PRELIMINARY DRIFT EXPLORATION STUDIES, NORTHERN VANCOUVER ISLAND (92L/6, 92L/11)

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KEYWORDS: Drift exploration, Quaternary, surficial geology, terrain, glaciations, till geochemistry, pebble lithologies, facies analysis, diamicton, drift thickness, Vancouver Island, Late Wisconsinan, Holocene

INTRODUCTION

Quaternary geological investigations were undertaken in NTS sheets 92L/6 (Alice Lake) and 92L/11 (Port McNeill) as part of an integrated resource assessment program on Northern Vancouver Island (see Panteleyev *et al.*, 1994, this volume, for a review of the program; Figure 1).

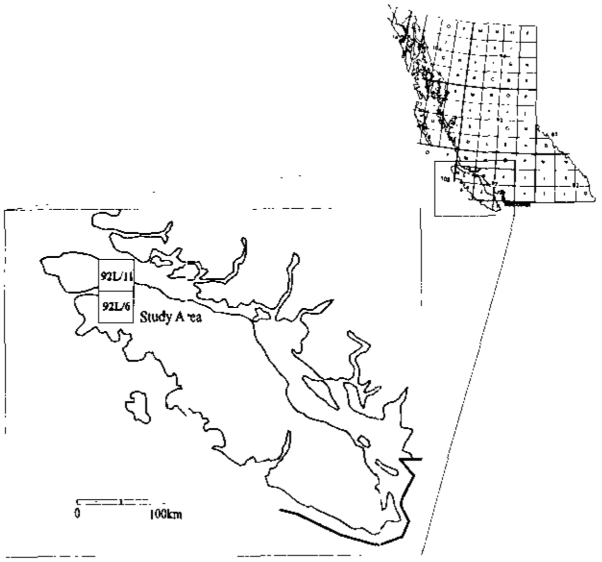

Figure 1. Location map of 1993 drift exploration study.

The aim of the Quaternary geology aspects of the project was to provide surficial geology data that would be useful in expanding current areas of exploration as well as stimulate long-term exploration activities. Specifically, the Quaternary geology project consisted of several components which sought to:

- document the Quaternary geological history of the study area.
- map the surficial geology at 1:50 000 scale.
- complete a regional drift - exploration project centred on till geochemistry sampling.
- develop drift-exploration models for the region.
- generate surficial geology maps.
- derive interpretive exploration products currently termed "sample media confidence maps".

This paper provides a brief summary of the 1993 fieldwork activities, a progress report on the analyses currently in progress and several preliminary conclusions relevant to the project objectives.

BACKGROUND

The northern Vancouver Island area was selected for detailed study by the Geological Survey Branch as a region of under-explored mineral potential. A variety of deposit types occur in the area, but the most significant are gold-bearing porphyry copper-molybdenum deposits including the Island Copper mine at the east end of Rupert Inlet, and several well-known mineral occurrences (*e.g.* Red Dog and Hushamu/Mount

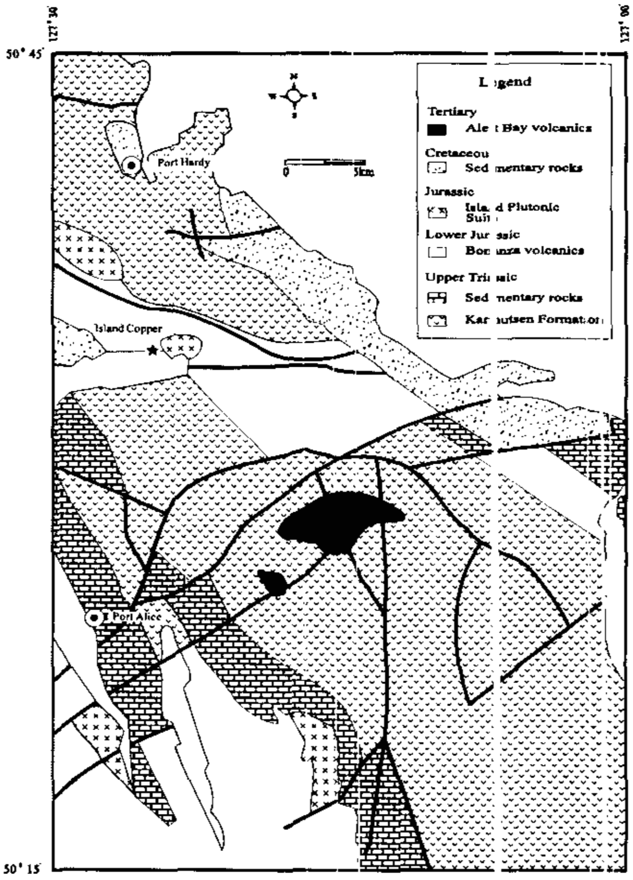

Figure 2. Generalized bedrock geology map.

Figure 3. Terrain geology map, NTS 92L/6 (Alice Lake). This 1:50 000 scale map provides morphological landform data. See Howes and Kenk (1988) for legend details.

Figure 4. Terrain geology map, NTS 92L/11 (Port McNeill). This 1:50 000 scale map provides morphological landform data. See Howes and Kenk (1988) for legend details.

