176.46	1,333.24	**9,666**
Accommodatio	20,377	5,269.91	1,301.98	2,521.29	1,033.32	20.67	1,446.64	5,600.58	371.99	2,810.62	**20,377**
Groceries	22,617	5,849.22	1,445.10	2,798.45	1,146.91	22.94	1,605.67	6,216.23	412.89	3,119.59	**22,617**
Camp Supplies	3,507	906.98	224.08	433.93	177.84	3.56	248.98	963.89	64.02	483.72	**3,507**
Communication	8,596	2,223.10	549.24	1,063.60	435.90	8.72	610.26	2,362.59	156.92	1,185.66	**8,596**
Airfares	6,461	1,670.95	412.82	799.43	327.64	6.55	458.69	1,775.79	117.95	891.17	**6,461**
Ground Transp.	44,512	11,511.72	2,844.07	5,507.57	2,257.20	45.14	3,160.08	12,234.03	812.59	6,139.59	**44,512**
% of item (based on samples)		52.51	29.21	14.83					1.69	1.76	100.00
Assays	61,102	32,085	17,848	9,061					1,033	1,075	**61,102**
Freight	4,662	2,448	1,362	691					79	82	**4,662**
% of item				100.00							
Air Charter	3,627			3627.00							**3,627**

Ground Geophysics - Grid Statistics

Date	Grid	EM (kms)	Mag (kms)	Mandays	Charges	$ / km
17-Oct	3	3.000		2	1,000	
18-Oct	3	2.150		1	250	
18-Oct	3	6.700		2	750	
20-Oct	3	0.375		1	250	
	SJ TOTAL*	12.225	0.000	5	2,250	
	HBED TOTAL*	6.000	6.000	5	2,250	375
19-Oct	4	2.150		1	500	
19-Oct	4		4.600	2	1,100	
20-Oct	4	2.000		2	750	
	SJ TOTAL*	4.150	4.600	5	2,350	
	HBED TOTAL*	4.000	4.000	5	2,350	588
28-Sep	5	4.000		2	1,100	
30-Sep	5	4.000		2	1,100	
21-Oct	5		8.725	2	1,000	
	SJ TOTAL*	8.000	8.725	6	3,200	
	HBED TOTAL*	8.000	8.000	6	3,200	400
17-Oct	6		8.850	2	1,100	
19-Oct	6	2.000		1	500	
20-Oct	6	3.600		2	1,100	
21-Oct	6	3.200		2	1,100	
	SJ TOTAL*	8.800	8.850	7	3,800	
	HBED TOTAL*	9.000	9.000	7	3,800	422
12-Oct	A	3.000		2	1,100	
13-Oct	A	2.400		2	1,100	
14-Oct	A	4.000		2	1,100	
14-Oct	A		6.700	1	500	
15-Oct	A	2.750		2	1,100	
15-Oct	A		10.800	1	500	
16-Oct	A	2.075		4	2,100	
18-Oct	A	2.450		2	1,100	
	SJ TOTAL*	16.675	17.500	16	8,600	
	HBED TOTAL*	16.000	16.000	16	8,600	538
25-Sep	General				1,750	
13-Oct	General			1	800	
15-Oct	General			1	800	
	SJ TOTAL*	0.000	0.000	2	3,350	
	HBED TOTAL*	0.000	0.000	2	3,350	
8-Oct	Kahn	2.300		2	1,100	
9-Oct	Kahn	2.500		2	1,100	
10-Oct	Kahn	2.650		2	1,100	
11-Oct	Kahn	2.700		2	1,100	
	SJ TOTAL*	10.150	0.000	8	4,400	
	HBED TOTAL*	9.800	9.800	8	4,400	449

1-Oct	Ketchum		4.200	2	1,100	
2-Oct	Ketchum		14.100	2	1,100	
3-Oct	Ketchum	2.150		2	1,100	
4-Oct	Ketchum	2.350		2	1,100	
6-Oct	Ketchum	2.600		2	1,100	
7-Oct	Ketchum	2.450		2	1,100	
22-Oct	Ketchum	1.800		2	1,000	
	SJ TOTAL*	11.350	18.300	14	7,600	
	HBED TOTAL*	10.100	10.100	14	7,600	752
26-Sep	Lottie	2.000		2	1,100	
27-Sep	Lottie	2.275		2	1,100	
29-Sep	Lottie	1.800		2	1,100	
22-Oct	Lottie	2.600		2	1,100	
	SJ TOTAL*	8.675	0.000	8	4,400	
	HBED TOTAL*	8.675	0.000	8	4,400	507
	HBED TOTAL	71.575	62.900	70	39,950	558

* SJ TOTAL - line kilometers as shown on daily progress sheets

* HBED TOTAL - line kilometer total taken from maps

EUREKA DRILL PROGRAM - 2000 - BID COMPARISON

	Mob/ Demob	Overburden Casing(/metre)	Coring (/metre)	Operating Field Cost (per hour)	Non Operating Field Cost (per hour)	Site Preparation	Moves between holes	Cat Rate (per hour)	Water Line (max incl.)	Equipment Lost in Hole	Travel Time	Mud & Additives
BRITTON BROS. DIAMOND DRILLING Smithers, B.C.	incl.	53.45	53.45	90.10	65.00		incl.	92.10 D6 cat	1000 m length with 100 m lift	pro-rated cost	incl.	replacement cost
FALCON DRILLING Prince George, B.C.	$6,500 (estimate)	60.70 field cost beyond 15 m	60.70 possible bit charges		85.00	HBED cost	field cost	85.00 D6 cat		replacement cost plus 10%	field cost	cost plus 10%
ADVANCED DRILLING Surrey, B.C.	$6,850	52.80 56.70 (15-25m) cost plus(+25m)	44.40	96.00	84.00	cat and labour @ cost plus	cost plus after 6 man hours	68.00 D5 cat	see Moves	replacement cost plus 8%	?	cost plus 8%
AGGRESSIVE DIAMOND DRILLING Kelowna, B.C.	incl. (if <1000m $1200)	59.75	59.75 possible bit charges	100.00	60.00	$30.00 per manhour	incl.	not given	incl.		$30.00 /manhour over1 hr/day $65/day (truck)	replacement cost
HY-TECH DRILLING Smithers, B.C.	declined to bid, personnel tied up											

