13 K/7 (1)
Map 78170
313 1102
F. or DRAWING No. 78170
DETAILS BRUCE LAKE

MINERAL DEVELOPMENT DIVISION
DEPARTMENT OF MINES AND ENERGY
GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

1:50,000

LEGEND

ELSONIAN AND YOUNGER

16	*Gabbro and diorite plugs and sills and diabase dikes;* **16a**, *altered leucogabbro.*
15	*Pink muscovite granite.*
14	**Otter Lake granite:** *Coarse monzonite and granodiorite;* **14a**, *leucogranite.*
13	*Quartz-feldspar porphyry.*

PALEOHELIKIAN

Bruce River Group

Sylvia Lake Formation (7-12)

12	*Coarse plagioclase-porphyritic andesite, in part intrusive.*
10 / 11	*Cyclic sequence of massive and porphyritic andesite and agglomerate* (**10**) *and felsic porphyritic flows, breccias, and ignimbrites* (**11**); **10a**, **11a**, *mafic and felsic tuff, sandstone, and conglomerate.*
9	*Mauve porphyritic andesite;* **9a**, *tuffaceous sandstone.*
8	*Massive mafic flow.*
7	*Rhyolite flow breccia.*
6	**Brown Lake Formation: 6a**, *Red cobble and boulder conglomerate;* **6b**, *varicolored tuffaceous sandstones.*
5	**Heggart Lake Formation: 5a**, *Dominantly feldspathic sandstone;* **5b**, *dominantly gray, cobble and boulder conglomerate;* **5c**, *mafic flows and sills.*

APHEBIAN OR OLDER

4	**Junior Lake granite:** *Pink biotite granite.*

APHEBIAN

Moran Lake Group

3	*Massive and pillowed mafic flows;* **3a**, *amphibolite and schistose metabasalt.*
2	*Slate, siltstone, dolostone;* **2a**, *Slate, phyllite, pelitic and semipelitic schist.*

ARCHEAN

1	*Weakly foliated leucogranite.*

SYMBOLS

Geological contact (defined, approximate, assumed or extrapolated)
Bedding; tops unknown (inclined, vertical)
Bedding; tops known (inclined)
Igneous foliation (flow banding, eutaxitic structure)
Schistosity: in units 1, 2a, 3a, 14, 15, 16
Cleavage: in units 2 to 13
Syncline, anticline (with plunge direction of fold axes)
Fault (defined, approximate, assumed)
Structural trend from aerial photograph
Hornfels ... H
Dike
Outcrops in areas of little exposure ... ×
Areas of extensive glacial drift cover
Esker
Mineral occurrences ... ×

ABBREVIATIONS

Chalcopyrite	cp
Chalcocite	cc
Bornite	bo
Fluorite	fl
Pyrite	py
Pyrrhotite	po
Hematite	hem
Uranium	U

Compiled by A.B. Ryan, April 1978. Based on mapping as follows:

1. Area northwest of Bruce Lake Shear Zone: B.E. Marten, 1974.

2. Area between Bruce Lake Shear Zone and Gravelly Lake Shear Zone: W.R. Smyth, B.E. Marten and A.B. Ryan, 1974; W.R. Smyth, A.B. Ryan, 1976.

3. Area southeast of Gravelly Lake Shear Zone: W.R. Smyth and A.B. Ryan, 1976; A.B. Ryan, 1977.

This map may be subject to revision and correction.

Geological cartography by Mineral Development Division, Department of Mines and Energy, Government of Newfoundland and Labrador.

Copies of this map may be obtained from the Publications and Information Section, Mineral Development Division, Department of Mines and Energy, P.O. Box 4750, St. John's, Newfoundland A1C 5T7.

Approximate magnetic declination 1972, 34°19'W, decreasing 5.8' annually.

Elevation in feet above mean sea level.

