LEGEND

DEVONO-CARBONIFEROUS

DClm — **LEUCOMONZOGRANITE** - light grey to buff, fine- to medium-grained, equigranular or slightly porphyritic, 4-6%* biotite, 1-4%* muscovite, devoid of xenoliths.

DCmgDL — **DAVIS LAKE MONZOGRANITE** - whitish-grey locally with mottled blue-grey/whitish colour, medium- to coarse-grained, very megacrystic (20-40%) with megacrysts up to 12 cm in length, common rapakivi texture, 5-10% biotite, trace-2% muscovite, 1-3%* cordierite, rare xenoliths.

DCmgKJ — **KEJIMKUJIK MONZOGRANITE** - medium grey, fine- to coarse-grained, megacrystic (approximately 10%) with euhedral uniform-sized alkali feldspar megacrysts (1 x 2-2.5 cm), 12-16% biotite, trace-1% muscovite, xenoliths are common.

DCmgSG — **SCRAG LAKE MONZOGRANITE** - light- to medium-grey, medium- to coarse-grained, megacrystic (5-15%) with variably sized megacrysts, minor rapakivi texture, subrounded quartz eyes to 1.5 cm, 10-16% biotite, trace-1% muscovite, may contain trace garnet and/or cordierite, common to abundant metasedimentary (?) xenoliths (5 cm->1 m).

DCgdSG — **SCRAG LAKE GRANODIORITE** - very similar to DCmgSG except is granodioritic in composition. Biotite content generally higher than in DCmgSG (10-22%).

ORDOVICIAN-DEVONIAN

ODM — **MAFIC INTRUSIONS** - area containing abundant boulders of gabbro; some peridotite and quartz gabbro; age uncertain.

ODWK — **WHITE ROCK and KENTVILLE FORMATIONS** (undivided) quartzite, slate, siltstone, calcareous shale (fossiliferous), rhyolite, basalt, andesite.

CAMBRO-ORDOVICIAN

MEGUMA GROUP

COH — **HALIFAX FORMATION** - siltstone and slate.

COG — **GOLDENVILLE FORMATION** - metagreywacke and minor slate

*from visual modal estimates and point counting stained rock slabs (500-600 points)

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)

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 (inclined, 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(feference 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 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); SIL-silification; 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.

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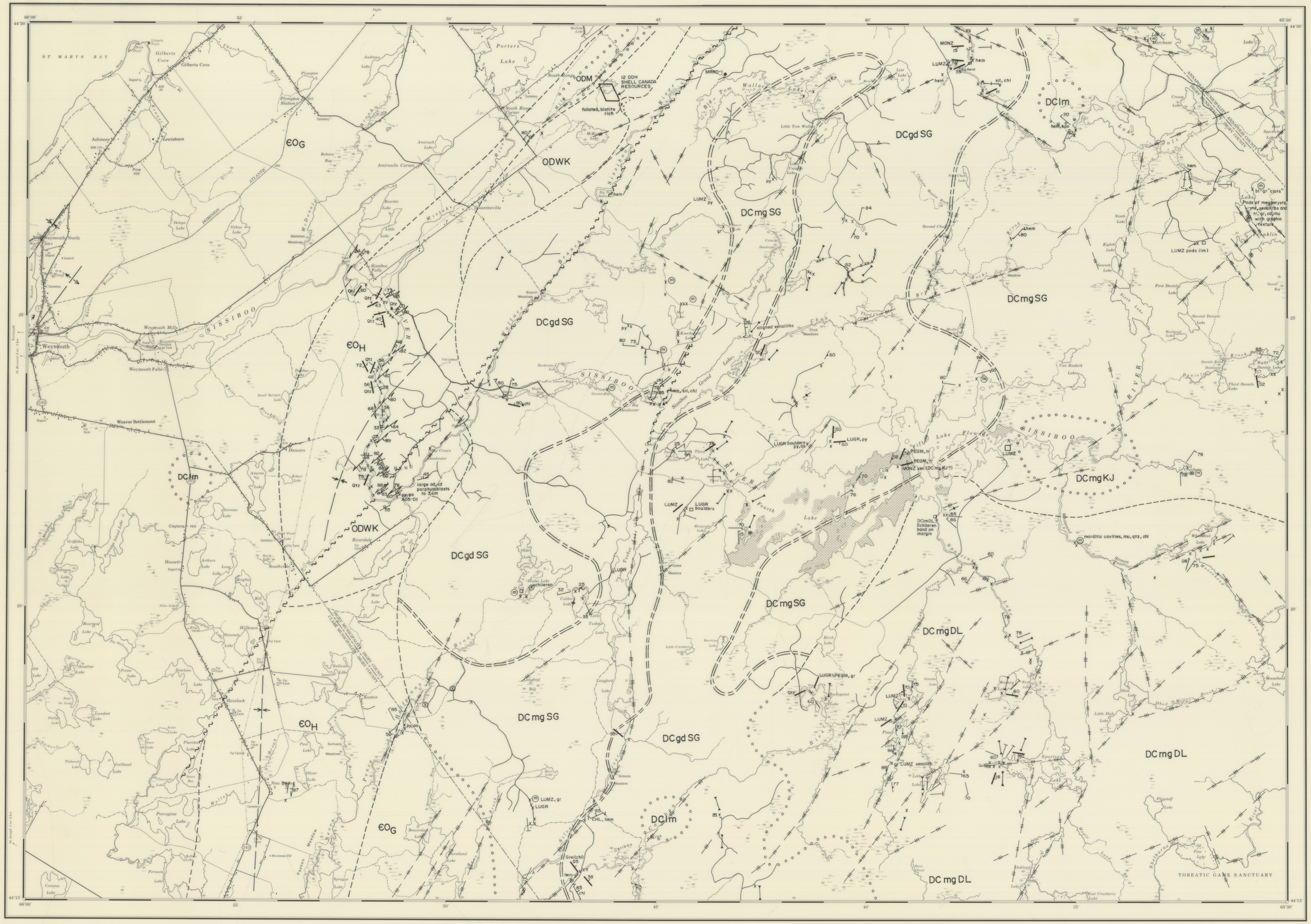