McIntosh) between Port Hardy and Holberg. Mineral deposit studies have been ongoing since 1991 in 92L/12 (Quatsino; Panteleyev, 1992; Panteleyev and Koyanagi, 1993, 1994, this volume). They now conclude that much of the copper-gold mineralization found in the extensive zones of argillic alteration are a product of hydrothermal alteration of the Bonanza volcanic rocks. These acid-sulphate alteration zones are often hosted by rhyolitic units (Nixon *et al.*, 1994, this volume). Bedrock geological mapping at 1:20 000 scale, which started in 1992 with 92L/5 (Mahatta Creek; Nixon *et al.*, 1993), has been extended northward into 92L/12 and the western margin of 92L/11. Bedrock mapping results indicate that part of the Bonanza volcanics can be subdivided into units mappable at 1:50 000 scale, consisting of rhyolitic lavas and ash-flow tuffs (Nixon *et al.*, 1994, this volume). Geochemical data were collected in 1988 for 92L as part of the Regional Geochemical Survey (Gravel and Matysek, 1989) and again in 1993 with detailed follow-up work of significant anomalies. Although many anomalies are evident, this work also concludes that only 54% of the area in 92L/SW is realistically covered by Regional Geochemical Survey data (Sibbick, 1994, this volume). Till samples were obtained in 1991 for 92L/12 (Kerr *et al.*, 1992) and new samples were collected this year in the west half of 92L/6 and 92L/11. Surficial geology mapping at 1:50 000 scale was completed for 92L/12 in 1991 (Kerr, 1992). Fieldwork during the 1993 season extended the surficial mapping at a similar scale into all of 92L/11 and 92L/6. The primary intent of this wide mapping focus was to overlap the Bonanza volcanics which extend south-eastward from Island Copper (Figure 2).

METHODS

Research in the area first involved interpretation of the surficial sediments using air-photographic study at a scale of 1:50 000 (photo suites BC77114). Terrain geology maps, which provide morphological landform data, were produced in 1980 at a scale of 1:50 000 for map sheets 92L/6 and 92L/11 (Figures 3 and 4). The air-photograph evaluation was used in conjunction with the existing morphological landform data portrayed on the terrain maps to construct preliminary surficial geology maps.

Field research was restricted to the western half of the two map sheets which were easily accessed by an extensive logging road network covering most of the region. Ground-truthing of the sediments portrayed on the preliminary surficial maps was accomplished by examination of exposures in road cuts, hand-dug pits and stream banks. Several hundred exposures were examined. Detailed descriptions including deposit types, unit thickness and extent, structures, contacts, texture, sorting, compaction, clast content, and weathering were

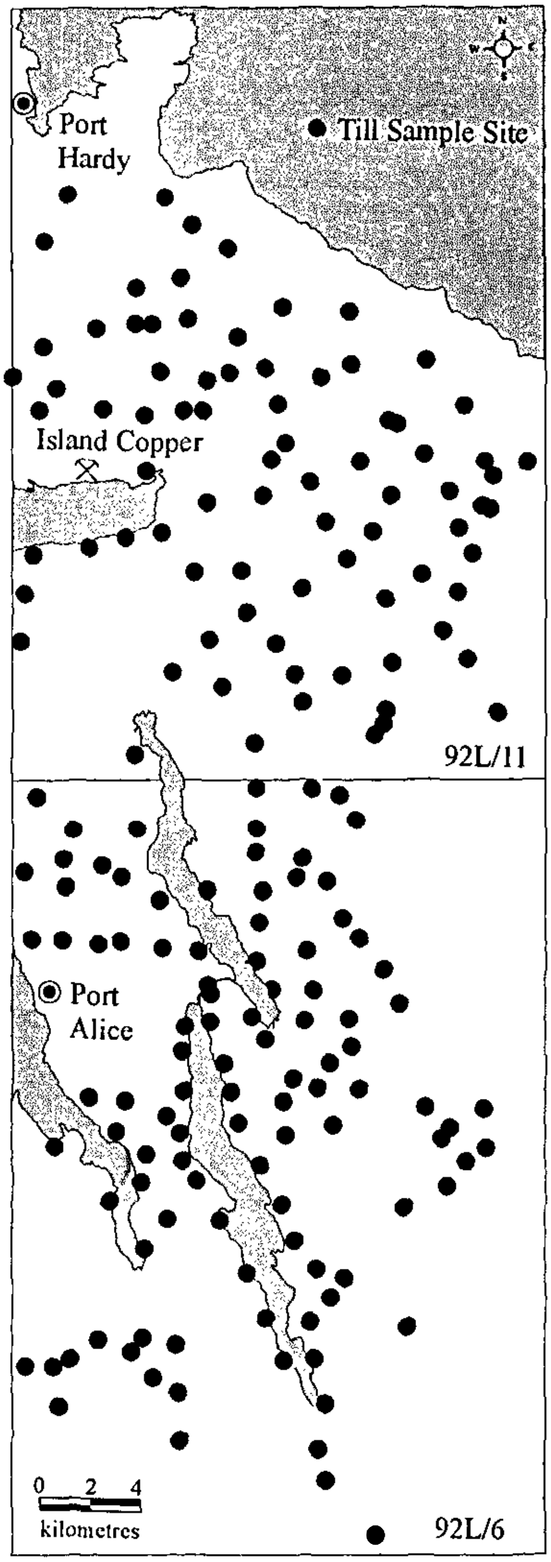

Figure 5. Drift sample location map. This map shows the location of 178 formally designated stops in the west half of maps NTS 92L/6 and 92L/11.

