LEGEND

CARBONIFEROUS (after Graves and Finck, 1988; Giles, 1981)

$_EC_W$ — WINDSOR GROUP UNDIVIDED: red shale, arkose, limestone

DEVONO-CARBONIFEROUS

DClgBB — BURNT BLANKET HILL COMPLEX: buff-pinkish-red; fine- to medium-grained moderately equigranular to porphyritic; biotite (<2%), muscovite (2-4%), cordierite (trace - 1%), contains pegmatite segregations

DClgLO — LONG LAKE LEUCOGRANITE: buff coloured, fine- to medium-grained moderately equigranular, biotite (<2%), muscovite (1-4%), contains pegmatite segregations

DClmPL — PANUKE LAKE LEUCOMONZOGRANITE: light buff to pinkish-grey predominantly fine grained, equigranular to porphyritic; biotite (2-6%), muscovite (trace-6%), cordierite (trace-4%); alteration effects may produce rocks of episyenite (quartz depleted) to syenogranite composition

CLlmNR — NEW ROSS LEUCOMONZOGRANITE: light-to whitish-grey, pinkish-grey to orange, predominately medium-to coarse-grained moderately equigranular to K-feldspar megacrystic (≤15%), biotite (4-6%), muscovite (trace-4%, cordierite (trace-2%)

DClmSP — SPECTACLE LAKE LEUCOMONZOGRANITE: whitish-grey, coarse grained, extremely K-feldspar megacrystic (20-40%), biotite (4-6%), muscovite (trace-2%), cordierite (trace-2%); contains xenoliths

DCmgS — SHERWOOD MONZOGRANITE: whitish-grey to pinkish-red, fine-to coarse-grained, seriate to megacrystic (≤15%), biotite (8-10%), muscovite (1-4%), cordierite (trace-1%)

DCmgSL — SANDY LAKE MONZOGRANITE: whitish-grey, medium-to coarse-grained, megacrystic (10-20%) to slightly porphyritic; biotite (10-15%), muscovite (trace-1%), cordierite (trace-3%)

CAMBRO - ORDOVICIAN

MEGUMA GROUP (after O'Brien et al., 1985).

CO_H — HALIFAX FORMATION: finely laminated grey-black slates and siltstones

CO_{GB} — GREEN BAY FORMATION: thin to thickly bedded, green to grey fine grained sandstones

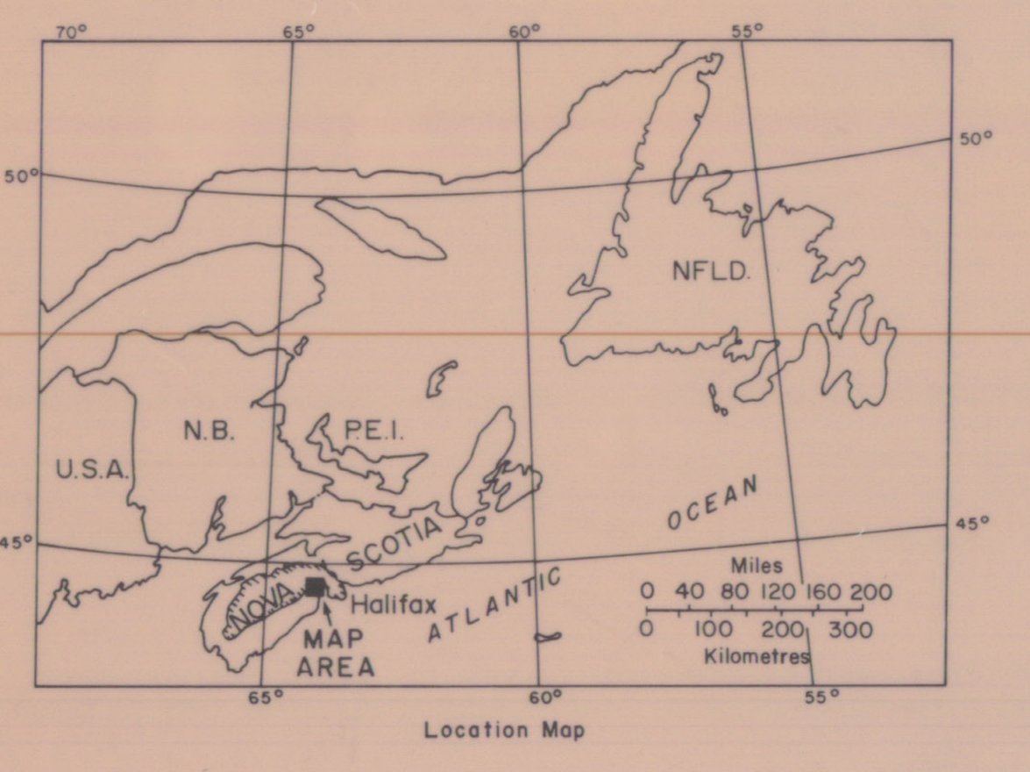
CO_G — GOLDENVILLE FORMATION: green-grey metagraywackes and minor interbedded slates

