TILL GEOCHEMICAL SAMPLING: CH, BLACKWATER-DAVIDSON AND UDUK LAKE PROPERTIES, BRITISH COLUMBIA: REPORT OF ACTIVITIES

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INTRODUCTION

This paper describes a till geochemical sampling program conducted in the 1994 field season by the authors on the CH, Blackwater-Davidson and Uduk Lake properties (Figure 1). A detailed sampling program was completed in conjunction with a regional till survey (Giles *et al.*, 1995, this volume) to better define areas of mineralization and to study glacial dispersal processes on three properties. This work follows on similar studies previously completed in the region (Giles and Levson, 1994a,b; Levson and Giles, 1994; Levson *et al.* 1994).

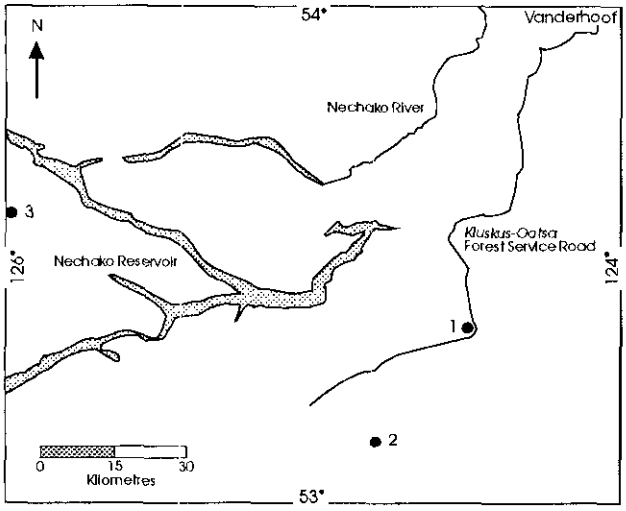

Figure 1. Location of areas sampled south and west of Vanderhoof; 1 CH, 2 Blackwater-Davidson and 3 Uduk Lake.

On the properties selected for this study, soil samples had been previously collected and these data were available for examination. The objectives of this project are to compare the geochemistry of till samples with samples previously collected from the A and B soil horizons, and to examine the effectiveness of till geochemical studies in locating zones of high mineral potential in areas of thick overburden.

Vertical profile sampling was completed in trenches on the Uduk Lake property. These samples will be used to assess geochemical variability in the A, B and C soil horizons derived from till.

BACKGROUND

Glaciers moving over mineralized bedrock erode bedrock and deposit the debris in till as dispersal trains (Shilts, 1976; Coker and DiLabio, 1989). Dispersal trains are fan or ribbon-shaped zones of anomalous mineral and geochemical concentrations located down-ice from mineral occurrences. They can be used to locate new occurrences, and can also contribute to an understanding of dynamics of glacier flow (Hornibrook *et al.*, 1993). The size of the dispersal train within the till is often many times larger than the original outcrop of mineralized bedrock because of debris mixing and dispersal within the glacier. As a result, till is an excellent medium for geochemical exploration.

Tills are 'first-derivative' products of bedrock, deposited by the linear movement of glaciers, and till dispersal trains are relatively easy to trace back to the point of origin (Shilts, 1993). Higher order derivatives, such as glaciofluvial or glaciolacustrine sediments, have a more complicated transport history, often with several episodes of transport; tracing them back to their source is more difficult and less accurate.

FIELD METHODS

Mapping of the surficial geology at each property has now been completed. During mapping (June - August, 1994), areas suitable for geochemical till sampling were identified and sampled. Local ice-flow directions were interpreted mainly from glaciated landforms identified on 1:60 000 aerial photographs, including crag-and-tail features, flutings and drumlins. These directions were confirmed on site by direct measurement of striae and landforms.

Sampling traverses down-ice from the mineralized zone on the Blackwater-Davidson property were oriented perpendicular to local ice-flow direction and form a fan shape. Some sample sites coincided with soil anomalies detected by previous sampling programs by the property owners. At all properties the sampling density was greatest slightly down-ice and around the area of highest mineral potential. Additional till samples were collected directly up-ice from the known showings to ensure that the source of the dispersal train is not further up-ice than inferred by the property owners.

With the exception of Uduk Lake, where eight trenches were available for study, sample sites typically consisted of roadcuts and hand-dug pits often

exceeding 1 metre in depth. Lodgement till (*sensu stricto*, Dreimanis, 1976) was the preferred sample material. All sample sites were marked with a B.C.G.S. regional geochemistry aluminum tag indicating the sample number and with orange flagging tape. The sample locations were plotted on topographic maps with the aid of air photographs; where possible, sample locations were referenced to the property grids.

