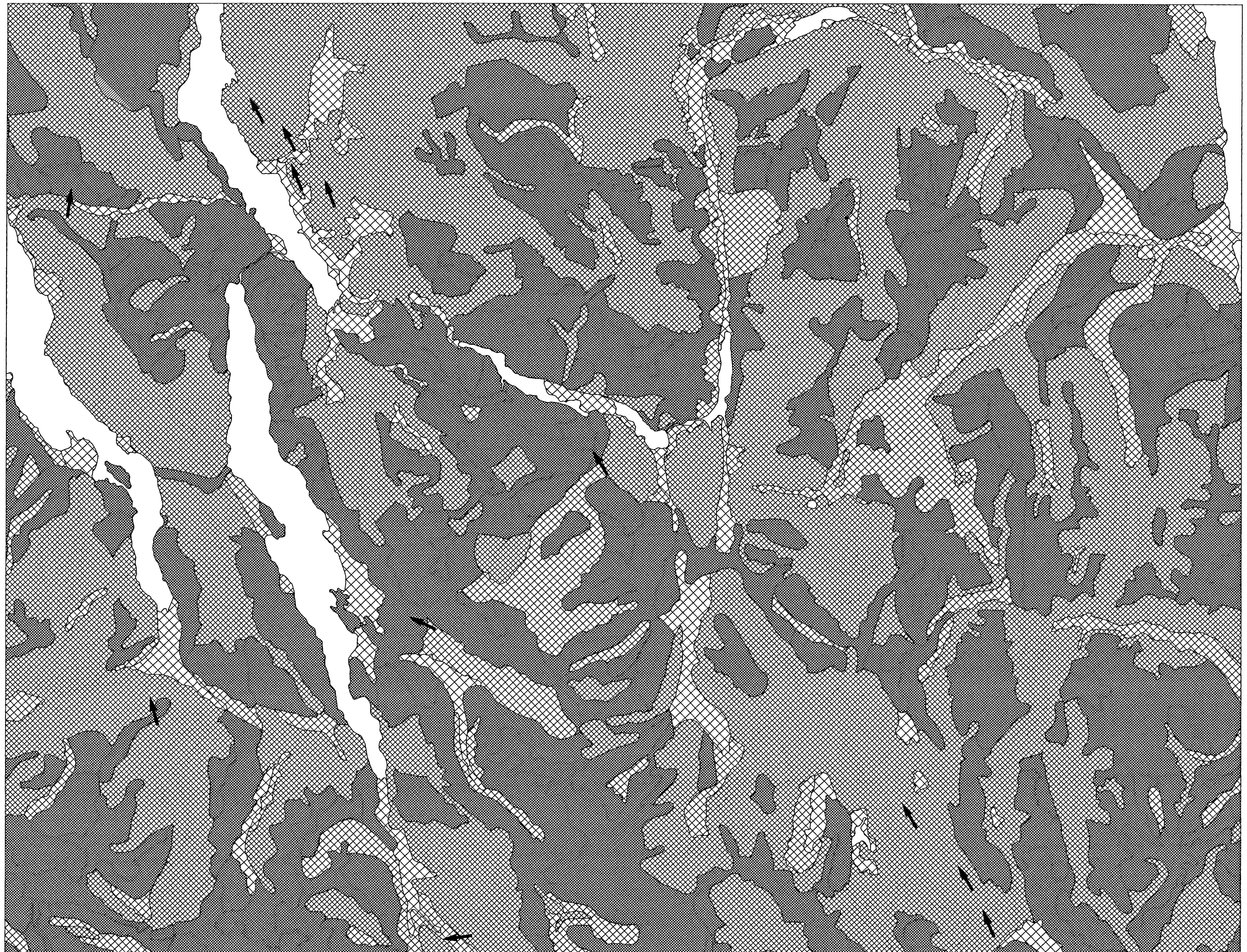

EXPLANATORY NOTES

This map is an interpretive product of a basic terrain map by Pattison (1979) and follows the terrain classification system of Howes and Kenk (1988). The idea of sediment derivatives is adapted from Shilts (1993) and the full methodology is detailed in Proudfoot *et al.* (1994).

The principles of surficial geology can be applied to obtain derivative information from basic terrain (surficial) maps to generate interpretive products such as a **Drift Exploration Potential Map**. This type of map categorizes surficial sediments for drift exploration sampling before a field program is undertaken. Drift exploration is assumed to include bulk sediment sampling for geochemical analysis and pebble/boulder collection for lithological provenance study. The potential for obtaining primary, reliable, useful and easily interpretable results from either of the two sampling approaches can be ranked from very high to very low potential in five categories. The utility of this map is restricted to clastic glacial dispersal and not hydromorphic anomalies.