SYMBOLS
(not all symbols occur on map)

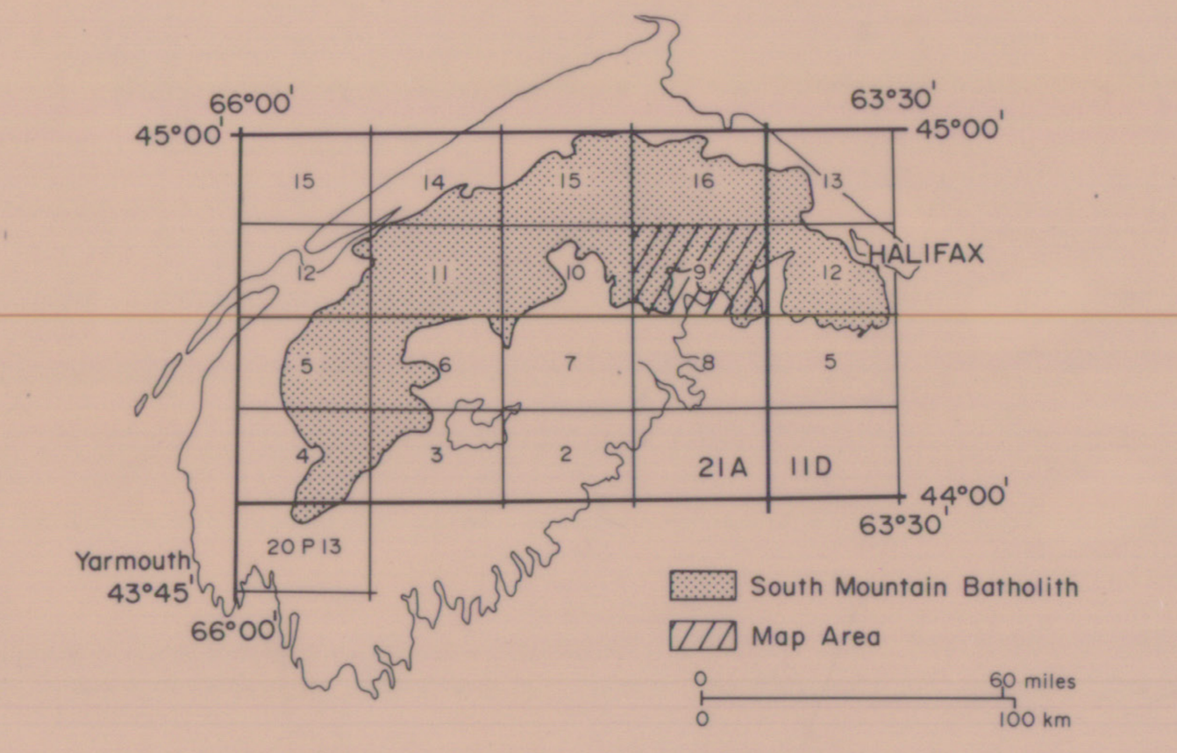
- Rock outcrop, area of outcrop, probable outcrop, float
- Geological boundary (defined, approximate, assumed, defined by till clasts
- Geological boundary-gradational (‹ 100 m; ›100 m)
- Exposed intrusive contact (arrow pointing toward younger unit, age relation not determined)
- Unconformity (hatching on younger side)
- Limit of mineralogical or textural variation
- 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 (horizontal, inclined, vertical, dip unknown)
- Stockwork (type indicated) — QTZ
- Sheeted complex (type indicated) — QTZ
- Area of abundant dyking (type or map unit indicated) — DCpd
- 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 — A16-1
- Trench, adit, 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
- 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-feldspathizayion); 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; au-autunite; bo-bornite; ca-calcite; cc-chalcocite; ks-cassiterite; cp-chalcopyrite; ch-chlorite; cd-cordierite; cy-chrysocola; 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; si-sillimanite; sp-sphalerite; se-sericite; to-torbernite; tr-tourmaline; wo-wolframite.



