LEGEND

DEVONO-CARBONIFEROUS

LUMZ — LEUCOMONZOGRANITE: fine-to medium-grained moderately equigranular to porphyritic, contains biotite (4-7%), muscovite (2-4%), and rare cordierite (trace).

DClmDL — DAVIS LAKE LEUCOMONZOGRANITE: medium-to coarse-grained with abundant K-feldspar megacrysts; contains biotite (4-7%; locally may reach up to 9%), muscovite (trace - 2%) and cordierite (trace-2%).

DCmgTL — TOBEATIC LAKE MONZOGRANITE: medium-to coarse-grained, megacrystic texture; contains biotite (16.5%), and muscovite (<2%).

DC RL — ROSEWAY LAKE GRANODIORITE: medium grained equigranular to slightly porphyritic, contains biotite (16-18%), muscovite (1-1.5%) and very abundant metasedimentary xenoliths.

CAMBRO-ORDOVICIAN

€OlmBM — BALD MOUNTAIN PLUTON (after Rogers, 1986; 1988): medium grained equigranular with well developed foliation, contains biotite (5%) and muscovite (9%).

MEGUMA GROUP (after Taylor, 1969; and Rogers, 1986)

€OH — HALIFAX FORMATION: finely laminated, black-dark grey slates and siltstones

€OG — GOLDENVILLE FORMATION: greenish-grey to light-grey metagreywackes, argillite and minor interbedded slates

SYMBOLS
(not all symbols occur on map)

Rock outcrop, area of outcrop, probable outcrop, float

Geological boundary (defined, approximate, assumed, defined by till clasts, defined by airborne spectrometry)

Geological boundary-gradational (‹ 100 m; › 100 m)

Exposed intrusive contact (arrow pointing toward younger unit, age relation not determined)

Unconformity (hatching on younger side)

Bedding (horizontal, inclined, vertical, overturned, dip unknown, younger direction unknown)

Anticline (defined, approximate)

Syncline (defined, approximate)

Preferred orientation of feldspar megacrysts (horizontal, inclined, vertical, dip unknown)

Schistosity, gneissosity, cleavage, foliation (horizontal, inclined, vertical, dip unknown)

Breccia

Schlieren banding (horizontal, inclined, vertical, dip unknown) poorly developed isolated bands and well developed (thin and heavy lines respectively)

Lineament (from air photos)

Fault (defined, approximate, assumed, inclined, vertical)

Fault (sinistral, dextral)

Shearing and intense fracturing, fracture cleavage (horizontal, inclined, vertical, dip unknown)

Joint (horizontal, inclined, vertical, dip unknown)

Dyke or vein: ALBI–albitite; APPG–aplite with minor pegmatite; DIAB–diabase; ELVA–elvan; LUGR–leucogranite; LUMZ–leucomonzogranite; LUPO–leucoporphyry; MIAP–mica aplite; PGAP–pegmatite with minor aplite; PEGM–pegmatite; PEGMZ–zoned pegmatite; PORP–porphyry; QTZ–quartz (indicated if mineralized); all unlabelled dykes are aplites; ‹1 m–thin lines, ›1 m–heavy lines (inclined, horizontal, vertical, dip unknown)

Stockwork (type indicated) — QTZ

Sheeted complex (type indicated) — QTZ

Area of abundant dyking (type or map unit indicated) — DCgd

Greisen: ‹1 m, ›1 m (indicated if mineralized) — Cp

Megacryst-rich areas

Xenoliths (›1 m, ›10 m, concentration of xenoliths) map unit indicated when known

Diamond-drill hole (reference number from N.S.D.M.E. Open File Report) — AI6-1

Trench, shaft

Mineral occurrence (commodities indicated at top; number on bottom refers to marginal notes or N.S.D.M.E. mineral occurrence cards) — U,Cu 1