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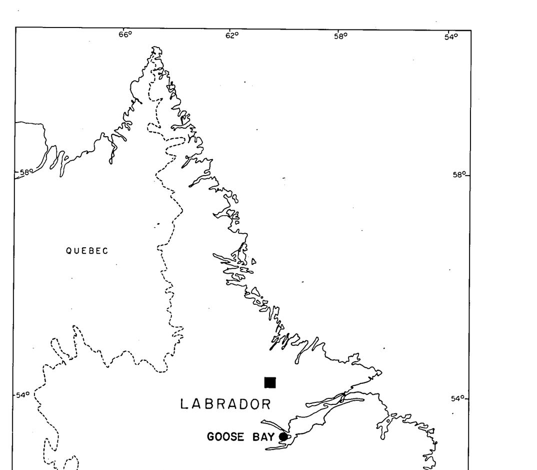

INDEX MAP

Produced by the MAPPING AND CHARTING ESTABLISHMENT, DEPARTMENT OF NATIONAL DEFENCE for the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES, from aerial photographs taken in 1970. Printed 1972.

MAP 78170
BRUCE LAKE
COAST OF LABRADOR DISTRICT
NEWFOUNDLAND

Scale 1:50,000 Échelle

Miles 1 0 1 2 3 Milles
Metres 1000 0 1000 2000 3000 4000 Mètres
Yards 1000 0 1000 2000 3000 4000 Verges

Some names on this map are not yet official. Corrections or additions are invited by the Surveys and Mapping Branch.

MARGINAL NOTES

The map area lies within the Central Mineral Belt of Labrador and is easily accessible by float plane or helicopter from Goose Bay 130 km to the southeast.

Bedrock exposure north of the Gravelly River is good, the area being primarily a barren plateau with vegetated valleys. South of the Gravelly River large areas of glacial outwash sands and boulder fields obscure bedrock, and only high hills offer much outcrop.

The area has been previously mapped at a scale of 1:250,000 by the Geological Survey of Canada (Williams, 1970), and has periodically been a target for base metal and uranium exploration over the past 30 years.

The sedimentary-volcanic rocks of the map area were originally named the Croteau Lake Series by Halet (1946) and the Croteau Group by Williams (1970). On the basis of a major regional erosional unconformity within the Croteau Group, Smyth *et al.* (1975) redefined it as the Moran Group and the Bruce River Group. The name Moran Group has subsequently been replaced by Moran Lake Group (Smyth *et al.*, 1978). The oldest rock unit of the area is considered to be a weakly foliated medium grained leucogranodiorite (Unit 1). It appears to be part of the gneiss-granite complex of the Nain structural province to the north and is therefore assigned an Archean age.

The Moran Lake Group (Units 2, 3) is assumed to be in nonconformable contact with the foliated leucogranodiorite; it is composed of a basal sedimentary division overlain by a mafic volcanic division, and is considered to be Aphebian in age (Williams, 1970).

The sediments (Unit 2) of the Moran Lake Group are predominantly gray and black argillite and siltstone, with lesser gray dolostone and chert. A thin rusty brown dolomitic limestone with chert stringers outcrops sporadically at or near the base of the sediments.

The volcanic rocks (Unit 3) consist predominantly of massive and pillowed basalts which are green on fresh surfaces and weather gray to brown; agglomerates are locally present.

Several areas of polydeformed metasedimentary and metavolcanic rocks which appear lithologically correlative with the Moran Lake Group occur within the map area (Units 2a, 3a). The metasedimentary rocks (Unit 2a) range from slate and phyllite with primary sedimentary features preserved, to biotite rich pelitic, semipelitic and psammitic schists with composite fabrics and metamorphic layering; quartzite and calc-silicate occur locally. Pyrrhotite-pyrite gossan zones are widespread in psammitic units. Actinolite schists, amphibolitic metatuffs and cleaved metabasalt ("greenstone") (Unit 3a) occur structurally below the metasediments north of Yvon Lake and as a fault wedge north of Alvin Lake.

The deformation and metamorphism of the Moran Lake Group are attributed to the Hudsonian Orogeny (Smyth *et al.*, 1975). If the metasediments and metavolcanics (Units 2a and 3a) are Moran Lake Group equivalents, then the Hudsonian imprint increases southeastwards across the area, as is indicated by the slightly metamorphosed state of the rocks around Moran Lake in contrast to the strongly schistose garnet-grade metamorphic rocks north of Yvon Lake. In the latter quartz-plagioclase-biotite-muscovite-garnet is a typical assemblage of the pelitic and semipelitic rocks; tourmaline, graphite, pyrite, chlorite and zircon are common accessories.