TABLE 1

DRIFT SAMPLE FREQUENCY DISTRIBUTION AND SUMMARY STATISTICS

	SAMPLE DEPTH[a]	PERCENT CLASTS[b]	MEAN CLAST[c]	MAX CLAST[d]	SECTION HEIGHT[e]	OXID. DEPTH[f]	NUMBER SAMPLES[g]
FACIES A	2.3	25.9	6.0	61.2	4.0	0.9	77
FACIES B	1.7	33.3	8.5	63.2	3.2	0.8	24
FACIES C	1.7	37.2	9.1	52.3	2.9	1.4	49
FACIES D	1.8	41.0	10.4	47.4	2.8	1.4	21
OTHERS	-	-	-	-	-	-	7
TOTAL	-	-	-	-	-	-	178

a-depth below surface in metres
b-field estimated clast content
c-mean clast size in centimetres
d-average maximum clast size in centimetres
e-mean height of mappable exposure in metres
f-mean depth of contact to oxidation in metres
g-sample size

taken at 188 formally designated stops (Figure 5). Facies analysis of the unconsolidated sediments observed at each stop was used in the verification of the surficial map units and in the interpretation of sediment genesis.

As part of the reconnaissance drift-exploration program, bulk sediment samples (4-10 kg/sample) were collected at 178 designated stops for till geochemistry analysis. Mean sampling depth below ground surface ranged from 1.7 to 2.3 metres depending on the facies (Table 1).

Given a total land area actually sampled of about 860 square kilometres, sampling density was approximately 1 per 500 hectares (1 per 5 km^2). Samples were stored in heavy-mil plastic bags. An additional ten duplicate drift samples were collected (about 1 in every 18 samples) for quality control tests. The principles of drift exploration are well summarized by Kauranne *et al.* (1992). Pebble samples (+100 clasts/sample and 5-10 cm in size) for clast lithologic analysis were also collected at 167 designated stops. The method and theory of pebble lithology analysis is described by Clark (1987) and Strobel and Faure (1987). Paleoflow indicators (*e.g.* fabrics, striations, crossbedding) were measured at 24 locations for either glacial or nonglacial deposits (Plates 1, 2 and 3). The importance and use of paleoflow indicators in drift studies is explained by Kujansuu and Saarnisto (1990).

In the laboratory, bulk-sediment samples were removed from their bags and air-dried at 25 to 30°C for a minimum of 48 hours, then crushed and sieved through stacked Tyler sieves to obtain the -230 mesh fraction. Representative splits of these fine-fraction samples were then submitted for aqua regia - inductively coupled plasma emission spectroscopy (ICP-ES) and instrumental neutron activation (INA) analysis. Geochemical results are pending. Pebble samples were split and will be categorized according to identifiable lithologies; results are also pending.

Plate 1. Glacially striated volcanic bedrock; paleoflow toward bottom.

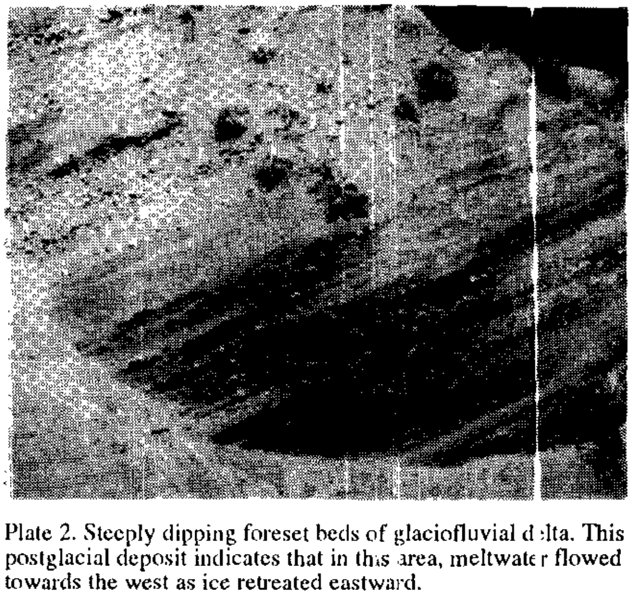

Plate 2. Steeply dipping foreset beds of glaciofluvial delta. This postglacial deposit indicates that in this area, meltwater flowed towards the west as ice retreated eastward.

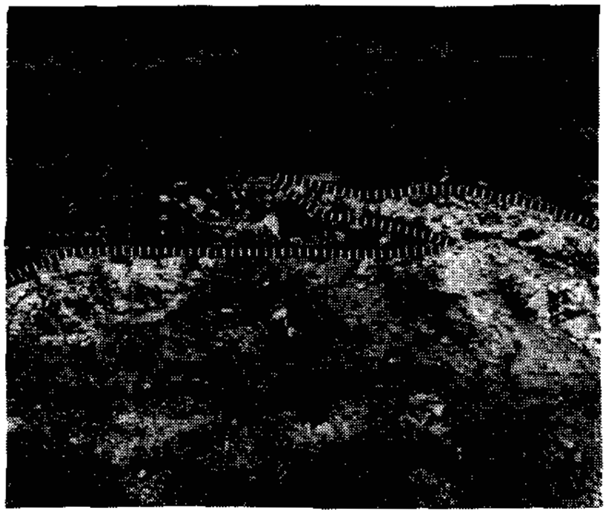

Plate 3. Attenuated plane of local bedrock (traced by dashed line) in subglacial till deposit indicates glacial flow to the west (to left). Subglacial thrusting mechanism is indicated, which is one method of incorporating debris into basal ice.