Location Map



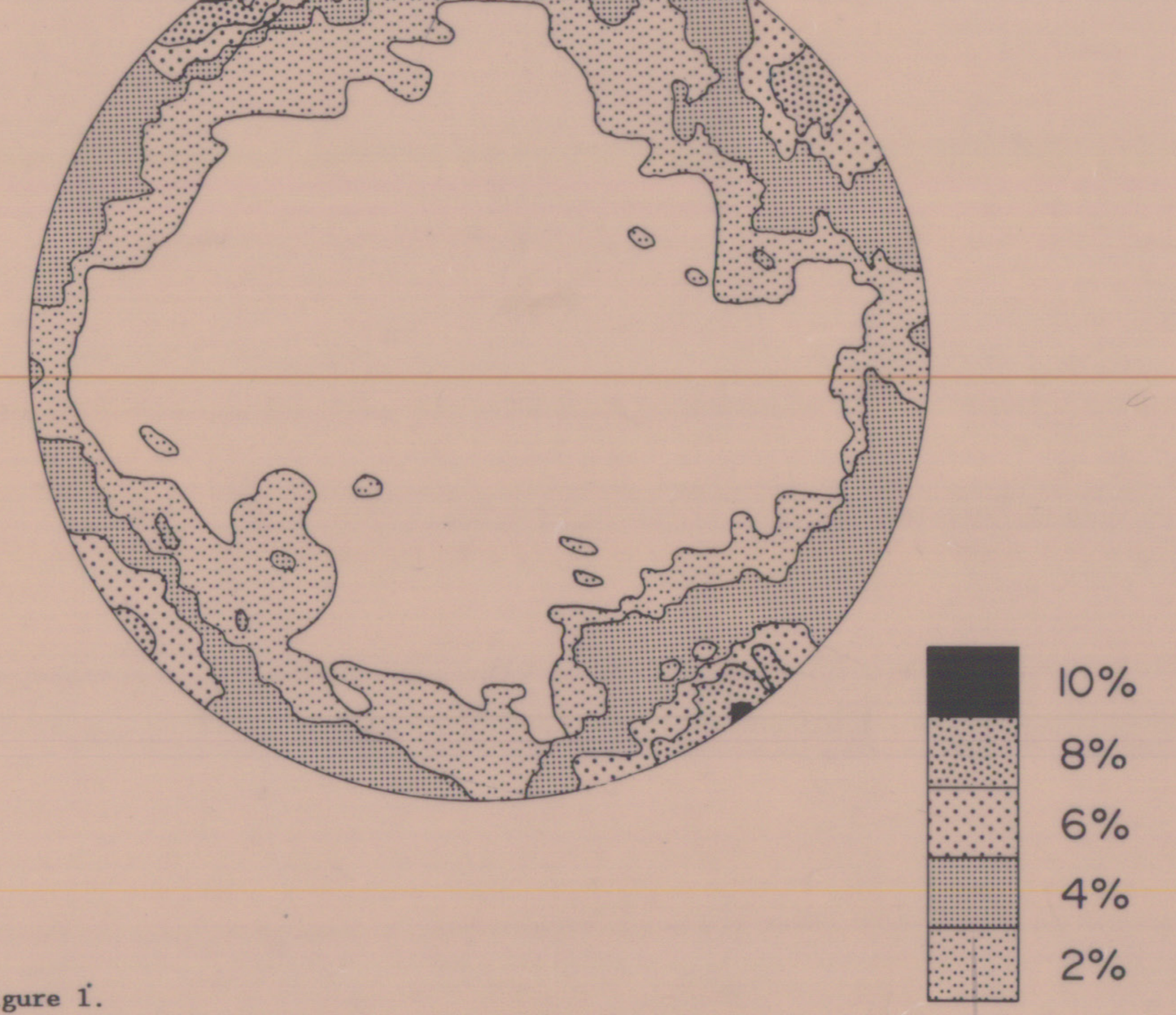


Figure 1.

