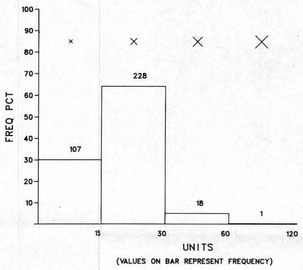
Energy, Mines and Resources Canada / Énergie, Mines et Ressources Canada

Geological Survey of Canada
Commission géologique du Canada

LEAD (PPM) TILL GEOCHEMISTRY DYKE LAKE NTS 23 NE

F.J. Thompson, R.A. Klassen, R.K. Burns

N POINTS	355	MEAN	19.
MEDIAN	17.	STD DEV	10.
MINIMUM	7.	MAXIMUM	64



BEDROCK GEOLOGY

PALEOHELIKIAN
- 9 Granite, adamellite, anorthosite

APHEBIAN (Labrador Trough)
- 8 Iron formation
- 7 Arkose, conglomerate, quartzite,slate, dolomite
- 6 Acid to mafic volcanics
- 5 Gabbro, peridotite
- 4 Basalt

APHEBIAN
- 3 Paragneiss
- 2 Granulite, unseparated acid intrusives

ARCHEAN
- 1 Granitic gneiss, granulite, unseparated acid intrusives

Geology modified after:

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1982: Geology of the south-central Labrador Trough; Mineral Development Division, Newfoundland Department of Mines and Energy, Map 82-6.

Contribution to Canada-Newfoundland Mineral Development Agreement 1984-89, a subsidiary agreement under the Economic and Regional Development Agreement. Project funded by the Geological Survey of Canada.

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DEPARTMENT OF MINES
GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Energy, Mines and Resources Canada / Énergie, Mines et Ressources Canada

Canada

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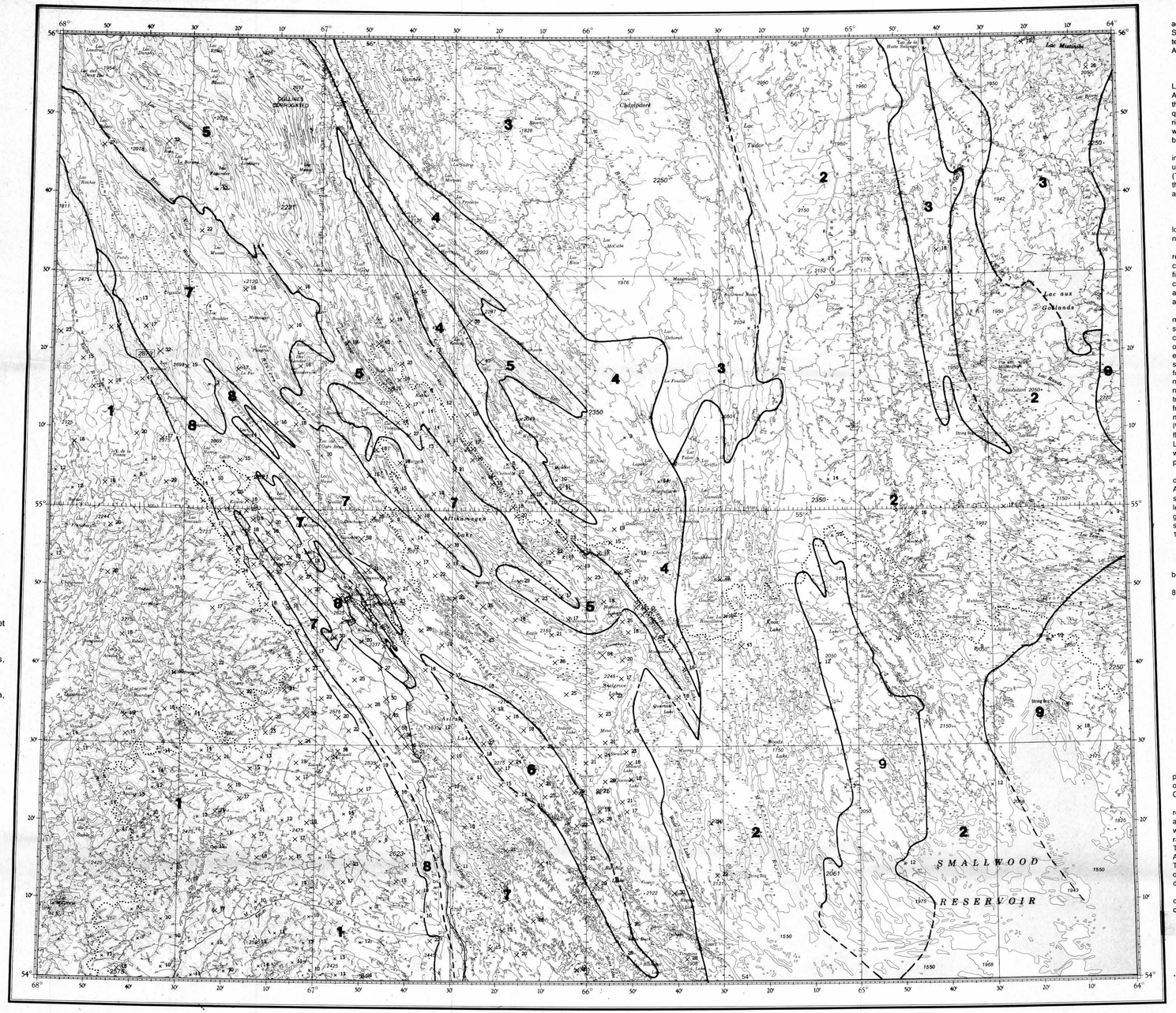