RESULTS

TERRAIN DISTRIBUTION

The study area encompasses approximately 1500 square kilometres of land which is differentially covered by varying combinations of sediments dominated by till, outwash and colluvium. A quantitative evaluation of the morphological landform data contained on the two terrain maps indicates that the major sediments occur in unequal proportions (Table 2; Figure 3). Colluvium is the most abundant throughout, covering approximately 49% (850 km^2) of the area, but predominates in the west and south where relief is high and gravitational processes are accentuated. Ground moraine covers an additional 23% (332 km^2) and occurs primarily in the north and southeast where relief is generally subdued. Glaciofluvial deposits are also common, representing 12% (147 km^2) of the total sediment cover; they are widely distributed, with an obvious concentration in the north-central part of the region. Fluvial sediments are not as common, covering only 5% (68 km^2) of the map, and are restricted in their distribution to topographic lows occupied by modern rivers and streams. The remaining 11% (157 km^2) of land surface consists of bedrock outcrops and lacustrine, glaciolacustrine, marine and organic accumulations.

DRIFT THICKNESS

Drift thickness is highly variable, but generally predictable on the basis of the landforms present. In the high-relief areas to the west, colluvial veneers and blankets, 1 to 3 metres thick, occur directly down-slope from bedrock outcrops. Farther down-slope, till veneers or blankets overlain by colluvial veneers occur in thicknesses up to 10 metres. Depressions between the topographic highs are sedimentologically complex, containing variable thicknesses of till often covered by outwash. The latter deposits can reach thicknesses in excess of 30 metres. In the low-relief, eastern part of the study area, there are blankets of till more than 100 metres thick, and occasionally covered by thinner accumulations of outwash. Non-random drilling by BHP-Minerals Canada Ltd. provides useful regional data on overburden thickness. The frequency distribution of 448 drill holes relative to 10-metre increments of depth is positively skewed (Figure 6). Over half of the holes (249) drilled in the area encountered less than 10 metres of unconsolidated sediment; mean depth in this range is 5 metres. An additional 29% (129) of the holes encountered bedrock between 11 and 30 metres below surface. The remaining 15% of the drill holes exceeded 30 metres in depth. These data indicate most

TABLE 2
TERRAIN DATA DISTRIBUTION FOR NTS 92L/6, 11*

PRIMARY GENETIC MATERIAL	NTS 92L/6 AREA COVERED (km^2)	NTS 92L/6 PERCENT	NTS 92L/11 AREA COVERED (km^2)	NTS 92L/11 PERCENT	TOTAL STUDY AREA COVERED (km^2)	TOTAL STUDY PERCENT
A	0.0	0.00	6.4	1.05	6.4	0.52
C	704.9	74.77	145.8	23.78	850.7	49.28
F	28.7	3.04	39.8	6.50	68.5	4.77
FG	7.8	0.83	139.7	22.77	147.5	11.80
M	137.3	14.56	195.4	31.85	332.7	23.20
O	0.0	0.00	21.3	3.47	21.3	1.74
R	61.9	6.56	1.4	0.23	63.3	3.40
U	2.1	0.22	2.3	0.37	4.4	0.30
W	0.1	0.01	61.2	9.98	61.3	5.00

* see Howes and Kenk (1988) for legend to terrain categories. Only major genetic classes listed here.

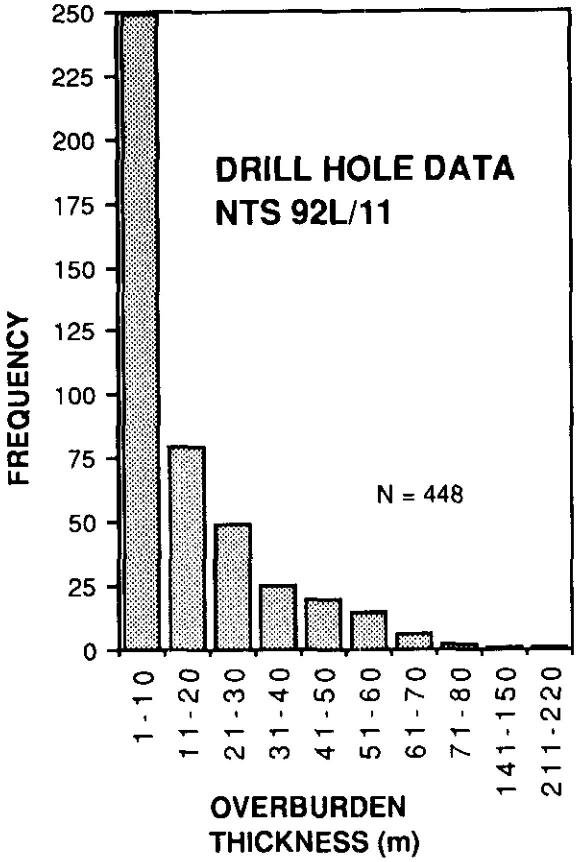

Figure 6. Histogram showing the frequency distribution of the drill hole relative to 10 m depth categories for overburden thickness.

accumulations categorized as blanket are of moderate depth. One hole east of Rupert Inlet passed through 215 metres of unconsolidated sediment. This hole and a 146-metre hole 600 metres to the north, are probably within a glacially over-deepened valley (fjord?) extending east from Rupert Inlet and associated with the Holberg fault. This scenario resembles the structurally controlled and glacially over-deepened valleys found in the southern interior of the province (*cf.* Bobrowsky *et al.*, 1993). In the latter case, ore deposits are sometimes associated with the glacially eroded tectonic structures.