Contoured plot of percentages of poles to combined planar features (joints, dykes, veins) within the map area.

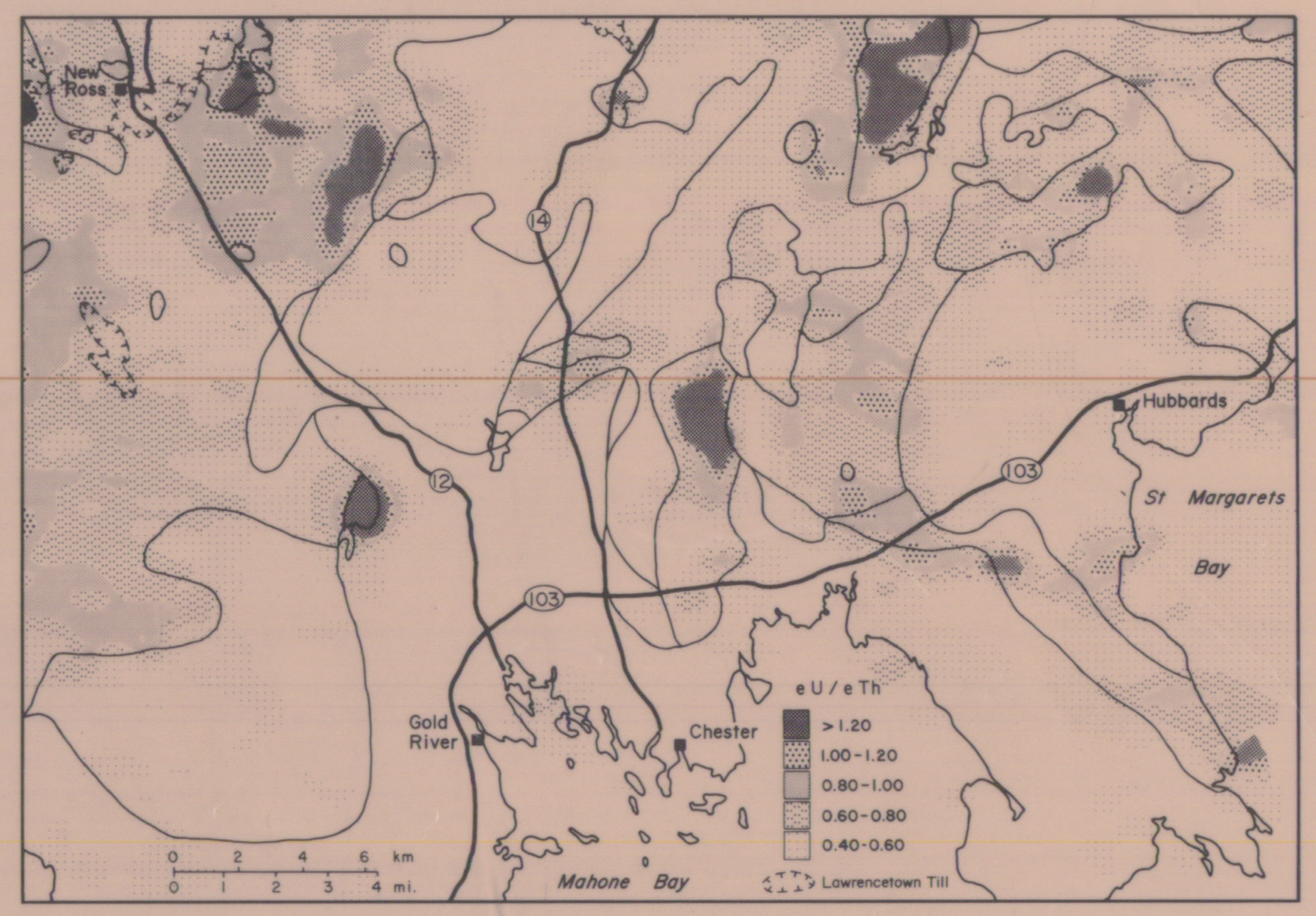


Figure 2.