Mine or Prospect — Sn

Quarry

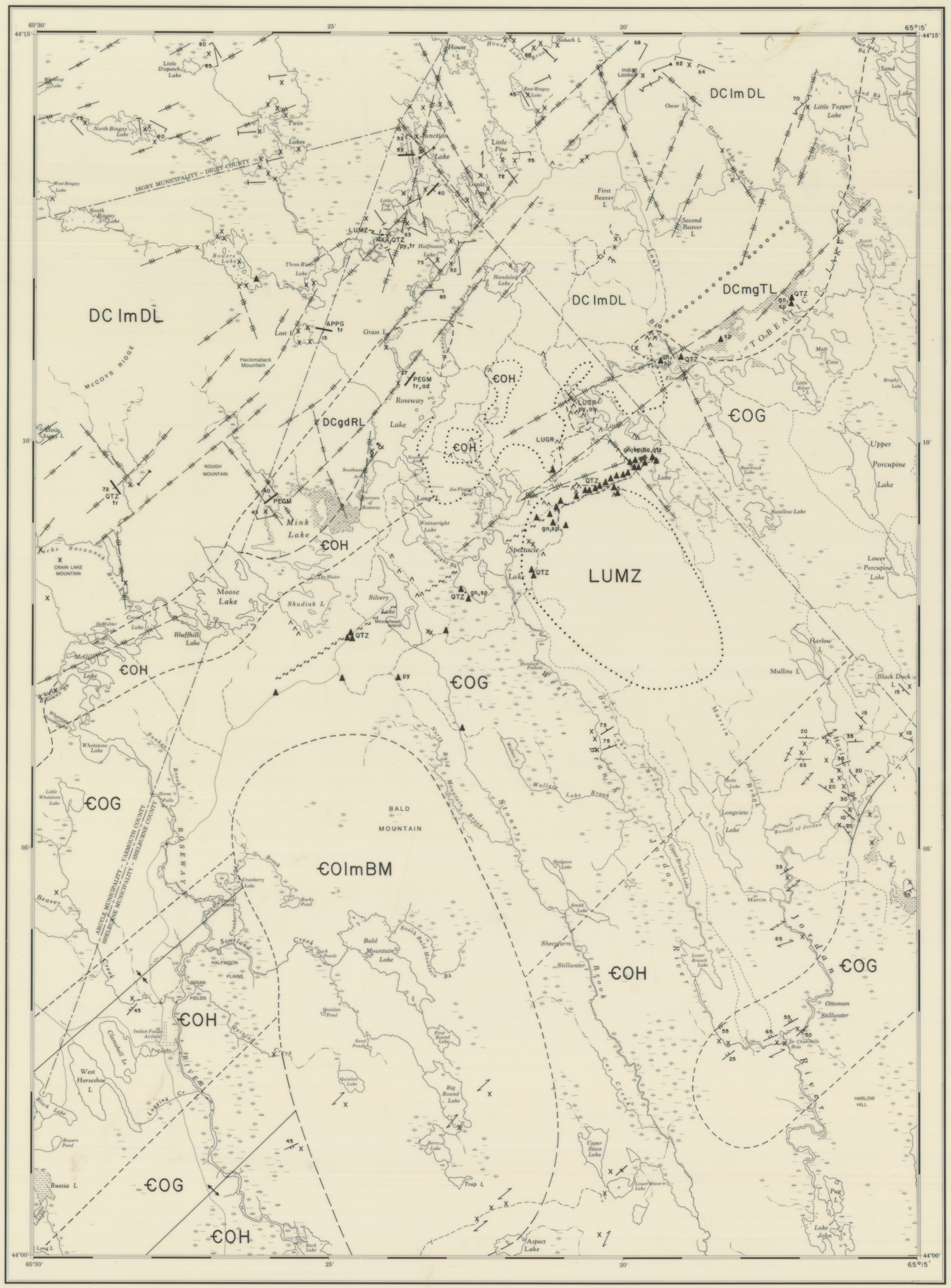
Alteration: ALB–albitization; CHL–chloritization; DES–desilicification; HAA–high alumina; HEM–hematization; KAO–kaolinitization; LIM–limonitization; POT–potassic (which include biotitization and K-feldspathization); SAU–saussuritization; intense and pervasive in capitals, slight to moderate in lower case — HEM, hem