SEDIMENTOLOGY

Successful drift-exploration is based on the accurate identification and interpretation of the sediments sampled (Shilts, 1993). Four diamicton facies were identified in the study area based on objective criteria including texture, structure, consolidation, permeability, percentage clasts, clast shape and surface markings, lithologies, fabric, basal contact where evident, surface expression/landform, and position relative to other sediments. Sampling was largely restricted to various

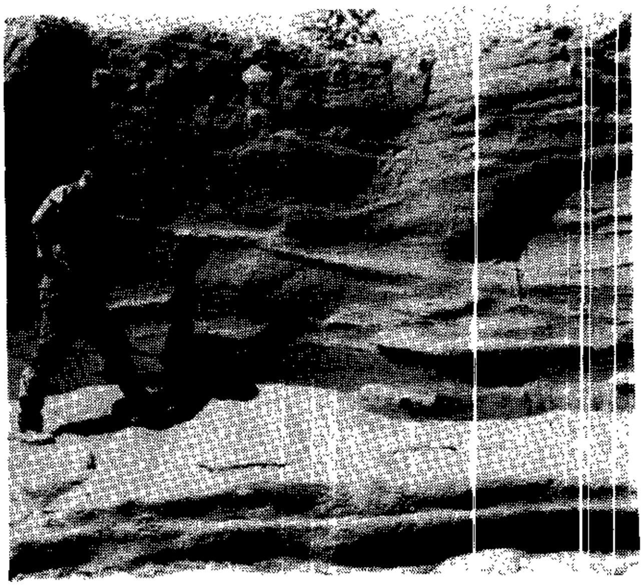

Plate 4. Horizontally laminated and planar tabular sand beds of glaciofluvial complex.

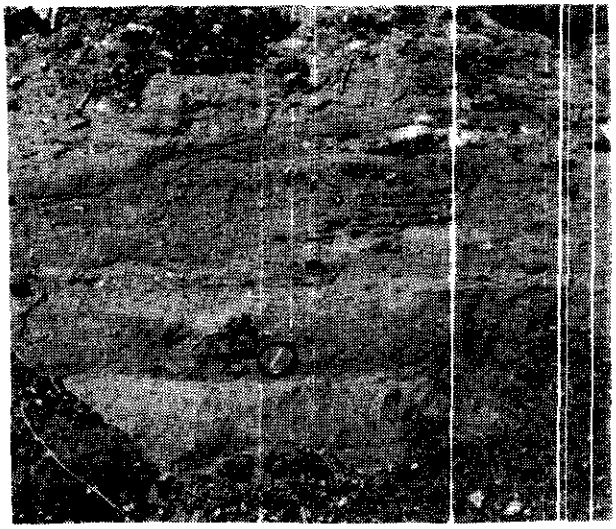

Plate 5. Inner-bay terrigenous facies of a glaciomarine environment.

diamicton facies, although other types of sediments were described, including those interpreted as representing glaciofluvial, glaciolacustrine, fluvial and marine environments (Plates 2, 4, 5 and 6). The primary attributes of the diamicton facies are described below.

Facies A is a cohesive, compact, dense, matrix-supported diamicton. The facies is generally massive, very poorly sorted and primarily grey to olive grey in colour. Clast content is low (average of 77 samples is 26%), consisting mainly of subrounded but occasionally subangular or rounded small pebbles; striations and faceting are also common. The pebble fabric is strong and bullet-shaped boulders are present. Some lithologies are mainly of local provenance, but exotics are present.

Plate 6. Rhythmic silty clay and clayey silt beds representing a postglacial lacustrine deposits. Rhythmite pairs occur between sets of arrows.

Plate 7. Example of facies A sediments interpreted as subglacial till deposit. See text for detailed facies description. Note massive nature of the matrix-supported diamicton.

Plate 8. Example of facies B sediments interpreted as supraglacial till deposit. Note large cobbles and boulders winnowed out of the deposit. See text for detailed facies descriptions.

Plate 9. Example of facies C sediments (above dashed line) overlying facies A. Former interpreted as colluviated till deposit. See text for facies description.

Deposit thickness is variable and ranges from 1 to more than 10 metres. The basal contact of the facies varies from sharp to indeterminate, the surface weathering is minimal and the base of the soil contact is usually abrupt. Facies A commonly overlies bedrock and is interpreted as representing a subglacial till deposit (Plate 7).

Facies B is a loose, soft to hard, poorly sorted and massive, matrix-supported diamicton. It is primarily olive grey to brown in colour. The clast content is moderate (average of 24 samples is 33%), consisting mainly of subangular to subrounded stones ranging in size from pebble to boulder; the latter are often abundant. The pebble fabric is moderately strong, with rare striated clasts and an absence of faceting. Stone lithologies include both local and exotic types. Deposits are generally 1 to more than 3 metres thick, and the basal contact varies from gradational to indeterminate. Surface weathering is usually deep, and the basal contact of the soil is often diffuse. This facies usually overlies facies A and rarely overlies bedrock. Facies B is interpreted as representing supraglacial till deposits (Plate 8).