eU/eTh map for the survey area derived by data furnished by the G.S.C.(1976). Note the excellent correlation between high ratio (>1.00) anomalies and highly evolved (and hydrothermally altered) leucomonzogranites and leucogranites. The reader is referred to O'Reilly et al. (1988), and Ford and O'Reilly (1985) for a discussion of the relationship between airborne spectrometric data, bedrock geology and granophile mineralization.

Nova Scotia Department of Mines and Energy — Canada ~ Nova Scotia Mineral Development Agreement

DESCRIPTIVE NOTES

INTRODUCTION

Bedrock mapping for this survey was restricted to the granitic rocks of the South Mountain Batholith (SMB) and metasedimentary Meguma Group rocks (see Schenk, 1982) within the immediate (<100m) contact aureole. Previously published geology maps within the area include: Faribault (1924, 1929); Keppie (1979) and O'Brien et al. (1985). In addition to the published maps previous work in the area included thesis studies of McKenzie (1974), Charest (1976), and Logothetis (1985). With the exception of McKenzie these studies were detailed and dealt with specific areas of interest. Carboniferous geology was taken from Sage (1954), Giles (1981) and Graves and Finck (1988). Pleistocene investigations by the latter authors suggest that the actual amount of Carboniferous bedrock is significantly less than that depicted on preceding geological maps.

The main purpose of this survey was to map the area in a consistent and systematic manner focusing on the texture, mineralogy, alteration and spatial relationships of the various granitic rocks. Based upon these parameters and using the classification of Streckeisen (1976), five granitic rock types were distinguished in the project area ranging in composition from granodiorite[1] to monzogranite[1], leucomonzogranite[2], leucogranite[3] and syenogranite[1]. The systematic staining of rock samples using sodium-cobaltinitrate together with extensive point counting are critical for distinguishing between the above rock types.

The reader is referred to O'Brien et al. (1985) for a detailed explanation of the geology of the Meguma Group within the map area. Where observed, the contact of the metasediments with the SMB is underformed with regional structures sharply truncated by granitoids of the SMB. Contact metamorphism has produced hard and massive spotted hornfels characterized by the presence of andalusite and cordierite porphyroblasts in proximity (<2 km) to the granite contact. Xenoliths of Meguma Group (?) metasediments of variable size and degree of assimilation are common within rocks of the SMB. In general, the most mafic SMB unit (i.e. granodiorite) contains the highest concentration of xenoliths while the leucocratic phases contain the least.

UNIT DESCRIPTIONS

SANDY LAKE MONZOGRANITE (DCmgSL)

For the most part rocks of this unit are medium-to coarse-grained, megacrystic (10-20%), and contain biotite (10-15%), muscovite (trace-1%) and cordierite (trace-1%). Exceptions to this are found adjacent to the Meguma Group contact (e.g. east of East River: centre of map sheet; northwest of Spondo Lake: southwest corner of map sheet) where the monzogranite contains less biotite (8-10%), more cordierite (<3%) and is less megacrystic. The cordierite occurs as dark green, 1 cm. blocky crystals which are invariably pseudomorphed by pinite. In other areas (e.g. Hubbards - Fox Pt. area: coastal section, centre of map sheet) rocks of this unit display a porphyritic[4] texture and exhibit a bimodal biotite distribution. A modal QAP plot (Streckeisen, 1976) of samples of this unit collected along Highway 103 northeast of East River show that it straddles the monzogranite-granodiorite join. Exposures of this unit along Highway 103 immediately east of Highway 14 (centre of map sheet) have intense pervasive and fracture-controlled hydrothermal alteration as shown by extensive albitization, saussuritization, kaolinization and hematization. Minor fluorite and sulphide (py-cpy-asp) mineralization occurs associated with the intense alteration.