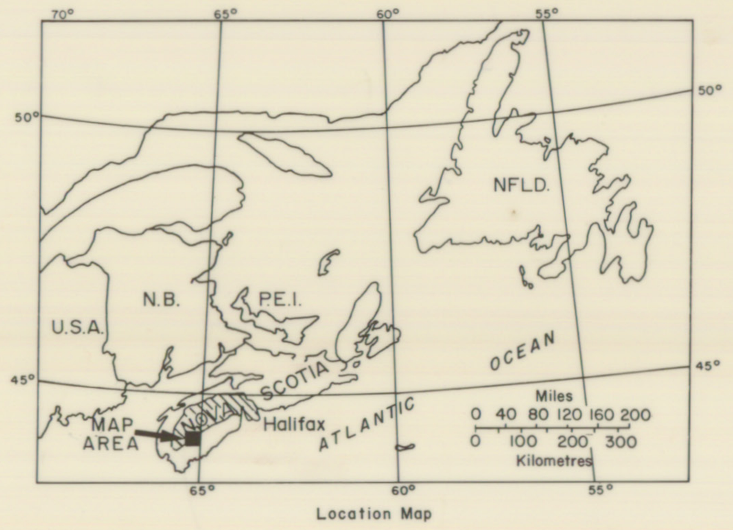
LIST OF COMMON MINERAL ABBREVIATIONS

ad–andalusite; am–amethyst; ap–apatite; as–arsenopyrite; at–autunite; bo–bornite; ca–calcite; cc–chalcocite; ks–cassiterite; cp–chalcopyrite; ch–chlorite; cd–cordierite; cy–chrysocolla; fl–fluorite; gn–galena; gr–garnet; he–hematite; il–ilmenite; ka–kaolinite; ma–malachite; mn–manganese minerals; mo–molybdenite; mu–muscovite; po–pyrrhotite; py–pyrite; sh–scheelite; sl–sillimanite; sp–sphalerite; se–sericite; to–torbernite; tr–tourmaline; wo–wolframite.

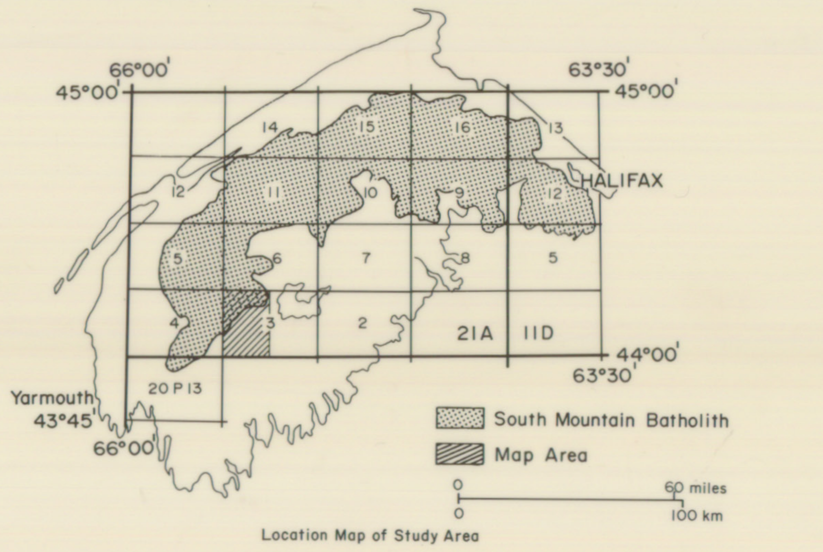
Nova Scotia Department of Mines and Energy