	Core Boxes	Acid Tests	Casing left in hole	Core Splitter	Fuel & Lubricants	Drill	Minimum Program (metres)	Minimum Hole Depth (metres)	Maximum Hole Depth (metres)	Minimum Hole Angle	Cost of 14 Hole Program (1750 m)	Cost/metre
BRITTON BROS. DIAMOND DRILLING	incl.	incl.	replacement cost	incl.		BB 2500 Hydraulic	1200 metres 20 % of un-used metres	50 m	500 m	-45	$ 126,393	$ 72.22
FALCON DRILLING	cost plus 10%	field cost		at cost	HBED cost	F2000 BTW tools	1000 metres			-45	$ 174,720	$ 99.84
ADVANCED DRILLING	cost plus 8%	cost plus 10%	replacement cost plus 10%		Advance cost (exc. water heater)	Longyear 38 or Boyles 25					$ 128,342	$ 73.34
AGGRESSIVE DIAMOND DRILLING	incl.	field rate	replacement cost plus 10%		HBED cost	JKS Super 300	1000 metres		400 m	-45	$ 152,083	$ 86.90

Appendix XI

AUTHOR'S QUALIFICATIONS

I, Gerald E. Bidwell, of the City of Delta, B.C., do hereby certify that:

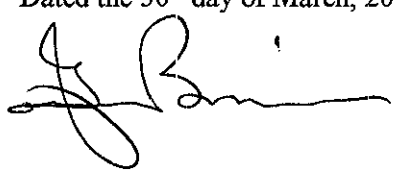
1. I am a geologist residing at 5186-44th Avenue, Delta B.C. and employed as a consultant by Hudson Bay Exploration and Development Company Limited of 800-700 West Pender Street, Vancouver, British Columbia.

2. I am a fellow of the Geological Association of Canada.

3. I have worked continuously as a mineral exploration geologist continuously since 1967 in Manitoba, British Columbia, Yukon Territory, Northwest Territories, Ontario and Alaska .

4. I am a co-author of this report and I conducted and supervised the fieldwork on the Eureka Property in the period May 21 to October 29, 2000.

Dated the 30th day of March, 2001



Gerald E. Bidwell, B.A., FGAC

Writer's Certificate

I, Geoff Mulligan, of the City of Vancouver, B.C., hereby certify that:

1) I am currently a Geoscientist in Training of the Association of Professional Engineers and Geoscientists of British Columbia.

2) I am a graduate of the University of British Columbia (1998) with a B.Sc. (Honours) in the faculty of Geology. I have practised my profession continuously since graduation.

3) I assisted with the collection of data as discussed in this report. I am co-authour of this report and verify the results to be true to the best of my knowledge.

Dated the 26th day of January, 2001

Geoff Mulligan, B.Sc.

Qualification Statement

Roger C. Paulen
Geological Consultant

1. ORGANIZATION

I have been privately consulting in surficial geology and mineral exploration since 1994.
Work awarded to me has always completed been completed within the time allocated.

2. EDUCATION

B.Sc. in geology, Mount Allison University 1993
M.Sc. in Quaternary geology, University of Waterloo 2001

Short Course: Ground Penetrating Radar (GPR) 1997
Short Course: Analysis and Quality Control in Mineral Exploration 1998
Short Course: Geology and Tectonics of the Canadian Cordillera 1999
Short Course: Diamond Exploration Methods and Case Studies 1999
Short Course: Drift Exploration in Glaciated Terrain 1999

3. EXPERIENCE

Categories of work that I normally perform include:

drift prospecting in glaciated terrain (ice flow studies, terrain analysis)
till geochemistry and diamond indicator mineral surveys
surficial mapping, and stratigraphy
Placer and aggregate sedimentology and facies mapping
GIS geochemical survey compilation
ERS-1 Satellite Imagery interpretation
Regional and local scale bedrock mapping

4. RECENT CONSULTING PROJECTS

Year	Client	Company	Description
2000	Gerry Bidwell	Hudson Bay Exploration	drift prospecting and mapping
1999	Paul Matysek	Vannessa Ventures Ltd.	facies and stratigraphy mapping
1999	John Kerr	Eureka Resources Inc.	drift prospecting and ice-flow
1999	Bjorn Simonsen	Bastion Group	surficial mapping
1998	Jens Toubourg	Jens Toubourg Consultants	ERS-1 imagery interpretation
1998	Peter Bobrowsky	BC Geological Survey	GIS till geochem compilation

5. PROFESSIONAL AFFILIATIONS

Canadian Quaternary Association (CANQUA)
Association of Exploration Geochemistry (AEG)
Geological Association of Canada (GAC)
American Quaternary Association (AMQUA)
Geological Society of America (GSA)

Date: March 2nd, 2001

Roger C. Paulen