Large inliers of the Sandy Lake Monzogranite also occur in the eastern half of the map sheet within texturally variable leucomonzogranite of the New Ross and Panuke Lake units (see below). These inliers have a general northeast orientation and display local moderate to intense pervasive kaolinization, hematization, and saussuritization. Minor fracture-controlled dark purple fluorite was also observed within the inliers.

SHERWOOD MONZOGRANITE (DCmgS)

This unit differs from the Sandy Lake Monzogranite in that it contains significant amounts of muscovite (1-4%), less biotite (8-10%) and generally fewer K-feldspar megacrysts (< 5%). An exception to this is near the contact with the Spectacle Lake unit where it locally is highly megacrystic (10-15%). This unit is predominately a fine-to coarse-grained seriate textured rock, with megacrysts occurring as large (<6 cm.) white K-feldspar laths. A predominately medium grained moderately equigranular to slightly porphyritic phase of this unit is exposed in the vicinity of Millet Lake (centre of map sheet) adjacent to rocks of the Meguma Group. At this location, the unit is intensely fractured and contains abundant fracture-controlled dark purple fluorite and rare pyrite. Milky white quartz and light green quartz-sericite greisen veins were also observed.

Hydrothermal alteration in this unit is, for the most part minimal, but intense and pervasive hematization was observed along Card Lake.

This unit displays a gradational contact with the New Ross Leucomonzogranite east and west of Card Lake and is intruded by numerous fine grained dykes of the Panuke Lake Leucomonzogranite along Highway 14 immediately east of Card Lake.

NEW ROSS LECOMONZOGRANITE (DClmNR)

This unit occurs throughout the map sheet predominately as a medium-to coarse-grained, moderately equigranular rock which can contain up to 15% K-feldspar megacrysts, biotite(4-6%), muscovite(trace-4%) and cordierite (trace-2%). The megacrystic (10-15%) phase seems to be generally resricted to the north central portion of the map sheet west of Canaan, whereas east of Canaan it is less megacrystic (5-10%). In the extreme northeastern corner of the map sheet in the vicinity of the community of The Forties a buff coloured megacrystic to slightly porhpyritic phase exists, characterized by deep orange-red megacrysts. This unit is characterized by moderate to intense hematization which has imparted the pervasive buff-orange colouration to the rock. This alteration can render the rock extremely friable if very intense as noted in the New Ross area (northwest corner of map sheet). Occuring within this unit are numerous small bodies of the Panuke Lake Leucomonzogranite. Contacts between these two units have been observed as gradational as noted along a trail north of Whitney Lake and in the New Ross area (Charest, 1976) and also sharp as observed in the vicinity of Connaught and Timber Lakes.

SPECTACLE LAKE LEUCOMONZOGRANITE (DClmSP)

This unit is mineralogically similar to DClmNR however unlike the above, it is characterized by a homogeneous coarse grained and extremely (20-40%) megacrystic (K-spar) texture. Contacts of this unit with surrounding units (DCmgS; DCmgSL) are sharp. Along Highway 14 a gradational contact of < 2 m between this unit and the megacrystic (15%) DClmNR is assumed since the close similarity between these two units make determination of the contact difficult. Along its western margin this unit a highly sheared (fault?) and intensely hematized contact between the DClmNR is exposed.

This unit also contains several large Meguma Group metasediment xenoliths, the largest (5 m^2) of which occurs along the road north of Second Lake.

PANUKE LAKE LEUCOMONZOGRANITE (DClmPL)

This unit is comprised of two fine grained texturally distinct, but mineralogically similar phases: a homogeneous, light buff to pinkish-grey, fine-to-medium grained equigranular phase, and a porphyritic phase. These phases are similar to the DClmNR in modal mineralogy with the exception of a cordierite-rich (2-4%) porphyry northwest of Glengarry in the New Ross area.

Contacts between phases are usually gradational but may also be sharp. Rocks of this unit were most commonly found as discreet bodies of variable dimension (1-10 km^2) confined to embayments or protruberences of the DClmNR. Several smaller bodies were also inferred by extrapolation from pebble counts of till samples (Finck and Graves, in press) and occur within the DClmNR.