Canada-Nova Scotia Mineral Development Agreement





Location Map



Location Map of Study Area

DESCRIPTIVE NOTES 21A/3

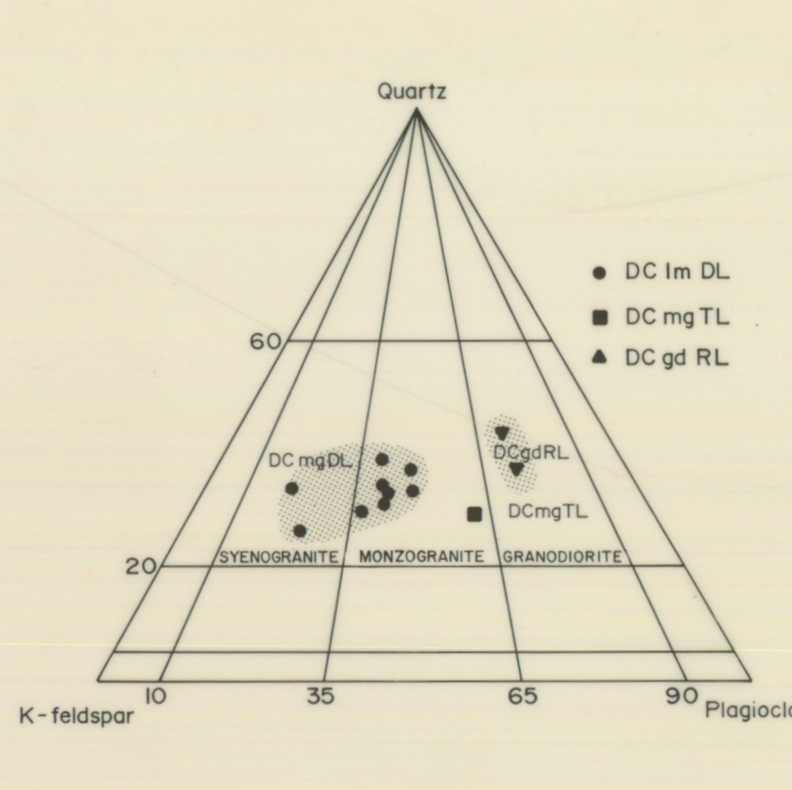


Figure 1. Modal proportions of quartz alkali feldspar and plagioclase (QAP) for the map units. Fields are after Streckeisen (1976). Proportion of albite was not determined.