Facies C is a loose, soft, poorly sorted, matrix to clast-supported diamicton. The facies is massive to crudely bedded and primarily olive - brown to brown in colour. Clast content is high (average of 49 samples is 37%), consisting rarely of striated or faceted stones, which are angular to subrounded in shape. Clasts are primarily pebble to boulder in size, and are mainly local but occasionally exotic in lithology. Deposits are generally 1 to 3 metres thick, displaying a gradational to sharp basal contact. Surface weathering is usually evident throughout, and if a soil is present, the contact is diffuse. This facies overlies facies A, B or bedrock. Facies C is interpreted as representing colluviated till (Plate 9).

Facies D is a very loose, soft, poorly sorted, clast-supported diamicton. The facies is massive to crudely bedded and primarily brown in colour. The clast content is high (average of 21 samples is 41%), consisting mainly of angular to very angular, cobble to boulder sized stones which lack striations and faceting. The pebble fabric is poor, represented almost entirely by local lithologies. Deposits are generally 1 to 2 metres thick, and the basal contact is sharp. Surface weathering is usually present throughout and the base of the soil contact is diffuse. Facies D usually overlies bedrock and is interpreted as representing bedrock colluvium.

All four of these diamicton facies represent first derivatives of erosion and deposition (primary indicator facies). Analytical results of samples obtained from these deposits must be interpreted separately, but all can be confidently used in the recognition and evaluation of buried mineral occurrences. Less reliable sediments are second derivative products which have undergone additional transportation and redeposition (glaciofluvial) or even third derivative products (glaciolacustrine or glaciomarine; *cf.* Shilts, 1993).

Table 1 provides the frequency distribution of drift exploration samples relative to the above facies. Viewed in terms of importance, reliability or confidence for interpreting drift data (geochemistry, pebble lithology, *etc.*) the facies can be ranked as follows: facies A, facies D, facies B, facies C followed by other second and third-derivative sediments. It is evident from this distribution, that most of the drift samples collected will provide reliable data for exploration purposes as only 4% of the samples are not representative of the four primary diamicton facies.

GEOLOGICAL HISTORY

QUATERNARY

The Quaternary geological history of northern Vancouver Island combines the effects of short-term episodic glaciation during the Late Wisconsinan and the gradual evolution of landscapes during the Holocene. Early descriptions by Dawson (1887) recognized the significant contribution of glacial activity to the landscape relief, bedrock erosion and sediment redistribution observed in the area, but overlooked much of the postglacial influence.

Howes (1981, 1983) concluded that northern Vancouver Island had been glaciated twice during the Quaternary on the basis of drill-hole evidence for an "older till" underlying interglacial sediments and Fraser Glaciation drift. In the absence of multiple till sections indicating more than one glaciation, Kerr and Sibbick (1992) concluded that the area north of Quatsino Sound had been glaciated only once, most likely during the Late Wisconsinan. However, given the evidence presented by Howes, this interpretation is clearly unfounded. Nonetheless, the near-surface sediments observed in this study and by Kerr and Sibbick relate to the last phase of glaciation and deglaciation; Port McNeill till and Port McNeill deglacial sediments, respectively.

Approximately 25 000 years ago, ice began to accumulate in several centres of British Columbia, including central Vancouver Island and the Coast Mountains north of Vancouver. As climatic conditions deteriorated, ice on the mainland expanded eastward into the interior and westward into the Strait of Georgia and Queen Charlotte Strait, whereas ice on Vancouver Island expanded locally to occupy topographic lows. Continued climatic deterioration resulted in a significant net transfer of water from the oceans to the ice sheets. This resulted in a eustatic lowering of sea level, a thickening of the ice mass up to 2 kilometres in the straits and 700 metres on Vancouver Island and a concomitant glacio-isostatic depression of the land surface to a maximum of about 200 metres (Clague *et al.*, 1982; Clague, 1983; Howes, 1983). Surrounding this depression was a forebulge which moved westward in union with the advancing ice sheet. At approximately 20 500 ± 330 years BP (GSC-2505), the coast east of Port Hardy and Port McNeill may have been depressed up to 100 metres, thereby inundating nearly 15% of the eastern study area with glaciomarine conditions. Isostatic depression on the west side of the island was also about 100 metres (Lutemauer *et al.*, 1989). Glaciomarine sediments were deposited in submerged areas adjacent to the advancing glaciers. At the height of glaciation in this area, about 15 000 years ago, the Cordilleran ice sheet captured local ice masses and the dominant flow of ice was west to northwest, well beyond the present limit of land. During this period thick sequences of subglacial till were deposited in depressions and thinner veneers on topographic highs. Ice began to disappear from the area about 13 630 ± 310 years BP (WAT-721); depositing blankets of supraglacial debris in areas of *in situ* ice decay and thin but widespread accumulations of glaciofluvial sediments in areas of active retreat.

An accelerator mass spectrometry wood date of 10 650 ± 350 years BP (RIDDL-984), from a submarine vibrocore obtained in the Pacific Ocean 20 kilometres north of Vancouver Island, provides good evidence for a period of very low sea levels at this time; 95 metres below present levels. The dated material comes from a paleosol surface subsequently buried below marine sediments (Lutemauer *et al.*, 1989).

HOLOCENE

A variety of geological processes have been actively modifying the landscape during the last 10 000 years.