Whether rocks of this unit represent later intrusions or chilled textural equivalents of the DClmNR cannot be determined based upon field observations. Contact relationships are enigmatic, with the same body exhibiting both sharp and gradational contacts with the DClmNR. A similar observation was noted by Charest (1976) for porphyry bodies in the New Ross area. Dykes of this unit were intrude the Sherwood Monzogranite in the Card Lake area. Local but intense metasomatic-hydrothermal alteration of these finer grained phases has produced muscovite rich (>4%) leucogranites, syenogranites, episyenites and greisens which are commonly associated with polymetallic U + Cu + Zn + As + Mo + Sn + W mineralization.

BURNT BLANKET HILL LEUCOGRANITE SUITE (DClgBB)

This unit exhibits the same textural and compositional variations as DClmPL but consistently contains <2% biotite and always has a sharp intrusive contact with the DClmNR. Contacts between textural variations of this unit however may be either sharp or gradational. Hydrothermal alteration within this unit ranges from a moderate pervasive hematization to local intense hematization and saussuritization as observed along the southern contact with DClmNR. A leucoporphyry phase which occurs in the northern portion of this unit contains abundant pegmatite segregations.

LONG LAKE LEUCOGRANITE (DClgLO)

This buff coloured, fine- to medium-grained moderately equigranular unit occurs at the extreme tip of a small embayment of the DClmNR in contact with metasediments of the Meguma Group. It is associated with a small body of DClmPL outcropping immediately to the north. This unit contains abundant pegmatite, and displays intense autometasomatic-hydrothermal alteration (albitization, K-feldspathization, greisenization) and is associated with significant Mo-W-Sn-Be-Zn-Cu mineralization (O'Reilly et al., 1982; Logothetis, 1984). These observations suggest that this unit may have a metasomatic rather than late differentiate origin.

STRUCTURE

Planar features (aplites, pegmatites, fractures) show a predominate northeast and northwest orientations throughout the map sheet (Fig 1; Horne et al., 1988). A similar orientation is also reflected by numerous shears, greisen and quartz veins particularly in the vicinity of Chester and the eastern side of the Aspotogan Peninsula. The pronounced northwest trend of the DClmPL unit in this area indicates that some of the magmatism was structurally controlled. A well exposed northwest trending fault zone at the southern tip of Panuke Lake is intruded by a narrow (10 cm wide) northwest trending, K-feldspar-rich dyke (elvan?). A gravel pit on the east side of Highway 14 approximately 8 km. north of Chester exposes intense northeast shearing (mylonites) in the vicinity of the metasediment - SMB contact. Samples from this pit indicate the shearing was not a singular event since minor displacement of pre-existing shears by later shearing was observed. The importance of these structural features as channelways for mineralizing hydrothermal fluids is evident at this site by the presence of fracture-controlled fluorite, calcite and pyrite.

Evidence for forceful emplacement of the SMB (as opposed to passive stoping as indicated by the presence of abundant xenoliths) is observed in the vicinity of Aspotogan where mapping by O'Brien et al.,(1985) shows an anticline which has been rotated normal to the regional (northeast) structural trend.

AIRBORNE RADIOMETRICS

Airborne gamma-ray spectrometric survey data was collected by the Geological Survey of Canada (1976). Figure 2 displays the distribution of the equivalent U/equivalent Th (eU/eTh) data for the map sheet. A comparison of the eU/eTh distribution pattern with bedrock geology shows a good correlation and indicates that in this area the airborne radiometric data accurately reflects bedrock geology (O'Reilly et al., 1988). A central corridor of low ratio values (< 0.4) correlates with the less evolved DCmgS and DClmgSP units. Broad anomalous areas (0.4-1.2) correspond with leucomonzogranites of DClmgNR and DClmgPL, whereas the highest responses (>1.2) correlate directly with occurrences of DClmgPL and DClgLO. There is also a close correlation of high ratio anomalies with many of the mineral occurrences and areas of intense, pervasive hydrothermal alteration. Examples are the Bezanson Lake area (Finck et al., in press) and Skinner Meadow (northeast corner of the map sheet; O'Reilly et al., 1988).