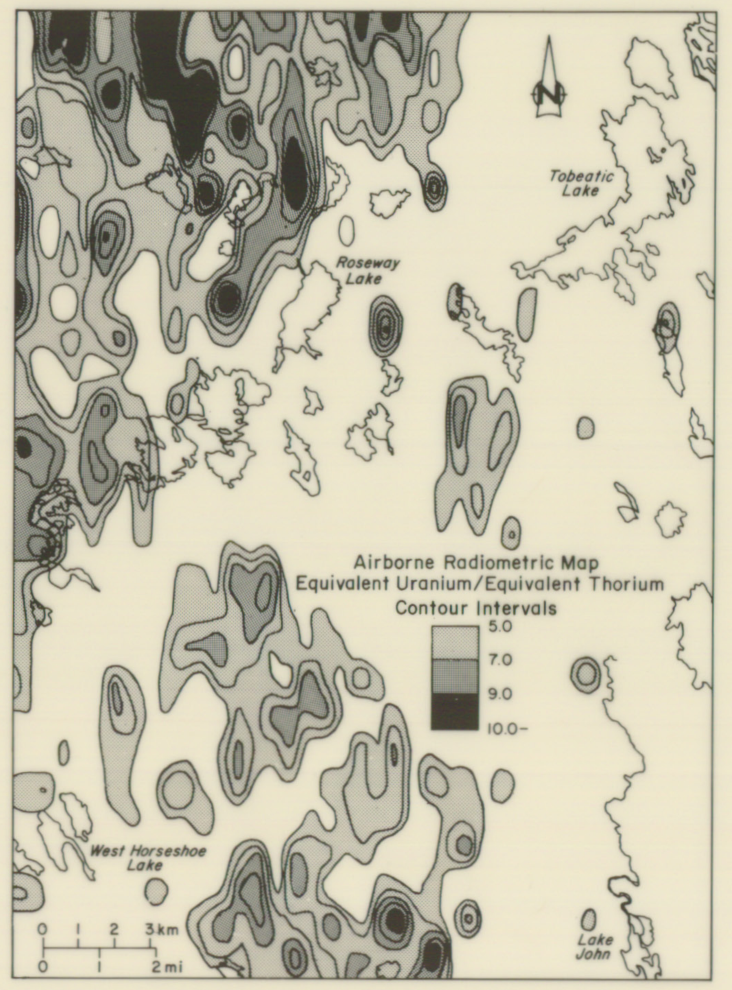


Figure 2. Equivalent Uranium/Equivalent Thorium

The purpose of this survey was to map the granitic rocks of the South Mountain Batholith (SMB) in a consistent and systematic manner focusing on their texture, mineralogy, alteration and spatial relationships. Based upon these parameters and using the classification of Streckeisen (1976), four (4) rock units encompassing granodiorite[1], monzogranite[1] and leucomonzogranite[2]. are identified in the map area. The systematic staining of rock samples using sodium-cobalt initrate to differentiate feldspar types (excluding albite) together with extensive point counting is critical for distinguishing between the above rock types (Fig. 1). The percentage of biotite was also determined by point-counting while that of muscovite and cordierite are based upon visual modal estimates.

The SMB in the map area had seen virtually no systematic mapping prior to this study. The Meguma Zone in the south half has been mapped by Taylor (1969) and more recently by Rogers (1986, 1988); the results of which are compiled on this map. Portions of the map area were subject to detailed geological and geochemical mapping programs during intermittant mineral exploration (see references).

Interpretation of the bedrock geology of the SMB in the map area is based on and is consistent with bedrock geology determined by MacDonald et al. (1988) for the surrounding SMB.

UNIT DESCRIPTIONS

Roseway Lake Granodiorite (DCgdRL): This unit occurs as a long, narrow body stretching northeast from Mink Lake to Roseway Lake where it is best exposed. It is predominately medium grained equigranular to slightly porphyritic[3] and contains biotite (16-18%), muscovite (1-1.5%) and very abundant (5% of outcrop) metasedimentary(?) xenoliths. Rapakivi textured K-feldspar and minor plagioclase phenocrysts are locally common. A sharp, intrusive contact between this unit and pelitic rocks of the Meguma Group is exposed along the shore in the southwest end of Roseway Lake. The contact area is marked by abundant granodiorite, aplite and pegmatite dyking and large angular blocks of metasediments.

Tobeatic Lake Monzogranite (DCmgTL): The presence of this unit is extrapolated from boulder occurrences and till clast counts (Finck and Graves, pers. comm.). It is medium-to coarse-grained, with K-feldspar and minor plagioclase megacrysts[4] (10-15%), biotite (16.5%) and muscovite (< 2%). The K-feldspar megacrysts frequently display well developed rapakivi textures and an enigmatic blue-grey colouration (alteration?) which varies locally in intensity. The abundance of angular metasediment xenoliths within this unit suggests that it occurs in close proximity to the metasediments of the Meguma Group.

Davis Lake Leucomonzogranite (DClmDL): This unit is the most abundant within the study area and is characterized by a medium-to coarse-grain size and a high concentration (15-30%) of large (≤7 cm) K-feldspar megacrysts. The megacrysts commonly display rapakivi textures and may exhibit a blue-grey colouration (also rarely observed in quartz grains) similar to **DCmgTL** above. Although not as abundant, plagioclase megacrysts also occur. They are commonly zoned and contain numerous concentrically arranged inclusions of biotite and quartz. The megacrysts may locally display a preferred NE alignment as observed near the north end of Great Pine Lake.

Biotite content varies from 4-9%, muscovite from trace-2% and cordierite from trace-2% within this unit. The latter commonly occurs as large (<1cm), blocky, pinitized crystals. The QAP plot (Fig. 1) show this unit to occupy an area which straddles the syenogranite - monzogranite fields. This trait probably reflects the abundance of K-feldspar megacrysts. Small (<5cm²) xenoliths (metasedimentary ?) are rare in this unit.