Most notably, the *in situ* modification of all surficial sediments through the process of pedogenesis. Northern Vancouver Island is covered by podzolic soils. Indeed, the strongly acidic bedrock in this area favors the development of these aluminum and iron-rich soils. Sulphides in the parent materials are easily oxidized and removed through groundwater leaching and are often replaced by *in situ* oxidates, such as limonite, which absorb heavy metals. Iron which precipitates in the lower B-horizon sometimes forms a distinct "hard-pan" containing complex salts of fulvic acids (Kauranne *et al.*, 1992; Plate 10). Early researchers sampled the B-horizon because of this metal concentration, but this practise simply adds soil formation variation factors to the geochemistry interpretation. The mean basal depth for pedogenic oxidation varies from 0.8 to 1.4 metres depending on the facies identified (Table 1). For this reason, all sampling in this study was restricted to fresh, unweathered C-horizon or parent material profiles. The average depth of the samples ranged from 1.7 to 2.3 metres below surface, also depending on the facies identified.

Fluvial and mass-wasting processes also act on the surface environment of this area. Creeks, streams and rivers are ubiquitous, providing an efficient mechanism for removing and redepositing significant volumes of sediment. Mass-wasting processes and deposits were observed in abundance in the study area, particularly in the west half, where the high relief and wet climate promotes slope instability.

DRIFT EXPLORATION MAPS

A number of attributes which characterize surficial sediments must be evaluated during drift exploration studies. Unfortunately, this is not always possible in field situations nor is it possible in the pre-field planning stage. Two attributes, sediment genesis and thickness, which are very important factors to consider in drift exploration work can be evaluated from air-photographic interpretation and then used in the planning process of drift sampling. The first factor follows Shilts (1993), who recognizes that drift sampling media can be ranked from excellent to poor according to genesis: first derivative products (*e.g.* till), second derivative products (*e.g.* outwash) and third derivative products (*e.g.* glaciolacustrine). This ordering emphasizes the importance of proximity to bedrock source and the transport history of sediments in affecting the integrity of samples. Similarly, the greater the thickness of a deposit the further the sampling surface is from the underlying bedrock.

Using the above two parameters, as portrayed in the information on a terrain map, we developed a series of genesis/thickness data pairs. To improve user interpretation, we then categorized our data pairs in the terrain units from 1 (excellent) to 5 (poor), as an indication of their utility and reliability in providing interpretable drift results. A 1 or 2 category terrain polygon implies that the explorationist can have a higher level of confidence in the interpretation of drift results in contrast to data retrieved from a 4 or 5 category polygon. For lack of a better term, we have tentatively called this style of map a "sample media confidence map". Industry response to an earlier variation of this method suggested that the original three categories should be expanded to further emphasize subtle variations in the deposits; hence, we have chosen five categories. Figure 7 is a sample media confidence map for 92L/11. The genesis / thickness pairs developed in this study which comprise the five individual categories are listed in the illustration.

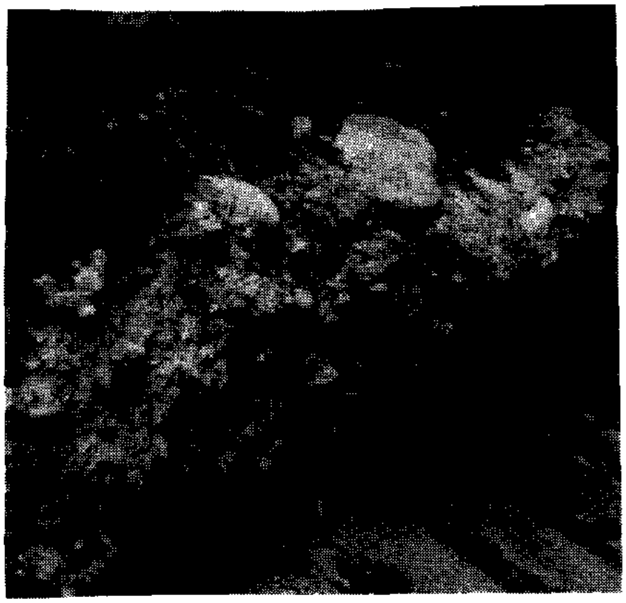
Plate 10. Hard pan formed in near surface gravel accumulation as a result of iron precipitation in Podzolic soil.

The samples collected in this study are distributed over most of the categories, but occur primarily in categories 1 and 2. As such, we feel confident that the integrity of the data derived from the drift sampling program is high. Most samples come from sediments which have undergone short transport distances, have simple transport histories, or occur as thin deposits and therefore offer a good reflection of the potential for mineralization in the region.