The purpose of a Drift Exploration Map is to assist explorationists to design sampling programs. In practice, the map should be consulted before fieldwork is undertaken, as it identifies types of surficial sediment and categorizes each according to potential utility for drift-related sampling. High potential refers to the utility of the surficial deposits for geochemical analysis and clast lithology study. Potential relates to the proximity of the sample to parent material or bedrock as well as the ease of interpretation of the data; it does not refer to the likelihood of encountering mineralization. The map provides cost-effective information since areas which contain poor or unreliable deposits can be avoided during sampling. Similarly, areas of exploration interest can be prioritized according to the five categories and sampled sequentially as results from higher potential categories are evaluated first.

Several factors are used in the characterization of surficial deposits including terrain unit, sediment thickness, transport distance (proximity to bedrock source), diagenesis (history of deposit from erosion to deposition), number of erosive/depositional phases, and ease of interpretation of analytical results. Geological data characterizing paleo-flow is also documented and illustrated to meet the purpose of the map. Collectively, these inter-related factors can be used to categorize all surficial sediments identified on a traditional terrain map to generate a Drift Exploration Potential map. The latter map can then be used to develop a sampling strategy for various levels of drift prospecting. Specific bulk and clast sampling designs can be structured to fit changing project objectives which may rely on data comparisons between different facies. Analytical results can be confidently interpreted after which further action can be taken.

As summarized in the accompanying matrix, very high potential (I) deposits include bedrock and colluvial veneers or morainal veneers which directly overlie bedrock. Such deposits are usually less than one metre in thickness and are locally derived from bedrock within a few tens of metres. As a first derivative product, the history of the sediment and clasts since erosion is easily interpreted. Similarly, geochemical and pebble results are easy to interpret. The second category of high potential (II) deposits to sample in order of preference consist of colluvial blankets over bedrock, colluvial veneers over moraine and morainal blankets. Colluvial blankets over bedrock differ from veneers over bedrock only in total thickness of the deposit (>1 m but rarely > 3 m) since proximity to bedrock source is still in the order of tens of metres. Colluvial veneers over moraine are usually thin, so that the underlying diamicton can be sampled as a first derivative product. Transport distance is often in the order of tens of metres. Finally, morainal blankets, which normally consist of supraglacial and basal till facies, are good sediments to sample. Although sediment thickness often exceeds one metre, bedrock source is close, usually in the order of tens or hundreds of metres. As first derivative products, the transport history since erosion for the above three sediment associations is easily interpreted. Geochemical and clast analysis results obtained from this category are also easily interpreted.

Terrain units of moderate potential (III) include some first and second derivative products which consist of complex associations of colluvium and morainal sediments. Deposits are moderately thick, often in excess of ten metres and proximity to bedrock source can be tens to hundreds of metres. Interpretation of both the history of transportation and analytical results is generally moderately easy. The fourth category of low potential (IV) deposits consists of glaciofluvial and fluvial sediments. These second and third derivative products often overlie till or bedrock and can be of variable thickness. The added phase of transportation increases distance to bedrock source so that hundreds of metres are common although tens of metres are possible. Interpretation of the sediment history since initial bedrock erosion is difficult as is the interpretation of the analytical results. The final category represents the very low potential deposits (V) consisting of glaciolacustrine, glaciomarine, lacustrine, marine, eolian, organic and anthropogenic deposits. As these terrain units often overlie complex sequences of other sediments, total deposit thickness can be in excess of ten metres. The third and fourth derivative products in this category have very complex transport histories and, as such, distance to bedrock source can be kilometres, although short pathways as little as tens to hundreds of metres can be encountered. In many cases analytical results can be very difficult to interpret.

The general principles outlined here apply to all levels of mapping, however, the specifics and categories of the accompanying matrix will change depending on the scale of the map. The accompanying matrix applies only to 1:50 000 scale maps, so the matrix and principles of categorization can be applied to any other terrain map of a similar scale. One important aspect is knowledge of paleo-flow direction of the sampled sediment, whether pebble fabric data in till, cross-bedding in outwash or striae on underlying outcrop. Although some paleo-flow directions are illustrated, detailed paleo-flow must be determined at each station during sampling. Complex flow vectors result by compounding several cycles of transportation. For example, a down-slope component in colluvium may be overprinted upon an oblique ice flow direction found in the till. Because any number of compounded flow-vector paths can occur, generalizations on the shapes, size and orientations of geochemical and clast anomalies are inappropriate.

Howes, D.E. and Kenk, E. (1988): Terrain Classification System for British Columbia, Revised Edition; *B.C. Ministry of Environment, Lands and Parks*, MOE Manual 10.

Pattison, A. (1979): Terrain Geology of the Port McNeill area, NTS 92L/11; Ministry of Environment, Lands and Parks. 1:50 000 scale.

Proudfoot, D.N.P., Bobrowsky, P.T. and D.G. Meldrum (1994): Drift Exploration Potential Maps; *in* Drift Exploration in Glaciated and Mountainous Terrain Cordilleran Roundup Short Course Notes, *B.C. Ministry of Energy, Mines and Petroleum Resources*, January 24, Hotel Vancouver.