MINERAL OCCURRENCES

Numerous mineral occurrences were observed within the map area. The majority of these occur within rocks of DClmPL which have been subjected to intense pervasive and fracture controlled metasomatic-hydrothermal alteration. O'Reilly et al. (1982) and Logothetis (1984) provide good descriptions of the various types of mineralization and associated late-stage alteration phenomena. Although restricted to the New Ross area, their observations are valid for all mineral occurrences within the map area. The most significant of these are discussed below.

The numbers in brackets correspond to the numbered mineral occurrence on the map sheet.

New Ross Area: This area is the most variable in terms of the texture and mineralogy of the granitic rocks present. It also contains a wide variation in the type and style of alteration and mineralization, ranging from pegmatite hosted Mo-Cu-W to uranium phosphate-bearing episyenites to polymetallic Mo-W-Cu-Zn-As-Be-bearing greisens. The most significant of these is the **Long Lake prospect (1)** situated near the north end of Long Lake. At this site Mo-bearing pegmatites, Mo-Cu-Zn-W-Be-Sn-bearing quartz-muscovite greisens and quartz veins occur within a metasomatised (albitized,K-feldspathised) leucogranite cupola and thermally metamorphosed metasediments of the Meguma Group. This occurrence has been the target of sporatic Sn-W-Mo exploration since 1964. The most recent work (trenching, diamond drilling) was conducted by M.E.X. Exploration Ltd. in 1980 (Black, 1980)

Other more local mineral occurrences (e.g. **Keddy Mo-W-Nb prospect (2)**, **Morleys pegmatite W-Sn-Be-Nb-Ta prospect (3)**, are documented by O'Reilly et al. (1982).

In addition to these, current bedrock mapping discovered disseminated chalcocite and wolframite within pegmatite segregations within a leucoporphyry phase of DClgBB at **Leville (4)**.

Bezanson Lake Area (5): Bedrock and pleistocene mapping have delineated an area from Bezanson Lake south to Hennyberry Lake as possessing significant exploration potential for endo-and exo-contact Sn-W-Cu-Zn mineralization. Fracture - controlled fluorite, polymetallic greisens, quartz veins and zones of intense metasomatism (hematization, sericitization, albitization, K-feldspathization, silicification) were discovered during Sn-W exploration (Sinclair et al., 1980). In addition to the above features the bedrock survey discovered several areas containing abundant mineralized (As-Cu-Zn + Sn + W) greisen float in local till (Finck et al., in press). A large high ratio eU/eTh anomaly (Fig. 2) is coincident with this area.

Fox Point (6): Chalcopyrite, sphalerite and arsenopyrite disseminations occur within <1.5cm wide greisen bordered, sheeted quartz veins. These are associated with episyenite developed in biotite monzogranite host rock.

The Puddle (7): Coarse to massive arsenopyrite and rare cassiterite occur within narrow (<1.0 cm), dark grey northwest-trending quartz veins hosted by a hematized zone within the Panuke Lake Leucomonzogranite. Approximately 0.5 km south of this occurrence, extensive light-green quartz-muscovite greisens were discovered in a 20 m coastal exposure. Minor disseminated pyrite was observed.

Timber Lake (8): This occurrence consists of fluorite-bearing leucogranites, pegmatites, and light green, quartz-muscovite greisen veins and pods. The fluorite is invariably fracture-controlled and is deep-purple. Minor disseminated pyrite was observed within the greisen.

[1]**Granodiorite, Monzogranite and Syenogranite**: After Streckeisen (1976).

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

[3]**Leucogranite**: Granitoid rocks with less than 2% combined mafic minerals.

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

[5]**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 (adjective: porphyritic)

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Brian Jennings, Ian Campbell and Margaret Shaw provided able field assistance. The use and interpretation of pebble clast data was furnished by Phil Finck and Mark Graves of the NSDME. Joe Campbell and collegues of the NSDME are thanked for their drafting skills. Production of this map was funded and supported by the Canada-Nova Scotia Mineral Development Agreement.

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OPEN FILE MAP 88-013
PRELIMINARY GEOLOGICAL MAP OF
CHESTER
NTS SHEET 21A/9

M.C. COREY

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

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

Honourable Ken Streatch, Minister — John J. Laffin, P.Eng., FEIC, Deputy Minister

HALIFAX, NOVA SCOTIA
1988