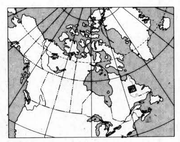

INDEX MAP

OPEN FILE 1901

DYKE LAKE

QUÉBEC–LABRADOR

Échelle 1/500 000 - Scale 1:500 000

Kilomètres 10 0 10 20 30 40 Kilometres

OPEN FILE
DOSSIER PUBLIC
1901
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA
1988

SHEET 8 OF 11

INTRODUCTION

Geochemical analyses of till in the Schefferville region of western Labrador are presented on the accompanying map. The till samples were collected during 1986 by the Terrain Sciences Division, Geological Survey of Canada, to establish drift composition and patterns of glacial dispersal in the area and to develop techniques of drift prospecting. The work is a contribution to the Canada-Newfoundland Mineral Development Agreement.

BEDROCK GEOLOGY AND PHYSIOGRAPHY

The central part of the study area is underlain by Aphebian supracrustal volcanics and sediments of the Labrador Trough which forms an 80 km-wide belt trending northwest-southeast. The Trough lies between Archean granites and gneisses of the Superior Province, to the west, and Aphebian granites and gneisses of the Churchill Province, to the east (Greene, 1970; Wardle, 1982; Avramtchev, 1985). The more resistant quartzites, iron formation, and volcanics of the Labrador Trough form northwest- southeast trending bedrock ridges and the softer shales underlie swamp and lake-filled valleys. To the south is swampy flat-lying land which is now in part flooded by the Smallwood Reservoir. The Archean granites and gneisses form rugged bedrock highlands with no distinct topographic grain.

Exploration activity has been concentrated in the Labrador Trough. Showings of Cu, Pb, Zn and Ni occur in shales and slates near the contact with gabbro in the eastern part of the Labrador Trough. Mafic and ultramafic rocks in that region are considered to have potential for precious and platinum group metals (T. Birkett, personal communication, 1986). Recent discoveries of 'anomalous' Zn in lake sediments west of the Howells River Valley (M. Beaumier, personal communication, 1986) and gold in Archean iron formation along the Goodwood River have sparked exploration activity in Archean bedrock.

GLACIAL GEOLOGY

Till, the most widespread glacial deposit is generally thin (< 2 m) to discontinuous in highland areas and locally thicker (2 to > 10 m) in valleys. Southeast trending eskers are common south of Astray Lake; they do not generally occur to the north.

The texture and composition of tills generally reflect the underlying bedrock lithology. On bedrock units resistant to glacial erosion, such as granites and gneisses, till is thin and has little fine-grained matrix component. The sediments and volcanics of the Trough are generally softer and more easily comminuted to fines, and till overlying these bedrock units is generally thicker, has a greater component of silt and clay, and a colour which reflects that of the underlying bedrock (Henderson, 1959). Red and grey tills, for example, are associated with iron formation and sedimentary rocks of the western Labrador Trough, and grey-green tills are associated with volcanics and mafic intrusives of the eastern Labrador Trough.