Shilts, W.W. (1993): Geological Survey of Canada's Contributions to Understanding the Composition of Glacial Sediments; *Canadian Journal of Earth Sciences*, Volume 30, pages 333-353.

DRIFT EXPLORATION POTENTIAL MATRIX

	I	II	III	IV	V
TERRAIN UNITS	R Cv/R Mv/R	Cb/R Cv/M Mb	Cbv Mbv Combined	FG F Combined	L, LG, E, O, A, W, WG Combined
TOTAL SEDIMENT THICKNESS	< 1 m	> 1 m	> 10 m	> 10 m	> 10 m
TRANSPORT DISTANCE	generally 10s metres	10s to 100s metres	10s to 100s metres	usually 100s metres but also 10s metres	often 100s to 1000s but also 10s metres
POST-EROSIVE DIAGENETIC INTERPRET	Very Easy	Easy	Moderate	Difficult	Very Difficult
DERIVATIVE PHASE	1st	1st	1st 2nd	2nd 3rd	3rd 4th
GEOCHEM/ PEBBLE SAMPLING INTERPRET	Very Easy	Easy	Moderate	Difficult	Very Difficult

BC

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

BRITISH COLUMBIA GEOLOGICAL SURVEY

Geological Survey Branch

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DRIFT EXPLORATION POTENTIAL OF THE ALICE LAKE AREA

NTS 92L/6

by D.G. Meldrum and P.T. Bobrowsky

1:50 000

Miles 1 0 1 2 3 Miles
Metres 1000 0 1000 2000 3000 4000 Metres

For an overview of the Quaternary geology of the Alice Lake area please refer to the report entitled "Preliminary Drift Exploration Studies, Northern Vancouver Island (92L/6, 92L/11)" by P.T. Bobrowsky and D. Meldrum; *in* Geological Fieldwork 1993, Grant, B. and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1994-1. Geology based on terrain map by A. Pattison (1979) and air photo interpretation followed by ground truthing in areas indicated on map. Fieldwork completed in 1993.

LEGEND

VERY HIGH POTENTIAL (I)

Mv which is material deposited directly by actively moving or stagnating glaciers (various facies of till) or **Cv** which are materials produced by the rapid down-slope movement of dry, moist or saturated debris derived from surficial morainal material and/or bedrock falling, toppling, sliding or flowing. All unconsolidated sediments in this category occur as thin mantles of material which have no constructional form, but derive their surface expression from the topography of the underlying unit which is assumed to be bedrock. The sediments reflect minor irregularities of the underlying surface, are generally between 10 and 100 centimetres thick, and outcrops of bedrock are common.

HIGH POTENTIAL (II)

Mb which is material deposited directly by glaciers (various facies of till) or **Cb** which are materials produced by the rapid down-slope movement of dry, moist or saturated debris derived from surficial morainal material and/or bedrock falling, toppling, sliding or flowing. All unconsolidated sediments in this category occur as thick mantles of material which derive their surface expression from the topography of the underlying unit which is usually not bedrock. The sediments mask minor irregularities in the underlying unit and are generally greater than 1 metre thick.

MODERATE POTENTIAL (III)

Mv, Mb, Cv and **Cb** units same as above, either alone or in varying combinations, but underlying units are variable and not easy to verify or interpret. All unconsolidated sediments in this category occur as veneers or blankets, generally masking underlying topographic irregularities and total thickness is usually > 10 metres.

LOW POTENTIAL (IV)

F^G are materials deposited in association with glacier ice; generally consisting of sand and gravel and sometimes showing evidence of ice melting. Sorting, stratification, texture and shape are variable; includes all types of outwash and ice-contact deposits. **F** are materials transported and deposited by rivers, alluvial materials; generally consisting of gravel, sand, silt and clay. Gravels are often well-rounded, contain interstitial sand, sediment is usually well-sorted and stratified, includes flood plain, terrace, deltaic, and some alluvial fan deposits.

VERY LOW POTENTIAL (V)

L are sediments deposited in lakes or reworked by wave action around lake shorelines; generally consist of stratified and well-sorted sand, silt and clay. **L^G** are lacustrine sediments that were deposited in lakes associated with glacier ice; generally consists of stratified and well-sorted sand, silt and clay. **E** are eolian materials transported and deposited by wind action; generally consisting of medium to fine sand and coarse silt that is well-sorted. **O** are organic materials resulting from the decay of vegetative materials. **W** are sediments deposited by marine waters or reworked by wave action along marine shorelines; generally consisting of sorted and stratified gravel, sand, silt and clay. **W^G** are sediments deposited in a marine environment in close proximity to glacier ice; generally consisting of poorly sorted stony marine drift.

Paleo-flow direction