A tongue of medium grained, weakly cleaved, pink biotite-albite granodiorite, called the Junior Lake granite (Unit 4), occurs north of Alvin Lake. Its age relative to the Moran Lake Group is uncertain, but both the granite and the Moran Lake Group are unconformably overlain by the Bruce River Group.

The Bruce River Group (Units 5-12) has been divided into three formations; *viz.*, the Heggart Lake Formation, the Brown Lake Formation and the Sylvia Lake Formation (Smyth *et al.*, 1978).

The Heggart Lake Formation (Unit 5), the basal division of the Bruce River Group, is assumed to rest unconformably on the Moran Lake Group southeast of Moran Lake; this contact may be fault modified. Red to pink, fine to medium grained tuffaceous sandstones with thin intercalations of mudstone and grit (Unit 5a) occur at the base of the formation in the Moran Lake area. The sandstones are commonly massive and lack sedimentary structures although cross-stratifications, slump features and ripple marks occur locally. A peculiar ochre yellow to brown breccia horizon hosting an important uranium showing occurs within the sandstones south of Lady Lake (or Lake 202). The breccia, which is extensively altered by carbonate (siderite or dolomite?) appears to be of extrusive volcanogenic origin. (Kontak, 1978) Interfingering with, and channeling into, the sandstones are coarse gray conglomerates (Unit 5b). The clasts, which vary from pebble to boulder size, are dominantly of foliated granite, quartzofeldspathic gneiss, mylonite, vein quartz, felsic porphyry and andesite. The matrix is a gray-green, medium to coarse grained arkose with variable amounts of quartz, feldspar and rock fragments. Massive and amygdaloidal, porphyritic, mafic flows and sills (Unit 5c), which are locally brecciated, occur sporadically throughout the Heggart Lake Formation, especially north of Alvin Lake. Generally, these units are less than 40 m in thickness. Thin units of reddish felsic porphyry are present locally; these are too small to show at the present map scale.

The Brown Lake Formation (Unit 6) disconformably overlies the Heggart Lake Formation, and also oversteps the Moran Lake Group in the Croteau Lake area to the west (Smyth *et al.*, 1975; Smyth and Ryan, 1978). In the map area it rests with angular unconformity on polydeformed equivalents of the Moran Lake Group north of Yvon Lake and with disconformity on Heggart Lake conglomerates near Alvin Lake. In contrast to the chiefly gray color of the Heggart conglomerates the basal conglomerate (unit 6a) of the Brown Lake Formation is red to mauve, due principally to its clast content, which is dominated by reddish arkosic sandstone and mauve felsic porphyry with lesser amounts of mafic volcanic, quartz and mylonite. Overlying the conglomerate is a sequence of well-bedded feldspathic sandstones which are commonly cross-bedded and are shades of red, pink, green and buff (Unit 6b). Devitrified glass shards are a significant component of some of the sandstones. Interbedded with the sandstones are local horizons of cherty dust tuff, impure gray-green orthoquartzite, conglomerate composed of purple felsic volcanic, granite and aplite fragments in a quartzite matrix, and very thin units of felsite and rhyolite breccia. Mafic dikes and sills are locally abundant in the sediments.