Regional ice flow trends are indicated by the orientation of striae and glacial landforms. Sense of movement has been determined by the shape of streamlined landforms and by small scale features on outcrop surfaces. The prominent ice flow trends cross regional topographic grain and overtop highland areas, and are consequently considered to reflect major phases of flow that were not topographically influenced. Five phases of ice flow have been identified in western Labrador, based on striae trends and the distribution of indicator erratics (Klassen and Thompson, 1987). Phase I, the oldest ice movement, records flow to the northeast and southwest from a dispersal centre either in or near to the Labrador Trough. Trough derived iron formation found > 100 km to the east and west of the Trough reflects transport in this phase of flow. Phase II records north-directed flow on the Archean highlands and in the Lac Wakuach area of the Trough. Erratics of nepheline syenite both southwest and north of the bedrock source (west of the Goodwood River) suggests transport in both Phases I and II, and possibly Phase III. Phase III records flow to the northwest and southeast from a dispersal centre in the Schefferville-Attikamagen Lake area. Large volumes of red rhyolite erratics northwest of the known bedrock source in the Martin Lake area reflects transport in this phase of flow. Phase IV records eastward flow across the Archean highlands and into the Trough. The northern limit of this phase of flow is in the Lac Bazil region. An increase in the abundance of Archean erratics in the southern part of the Labrador Trough along with a corresponding decrease in Trough debris on the Archean highlands is associated with this phase of flow. Phase V records northeast flow across the Trough and is considered to be a minor phase of flow without significant transport of erratics.

The overall direction of transport and composition of the drift may reflect glacial transport during ice flow other than that most recently recorded. For example, the abundance of Trough-derived debris on the Archean highlands west of Howells and Goodwood river valleys reflects transport primarily during the oldest southwest flow (Phase I) and not by later north or northwest flow (Klassen and Thompson, 1987). Anomalous levels of Zn recorded in lake sediments in this area (M. Beaumier, personal communication, 1986) may reflect glacial distribution of Labrador Trough debris and not the composition of local Archean bedrock. Lake sediment studies have shown the shales of the Labrador Trough to be enriched geochemically (McConnell, 1984).

GEOCHEMICALLY ENRICHED ERRATICS

Geochemical analyses of gossanous erratics collected during the course of fieldwork are summarized below. Their significance is not known but a few of the erratics containing pyrite are enriched in gold.

86-TBA-2020	-	2400 ppm Ba; 17 ppm W Archean bedrock source.
- 2189(A)	-	706 ppb Au Archean bedrock source (diatexite).
- 2189(B)	-	540 ppm Cr; 410 ppm Zn; 26 ppm W Archean bedrock source (Tonalite)
- 2193	-	1500 ppm Cr; 600 ppm Ni; 246 ppm La; 346 ppm Ce 18 ppm Sn; 57 ppm Th Archean bedrock source (diorite).
- 2380	-	1830 ppm As; 88 ppb Au Archean bedrock source (diatexite).
- 2474	-	227 ppm La; 348 ppm Ce; 21 ppm Sm; 110 ppb Au Labrador Trough bedrock source.

TILL GEOCHEMISTRY

Sample pits were dug to depths of 30-70 cm depending on depth to bedrock and difficulties in penetrating stony till. In areas of tundra vegetation, pits were dug in mudboils where soil zonation was absent or poorly developed due to periglacial churning. The clay-size (< 0.002 mm) fraction of till was analyzed for Cu, Pb, Zn, Ni, Cr, Mo, Mn, and Fe by atomic absorption methods, and for U by delayed neutron activation.

Because the trace element geochemistry is in part dependent on the degree of weathering as represented by position within the soil profile (Kassen, 1984), samples were collected from the least oxidized and most organic-free section of the pit. Fe and Mn can be used to estimate the degree of post-glacial weathering and provide a measure of sample quality. Samples in which Fe and Mn fall outside the 'normal' ranges are suspect. Depressed base metal and uranium values are commonly coincident with low Mn values. The normal range of values for Fe and Mn is 3 to 6% and 200 to 600 ppm, respectively, over Archean and Aphebian granites and gneisses and 5 to 9% and 400 to 4000 ppm, respectively, within the Labrador Trough. The highest values for Mn are associated with sediments of the Labrador Trough. Elevated Fe and Mn levels on the Archean highlands west of the Howells and Goodwood river valleys reflect the dominance of Trough-derived debris within the finest size fraction of till.

Despite geochemical variations related to weathering, the geochemistry of till generally reflects the composition of the underlying and immediately up-ice bedrock. Isolated anomalous values may be the result of local bedrock mineralization, although sample spacing is too wide to reliably identify specific occurrences.

Background levels for lead range from 10 to 30 ppm. Scattered high background levels (30 to 60 ppm) are associated with sediments of the Labrador Trough.

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