No contact relationships were observed between this and other units in the map sheet. The irregular nature of the contact between this unit and Meguma Group rocks in the area from Roseway Lake east to Tobeatic Lake is inferred from interpretation of airborne gamma-ray spectrometric potassium (K) data (Corey & Horne, 1989). The reliability of such data in determination of lithological and/or granite-facies boundaries has been demonstrated in the Meguma Zone by O'Reilly et al. (1988) and Ford and O'Reilly (1985).

Leucomonzogranite (LUMZ): Several small, discreet leucomonzogranite bodies occur within **DClmDL**. A pink, fine-to medium-grained equigranular to porphyritic body in sharp, intrusive contact with **DClmDL** is exposed in a river approximately 1 km southwest of Junction Lake. Numerous quartz veins, some containing disseminated pyrite, arsenopyrite and tourmaline, also occur at this location.

Two small **LUMZ** bodies also occur immediately west of Little Tobeatic Lake. The presence of **LUMZ** in this area is inferred by the occurrence of abundant angular fine-to medium-grained equigranular rubble-crop. The boulders exhibit intense alteration (silicification, greisenization, hematization) and brittle-ductile deformation (kink banded micas, stretched K-feldspar phenocrysts, C-S fabrics) effects which are attributed to activity associated with movement along the Tobeatic Fault Zone (see Structure below). **LUMZ** rubble immediately northwest of Little Tobeatic Lake contains abundant disseminated pyrite and arsenopyrite and locally intense blue-grey colouration. Although speculative, it is possible that these **LUMZ** occurrences represent extremely altered and deformed **DClmDL**.

LUMZ rubble-crop similar to that described above also occurs southeast of Little Tobeatic Lake, within what is assumed to be a **LUMZ** body seperate from the SMB (Corey & Horne, 1989).

Bald Mountain Pluton (COlmBM): The distribution and description of this unit is derived from geological mapping by Rogers (1986, 1988). This unit is medium grained equigranular and contains (average concentrations) biotite (5%) and muscovite (9%-derived by point-counting of thin sections). The percentage of biotite would classify this unit as a leucomonzogranite according to the classification adopted for this study (MacDonald et al., 1988). No contacts with the Meguma Group country rock were observed and metasedimentary xenoliths are rare and small (< 20cm²). Rogers (1988) reports that the pluton has a strongly developed foliation which he interpreted to be a magmatic feature incurred during regional Acadian deformation of the Meguma Zone. Although this unit is poorly exposed; boulder mapping and airborne spectrometric data (Fig. 2), suggests that it underlies a large area.

STRUCTURE

The most prominent structural feature within the map sheet is the Tobeatic Lake Shear Zone (TLSZ). The TLSZ is exposed for 8 km in a NE-SW orientation from Little Tobeatic Lake to west of Silvery Lake. The trace of the shear zone is marked by abundant quartz and fault-breccia boulders. The TLSZ is considered to be part of the Tobeatic Fault Zone as described by Giles (1985).

Boulders of intensely hematized fault breccia boulders discovered along the shore of Bower Lake in the central portion of the map sheet implies that other major shear zones likely exist.

AIRBORNE SPECTROMETRY

The role of airborne spectrometric data in geological mapping and delineating granophile mineralization and associated alteration within the SMB is well documented (Chatterjee & Muecke , 1982; Ford & O'Reilly, 1985; Corey, 1988; O'Reilly et al., 1988).

As mentioned above the airborne spectrometric K data was used to delineate the SMB/Meguma contact in the area from Roseway Lake east to Tobeatic Lake. This data indicates that the contact is likely very irregular and that large rafts of metasediment (marked by low K response) may be present within the SMB.

Discrimination of the more fractionated leucomonzogranite bodies is best achieved by study of equivalent U/equivalent Th data, as observed by the anomalous response of the leucomonzogranite bodies (Fig. 2). Several areas of anomalous eU/eTh response occur in the map area and remain unexplained due to lack of outcrop.