The geochemistry of the till samples will be analyzed using the -230 mesh (-62.5μm) fraction. A suite of 35 elements will be analyzed by instrumental neutron activation analysis (INAA) and 30 by inductively coupled plasma - atomic emission spectroscopy (ICP-AES). Vegetation samples consisted of bark from mature, healthy lodgepole pine trees, of roughly equal diameters. These samples will be analyzed by INAA and ICP-AES. All results will be made available in a 1995 Open File report.

REGIONAL BEDROCK GEOLOGY

The regional geology of the Nechacko River (93 F) map sheet was mapped by Tipper (1954, 1963) at 1:250 000 scale. Revised 1:50 000 bedrock geology maps will shortly be released for the Tsacha Lake (93F/2) and Chedukuz Creek (93F/7) areas (Diakow *et al.*, 1995a,b,c). The basic stratigraphy underlying all three properties consists of rhyolitic volcanics and sediments of the Lower to Middle Jurassic Hazelton Group. These rocks are intruded by Cretaceous to Eocene granitic to dioritic stocks. Overlying these units are Late Cretaceous to Eocene age Ootsa Lake Group felsic to intermediate volcanics. Oligocene to Miocene andesitic to basaltic flows of the Endako Group cap the section.

CH PROPERTY

DESCRIPTION OF SURVEY AREA

The CH property is currently owned by Placer Dome Inc. It is located approximately 90 kilometres south-southwest of Vanderhoof, British Columbia (53°21'N, 124°25'W). The claims straddle the boundary between 93F/7 and 93F/8 map sheets (Figure 2). Access to the property is by the Ootsa-Kluskus forestry service road to near kilometre 100. Access roads on the property are suitable for four-wheel-drive vehicles only.

The CH property lies on the north flank of a large meltwater channel which cuts through the Nechako Range. The area is characterized by a gently undulating topography, dissected by glacial meltwater channels and with several swamps and lakes. Local elevations are relatively low, ranging between 1100 metres (3600') to about 1340 metres (4400').