The Brown Lake sediments are overlain by a thick sequence of mafic, intermediate and felsic volcanic rocks (Baragar, 1969) known as the Sylvia Lake Formation (Units 7-11) which has yielded a Rb-Sr age of 1474 Ma (Wanless and Loveridge, 1972). The base of the sequence at Sesia Lake is marked by a thin pink rhyolite flow breccia (7) cut by an irregular stockwork of greenish felsite, which is overlain by a fine grained massive mafic flow (8). These two units also occur above the Brown Lake Formation southeast of Alvin Lake. These basal units are overlain by an extensive unit of mauve to mottled greenish, feldspar porphyritic, locally flow banded andesite (Unit 9). This mauve porphyry unit is overlain by a repetitive succession of mafic to intermediate (Unit 10) and felsic volcanic flows and ignimbrites (Unit 11) which form two cycles in the type section of the formation between McLeod and Bruce Lakes. The mafic and intermediate members (Unit 10) are green to gray, fine grained plagioclase ± pyroxene porphyritic and/or amygdaloidal flows with areas of volcanic breccia and agglomerate. Some of the massive looking mafic units exhibit diffuse layering and contain rock and crystal fragments suggestive of a pyroclastic origin. The felsic volcanic flows, pyroclastic units and ignimbrite sheets (Unit 11) are petrographically predominantly porphyritic dacite and rhyodacite in composition; chemically they are rhyolites. Feldspar phenocrysts, dominantly plagioclase with lesser potash feldspar, are nearly always present; quartz is relatively uncommon. The rocks exhibit a variety of colors in shades of gray, purple, red, and black and vary texturally from vuggy coarse fragmental lapilli and lithic tuffs to dense aphanitic welded tuffs. In the welded rocks primary igneous fabrics are defined by strongly flattened gray to pink collapsed, devitrified pumice and whispy, flow banded, devitrified glass. These primary features wrap around augen of green to pink feldspar crystal fragments and larger lithic fragments.

Narrow intercalations (Units 9a, 10a, 11a) of gray and green mafic tuff and maroon and buff tuffaceous sandstone, siltstone and conglomerates (lahars ?) occur associated with the volcanic succession. Some of these sedimentary rocks display syndepositional slump folds and are commonly well laminated and cross-bedded. One such horizon north of Sylvia Lake contains high-angle aeolian(?) cross-beds up to 3 m thick.

A coarse, plagioclase porphyritic, amygdaloidal andesite has been outlined in the Alvin-Sesia Lake area (Unit 12). This unit is intrusive, and has also been observed at other levels in the stratigraphic sequence of the Bruce River Group.

A massive quartz-feldspar porphyry intrudes the Brown Lake formation northwest of McLeod Lake. It may be related to the felsic volcanism of the Bruce River Group.

The Otter Lake granite (Unit 14) is a pink to white weathering, biotite monzonite to biotite-hornblende granodiorite which is typically coarse grained and rarely megacrystic; it locally contains irregular dioritic xenoliths (Ryan and Harris, 1978). It intrudes rocks of the Moran Lake Group and the Bruce River Group and yields a Rb-Sr age of 1445 Ma (Kontak, 1978). An intrusive contact with the felsic volcanics of the Bruce River Group is exposed on a ridge 5.5 km east of Otter Lake and elsewhere an intrusive contact is inferred from the presence of contact metamorphic minerals and granitic veining. A medium grained leucogranite (14a) intrudes, and contains numerous inclusions of, Moran Lake Group slates along the Gravelly River east of McLeod Lake. Although the contact with the Bruce River Group along the river is sheared, the sediments are locally hornfelsed and the leucogranite is considered to be a phase of the Otter Lake granite.

A pronounced contact aureole up to 0.5 km in width is developed in rocks adjacent to the Otter Lake granite. This is best displayed by the sedimentary rocks of the Brown Lake Formation north of Yvon Lake and along the Gravelly River where andalusite bearing spotted hornfelses (H) are developed. In the pelitic and semipelitic schists of Unit 2a north of Yvon Lake, blue cordierite porphyroblasts overgrow the main fabric, and in garnet bearing assemblages, the garnet has been thermally transformed into a cordierite(?)-hercynite symplectite. Northeast of McLeod Lake, gray slates and siltstones of the Moran Lake Group contain andalusite. Both the andalusite and cordierite in these rocks have been tectonically flattened and have been largely replaced by aggregates of white mica.

Several areas of pink muscovite microgranite (Unit 15) have been partially outlined, namely southeast of Pearl Lake, southeast of Ed Lake and east of Nipishish Lake. These are characterized by a saccharoidal texture, an amoeboid microstructure, and a foliation defined by partially chloritized biotite and muscovite. Although no contact relations are seen with the surrounding rocks, similar granite occurs as sheets intruding the Otter Lake granite south of Nipishish Lake (Ryan and Harris, 1977).