MINERAL OCCURRENCES

1. **Little Tobeatic Lake/Tobeatic Lake Shear Zone:** mineralization associated with the TLSZ consists of fine to coarse disseminations of galena ± minor sphalerite ± barite and(or) chalcopyrite ± arsenopyrite ± pyrite confined to quartz-vein and quartz-breccia boulders found along strike and down-ice of the fault zone (Dickie & Zwicker, 1983; Corey & Horne, 1989). Barite occurs as anhedral grains and large fan-shaped white crystal masses confined to quartz veins and vugs within quartz-breccia boulders. The best exposed Pb-Zn-Ba mineralization is along the western shore of Little Tobeatic Lake where extensive northeast-southwest quartz veining occurs in a silicified and brecciated metawacke outcrop. At this location, disseminated chalcopyrite, pyrite, sphalerite and galena occur within quartz-breccia. Approximately 200 m southwest along strike, coarse disseminations of galena, sphalerite and barite occur within extremely vuggy quartz-breccia boulders.

Analysis of mineralized quartz-breccia boulder samples taken along the fault zone have returned up to 4.9% combined Pb-Zn and 2% Ba (Dickie and Zwicker, 1983). The presence of Pb-Zn-bearing quartz-breccia boulders scattered along the north shore of Tobeatic Lake suggests that the TLSZ extends through this area.

In addition to Pb-Zn-Ba mineralization, highly anomalous Au values have also been reported. A sulphide-rich quartz-breccia boulder sample from south of Silvery Lake (Fig. 3) returned up to 2035 ppb Au (Dickie, 1978) and other quartz-breccia samples in the same area returned 135 and 735 ppb Au (Fig.3). Approximately 10 km northeast of Silvery Lake, a value of 415 ppb Au was obtained from a Pb(1.6%)-Zn(2%)-Ba mineralized quartz-breccia boulder taken from the north shore of Tobeatic Lake (Dickie and Zwicker, 1983).

2) **Pug Lake:** Approximately 1 km southwest of Junction Lake (NW portion of map sheet), disseminated pyrite, arsenopyrite and tourmaline were observed within several quartz veins. The veins are hosted by a pink, fine-to medium-grained equigranular to porphyritic **LUMZ** body in sharp, intrusive contact with **DClmDL**.

ACKNOWLEDGEMENTS

Able field assistance was provided by Kathy Hattie, Sean Lafontaine and Roberta Hicks. Airphoto lineament and pebble clast interpretation were provided by collegues Phil Finck, Mark Graves and Fred Boner. Joe Campbell and friends at NSDME are thanked for their drafting skills. Production of this map was funded and supported by the Canada-Nova Scotia Mineral Development Agreement.

REFERENCES

Corey, M. C. and Horne, R. J. 1989: Polymetallic-precious metal potential of the Tobeatic Fault Zone in southwestern Nova Scotia; in Report of Activities 1988, Part B, eds. D. R. MacDonald and Y. Brown; Nova Scotia Department of Mines and Energy, Report 89-3,

Dickie, G. B. 1978: Report of geology survey, rock analyses and map, Mink Lake, Shelburne County, Nova Scotia; Shell Canada Resources Limited; Nova Scotia Department of Mines and Energy, Assessment Report 21A/03C 51-P-10(01).

Dickie, G. B. and Zwicker, E. J. 1983: Report on geological, till, rock and IP-resistivity surveys, Bald Mountain, Shelburne County, Nova Scotia, Billiton Canada Limited; Nova Scotia Department of Mines and Energy, Assessment Report 21A/03C 54-P-14(01).

Finck, P. W., Graves, R. M., Boner, F. J. and Marsh, S. in prep: Till geochemistry and till clast lithology of the Lake Rossingnol map sheet NTS 21A/3; Nova Scotia Department of Mines and Energy, scale 1:50000.

Ford, K. L. and O'Reilly, G. A., 1985: Airborne gamma-ray spectrometric surveys as an indicator of granophile element specialization and associated deposits in the granitic rocks of the Meguma Zone of Nova Scotia; in High Heat Production (HHP) Granites, Hydrothermal Circulation and Ore Genesis; Meeting of Institution of Mining and Metallurgy, St Austell, Cornwall, England, 1985, pp. 113-133.