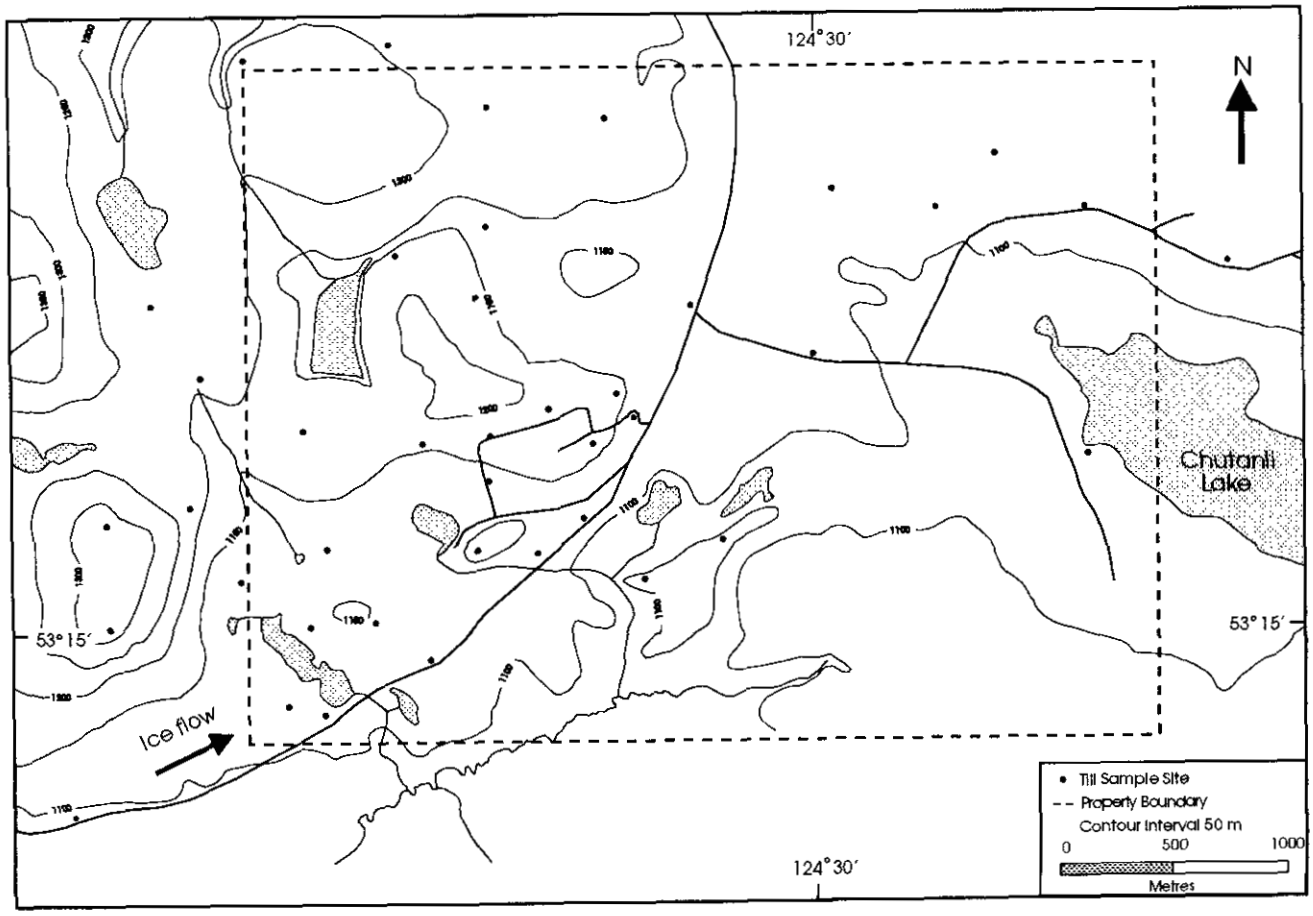

Figure 2. Site map for the CH property (dashed lines) with sample locations and glacial flow direction.

ALTERATION AND MINERALIZATION

Mineralization in the property is related to a hydrothermal system active during the emplacement of the Jurassic-Cretaceous Chutanli batholith (Warner and Cannon, 1992). Emplacement of the batholith led to hornfelsing of the country rocks, most intense in the northwest quadrant of the property and was accompanied by several types of alteration; propylitic, potassic, sericitic and siliceous (Edwards and Campbell, 1992).

Previous exploration programs uncovered sulphide veins containing lead, zinc, silver and gold in a trench located in the northwest portion of the claims. However, the primary exploration target is a porphyry-style quartz stockwork containing copper with minor gold mineralization (Edwards and Campbell, 1992).

SURFICIAL GEOLOGY

The area has been glaciated and covered with thick deposits of till and meltwater debris. The orientation of drumlins and flutings on the property indicates that the last major direction of ice flow was northeastward, towards 055°.

Deglaciation involved large-scale stagnation and frontal retreat. Large areas were inundated with meltwater and dissected by spillway channels. Extensive deposits of glaciofluvial sand and gravel occur in and adjacent to the spillway channels. A veneer of ablation till is common throughout the area.

WORK COMPLETED

Forty-five till samples were collected on the CH property (Figure 2), as well as ten additional samples, five collected down-ice and five collected up-ice. One area was chosen for detailed sedimentological profiles where twenty additional overburden samples were collected.

BLACKWATER-DAVIDSON PROPERTY

DESCRIPTION OF SURVEY AREA

The Blackwater-Davidson property, owned and actively explored by Granges Inc., is centred approximately 150 kilometres south-southwest of Vanderhoof, British Columbia at 53°11' north, 124°48' west. Access to the property is by the Kluskus-Ootsa forest service road to kilometre 146. An access road suitable for four-wheel-drive vehicles, continues eastward for approximately 18 kilometres to the property main grid. The claims are located on the north slope of Mount Davidson, in the Fawnie Range of the Nechako Plateau (Figure 3). Elevations range from about 1565 metres (4500') to 1861 metres (6107') at the peak.

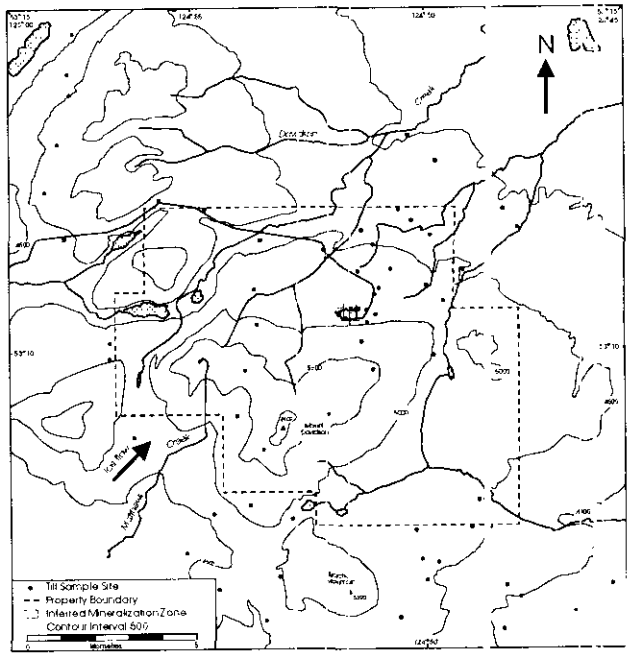

Figure 3. Site map for Blackwater-Davidson property (dashed lines) with sample locations and glacial flow direction.

MINERALIZATION

Sulphide mineralization on the property is associated with kaolinite and silicic alteration of felsic and intermediate volcanic rocks. A zone of gold and silver mineralization has been defined on a central grid. A strongly altered kaolinitized outcrop, in the southwest area of the claims, also contains sulphide minerals.