Numerous gabbro and diorite plugs and diabase dikes and sills (Unit 16) occur throughout the area and probably represent several periods of basic intrusion (*cf.* Kontak, 1978). Medium grained, highly altered, leucogabbroic intrusives near Lake Louis appear to be the oldest. Numerous oval diorite plugs occur within the Bruce River Group and include a fault dissected body north of Alvin Lake which is differentiated to quartz monzonite at its core. Linear bodies extending northeastwards from Nipishish Lake are biotite gabbros which are part of the Michael gabbros (Fahrig and Larochelle, 1972). An oval-shaped body northwest of Nipishish Lake is in thrust contact with the Otter Lake granite; both the gabbro and granite have developed gently dipping, strongly foliated zones at the contact.

The Bruce River Group, together with the Otter Lake granite and other intrusive rocks were deformed during the Grenville Orogeny, the effects of which increase southeastwards across the map area. The supracrustal rocks were folded into a major open, upright, southwest plunging syncline, bounded on both limbs by faults. The Otter Lake granite is zonally deformed and varies from unfoliated to mylonitic "augen gneiss". A single pervasive southeast dipping foliation is developed throughout the area, with an earlier subhorizontal cleavage locally present in the Bruce River Group as a result of stratabound thrusting (Smyth *et al.*, 1975).

Bruce River Group rocks northeast of the Gravelly River shear zone are generally little metamorphosed. The tuffaceous sediments are devitrified, but primary structures such as angular glass shards are abundant microscopically. Locally, a foliation is defined by sericite but there is only slight alteration in the clastic constituents. Plagioclase and potash feldspar phenocrysts which occur in the felsic volcanics show some development of sericite and epidote; the plagioclase is commonly albite. The groundmass of these rocks is a fine grained drusy felsitic intergrowth of quartz and feldspar with original flow banding accentuated by sericite growth. Relic clinopyroxene phenocrysts are present in the mafic rocks although in most cases these have been replaced by chlorite, pale green biotite, or pale green amphibole. Plagioclase phenocrysts, which retain their original zoning, are variably altered to epidote and sericite. The groundmass of the mafic rocks is composed of a matted intergrowth of partially sericitized feldspar microclites with chlorite and amphibole replacing mafics. Epidote, chlorite, quartz and calcite fill vesicles. These observations indicate that low greenschist facies metamorphism was attained in the northern part of the area during the Grenville Orogeny.

In the southern two belts of Bruce River Group rocks, Grenville effects are more pronounced. The mafic rocks, though retaining their primary porphyritic character, commonly exhibit brownish green biotite pseudomorphs of mafic phenocrysts and epidote-sericite replacement of plagioclase; in contrast to the northern area biotite is dominant over amphibole in the groundmass. The felsic volcanic rocks commonly exhibit a schistose or granoblastic microstructure in which no primary microscopic features are preserved except for sutured phenocrysts of feldspar. Discrete muscovite and/or biotite flakes form a foliation, and small euhedral garnets are seen in some thin sections of these rocks.

Several generations of faults are present, the earliest of which appear to be stratabound thrusts which rotate and juxtapose different elements of the stratigraphy in the Sesia-Alvin Lakes area. Similar structures are also present in the volcanic rocks northeast of Bruce Lake and in the sediments north of McLeod Lake. Three northeast trending major faults transect the area. These are high angle reverse structures, with varying amounts of strike-slip movement, and have been termed the Bruce Lake, Gravelly Lake and Minisinakwa Lake Shear Zones (Smyth *et al.*, 1975; Ryan and Harris, 1978).

Three areas of uranium mineralization are known in the map area, two south of Moran Lake and one near Sylvia Lake. One of the Moran Lake occurrences is confined to highly altered gabbroic intrusions and the surrounding sandstones (Smyth and Ryan, 1977) whereas the other occurs in a volcanic (?) breccia horizon within the sandstones of the Heggart Lake Formation (Kontak, 1978). The Sylvia Lake showing is located at the intersection of two faults cutting felsic pyroclastic rocks (Bernazeud, 1965). Base metal occurrences are widespread; chalcopyrite, bornite, pyrite, chalcocite and galena showings have been known from the Bruce River and Moran Lake Groups since early exploration activity began. Rusty pyrite-pyrrhotite zones are common in the schists southwest of Stipec Lake.

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