Geological Survey of Canada, 1988: Preliminary release of airborne gamma-ray spectrometric colour maps; Davis Lake Complex, East Kemptville area, Nova Scotia (parts of 20P/13, 21A/3,4,5,6); Geological Survey of Canada Open File Release 1784, 8 maps, scale 1:100000.

Giles, P. S. 1985: A major post-Visean sinistral shear zone - new perspectives on Devonian and Carboniferous rocks of southern Nova Scotia; in Guide to the Granites and Mineral Deposits of Southwestern Nova Scotia, eds. A. K. Chatterjee and D. B. Clarke, Nova Scotia Department of Mines and Energy, Paper 85-3, p. 233-264.

MacDonald, M. A., Corey, M. C., Ham, L. J. and Horne, R. J. 1988: South Mountain Batholith project: a progress report on bedrock mapping; in Mines and Minerals Branch, Report of Activities 1988, Part A, eds. D. R. MacDonald and Y. Brown; Nova Scotia Department of Mines and Energy, Report 88-3, p. 109-116.

MacDonald, M. A. and Ham, L. J. 1988: Geological map of Gaspereau Lake, N.T.S. sheet 21A/15; Nova Scotia Department of Mines and Energy, Open File Map 88-016, scale 1:50000.

McKenzie, C. B. 1987: Report on geology and till geochemistry, Tobeatic Lake property, Shelburne and Yarmouth Counties, Nova Scotia; BP Resources Canada Limited; Nova Scotia Department of Mines and Energy, Assessment Report AR87-194.

McKenzie, C. B. 1988: Report on till geochemistry, prospecting and geophysics, Tobeatic Lake property; BP Resources Canada Limited; Nova Scotia Department of Mines and Energy, Assessment Report AR88-295.

O'Reilly, G. A., Corey, M. C. and Ford, K. L. 1988: The role of airborne gamma-ray spectrometry in bedrock mapping and mineral exploration: case studies from granitic rocks within the Meguma Zone, Nova Scotia. Maritime Sediments and Atlantic Geology, 24: 47-60.

Rogers, H. D. 1986: Igneous and metamorphic geology of Shelburne and eastern Yarmouth counties, Nova Scotia. Geological Survey of Canada, Open File Report 1374

Rogers, H. D. 1988: Field relations, petrography, and geochemistry of granitic plutons in the Shelburne area, southern Nova Scotia. Geological Survey of Canada, Open File Report 1835, 128 p.

Streckeisen, A. L. 1976: To each plutonic rock its proper name; Earth Science Review, v. 12, p. 1-33.

Taylor, F. C. 1969: Geology of the Annapolis-St. Marys map area, Nova Scotia. Geological Survey of Canada, Department of Energy, Mines and Resources, Memoir 358.

[1]GRANODIORITE, MONZOGRANITE AND SYENOGRANITE: After Streckeisen (1976).

[2]LEUCOMONZOGRANITES: Monzogranitic rocks with less than 6% combined mafic minerals.

[3]PORPHYRY: A rock with a predominantly fine-grained groundmass and medium- to coarse-grained phenocrysts (i.e. bimodal grain size distribution). Phenocrysts rarely exceed 2.5 cm adj. porphyritic.

[4]MEGACRYST: A nongenetic term for a crystal that is significantly larger than the surrounding groundmass. In the SMB megacrysts are predominantly subhedral to euhedral K-feldspar and rarely plagioclase; crystals range from 2.5-7.0 cm. in length.

OPEN FILE MAP 89-010
PRELIMINARY GEOLOGICAL MAP OF
LAKE ROSSIGNAL
NTS SHEET 21A/3 WEST HALF

M.C. COREY and R.J. HORNE

Kilometres 1 0 1 2 3 4
Miles 1 0 1 2
1:50,000

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

Jack MacIsaac, Minister
John J. Laffin, D.Eng, FEIC, P.Eng, Deputy Minister

HALIFAX, NOVA SCOTIA
1989