SURFICIAL GEOLOGY

This region has been glaciated, leaving little outcrop on the property. In the Mount Davidson area, ice-flow direction was determined from numerous glacial flutings oriented at approximately 045° (Figure 3). Slight deviations were recorded near the mountain peak.

Although the main direction of movement remained northeastward, the ice mass was forced around the mountain, rather than flowing directly over it. This type of interference with glacier flow often results in complex dispersal patterns (Hornibrook *et al.*, 1993).

WORK COMPLETED

The locations for 54 till samples on or close to the Blackwater-Davidson property are shown on Figure 3.

Glacial striae and landforms were examined and measured for evidence of multiple flow directions. These data indicate that the major flow direction was towards 045°.

UDUK LAKE

DESCRIPTION OF THE SURVEY AREA

The Uduk Lake property is presently owned and explored by Pioneer Metals Inc. It is centred 70 kilometres south-southwest of Burns Lake, British Columbia, at 53°38' north, 125°59' west, on the boundary between the 93E/9 and 93F/12 map sheets (Figure 4). A new forest service road off the Ootsa Main forest service road has been built southward to within 3 kilometres of the property. A proposed clear-cut would allow full road access to the site.

The property is situated in the Windfall Hills area of the Nechako Plateau. The claims lie just east of Uduk Lake, approximately 15 kilometres south of Ootsa Lake. Local topography is relatively subdued, at elevations ranging from about 1095 metres (3600') to 1220 metres (4000'), with abundant swampy and boggy areas.

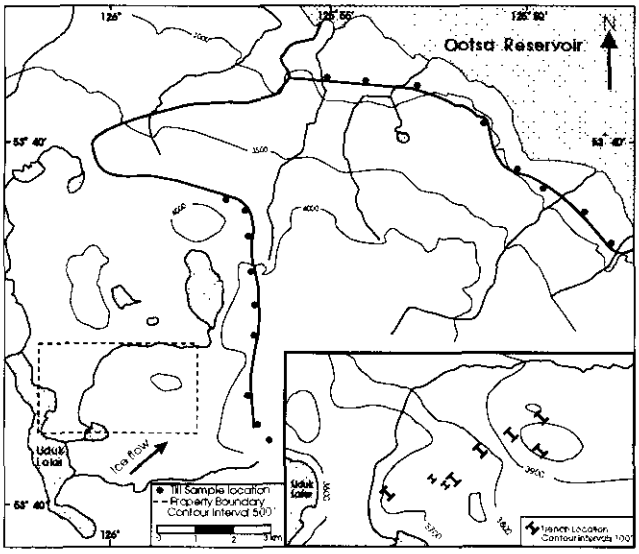

Figure 4. Site map for Uduk Lake with sample and approximate trench locations (insert) and glacial flow direction.

ALTERATION AND MINERALIZATION

The Ootsa Lake Group rhyolitic rocks at this property have undergone intense argillic alteration, transforming the volcanic rocks to a chalky clay. The rhyolites are characterized by intense silicification producing breccias and veins with drusy quartz. The age of mineralization is not well defined, but it is inferred to have occurred prior to the deposition of the Endako Group, as these rocks are unaltered (Taylor, 1989).

Nevadan-style epithermal deposits consist of stockwork veins in the altered rhyolitic rocks hosting low-grade concentrations, but often with high tonnages of gold and silver. The Uduk Lake claims have similar characteristics to this style of deposit (Taylor, 1989).

SURFICIAL GEOLOGY

The area has been intensely glaciated, with drumlins and flutings extensively developed. Outcrop is rare which has hampered exploration. Local ice-flow direction towards 050°, was interpreted from aerial photographs. The abundance of streamlined landforms suggests that the surface till sheet is probably a basal till, with an occasional thin veneer of ablation till and glaciofluvial sediment. Mineralized float has been found in till up to 15 kilometres down-ice (northeast) of the property.

WORK COMPLETED

Till samples were collected along the forest service roads which provide access to the property. Eighteen samples were taken several kilometres down-ice from the claims. These samples will help define the dispersal train.

Several areas on the claims were trenched by backhoe in the summer of 1994, as part of Pioneer Metals' exploration program. Areas designated for trenching had returned anomalous soil geochemical results. The trenches ranged from one to several metres deep, depending on the depth to bedrock, and 10 to 150 metres long.

The data from this study will be used to compare the element concentrations of the different soil horizons with that of basal till as well as the homogeneity of the till blanket (cf. Broster, 1986). In addition, the element concentrations from various sediment types and their relative usefulness for drift prospecting will also be assessed. A total of 40 soil and till samples were collected from the trenches. Ten vegetation samples were collected adjacent to the trenches, and twelve more southwest of the mineralized zone.

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