SUMMARY

Quaternary geology plays an important role in mineral exploration studies in areas of glaciated terrain. The principles of drift exploration rely on an accurate understanding of the regional geological history, the distribution of various types of sediment, the genesis of individual deposits and the relationship of sediment cover to bedrock lithology (Liverman, 1992). Terrain and surficial geology mapping provides a first step toward attaining these goals. Ground-truthing, including stratigraphic and sedimentologic descriptions using facies analysis further the exploration process by identifying deposit genesis. Following this, detailed sampling for till geochemistry and pebble lithologies can

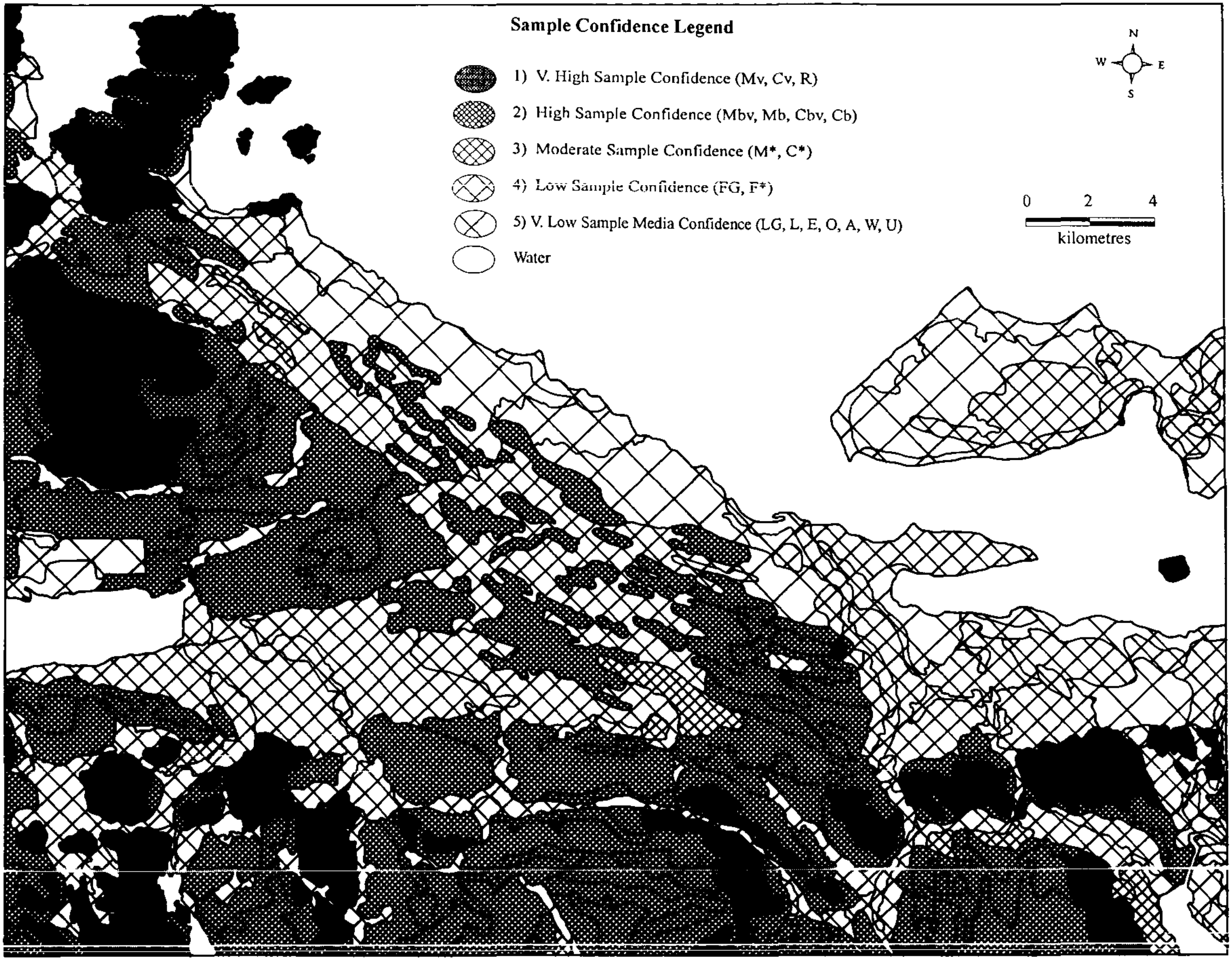

Figure 7. Sample media confidence map for NTS 92L/11. Preferred polygons for drift exploration studies are lower number categories (*i.e.* 1 to 3).

then be productively collected (*cf.* Coker and DiLabio, 1989). Successful interpretation of these data provides the final link between surficial geology and the exploration for buried mineral occurrences.

Terrain and surficial geology mapping must precede drift exploration studies which rely on till geochemistry and pebble lithology analysis. Such mapping not only identifies where preferred sediments occur, but also provides information regarding drift thickness and paleoflow direction. The identification of distinct glacial and nonglacial facies must be used in drift-exploration strategies, to ensure that comparability in results can be maintained. One recent study of glacial dispersal of till constituents showed clearly how flow paths and transport distances varied according to the different types of morainic landforms identified (Aario and Peuraniemi, 1992). Adequate sampling density suited to the objectives of the project must also be determined. The sampling density in this study (1 per 5 km^2) was intended to provide reconnaissance level data as a basis for further exploration activity at more detailed scales. Assuming average transport lengths of 1.0 kilometre for geochemical anomalies (*cf.* Salminen and Hartikainen, 1985) and 10.0 kilometres for pebble lithologies (*cf.* Gillberg, 1967), the data collected in this study exceed the reconnaissance level study and approach local-scale accuracy.

It is the intent of this project to next study the results of the geochemical analyses and pebble lithology counts in relation to the facies and landforms sampled. We expect to establish quantitative dispersal decay curves and glacially dispersed geochemical anomalies characteristic of the northern Vancouver Island environment. We further intend to integrate this information with our knowledge of drift thickness (based on drill-hole data and "sample media confidence maps") to generate mineral drift - exploration models unique to this area and test the models during the next field season.

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