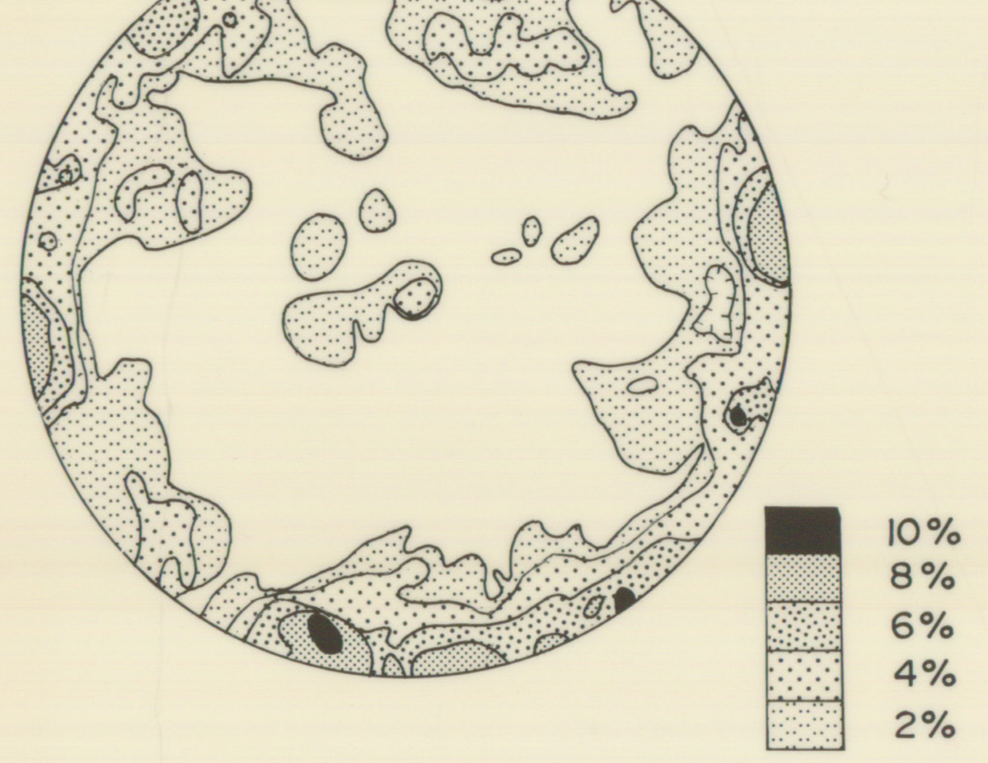


Figure 1. Contoured density plot of 180 poles to joint surfaces within the SMB.

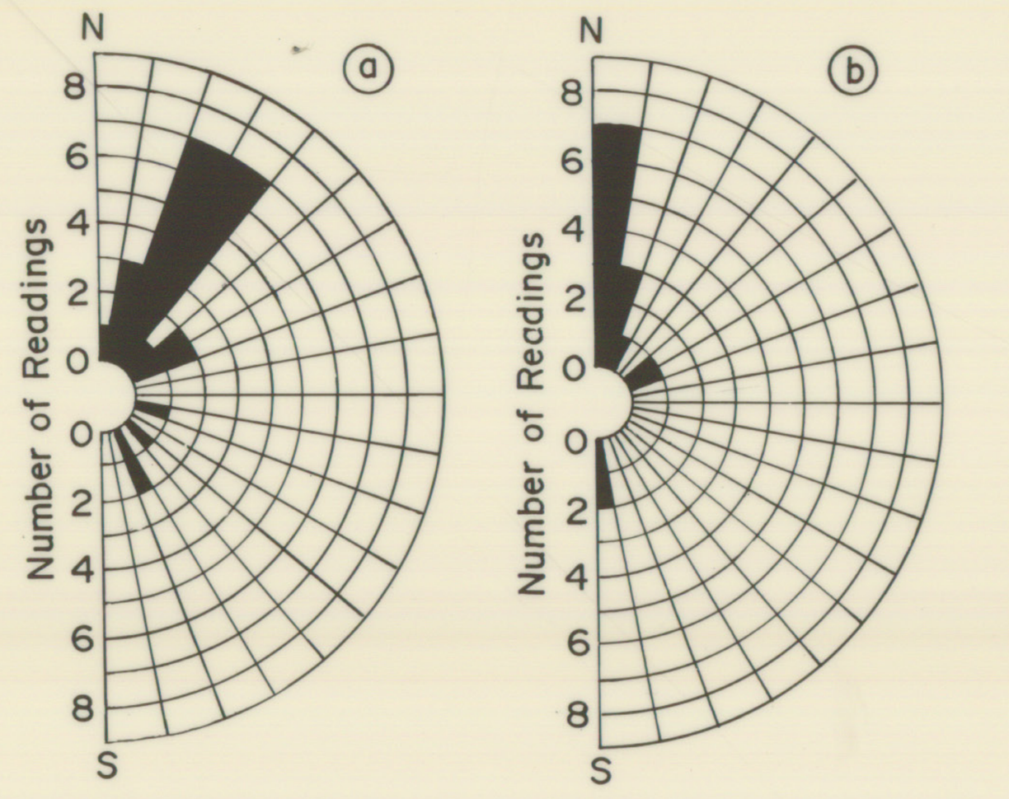
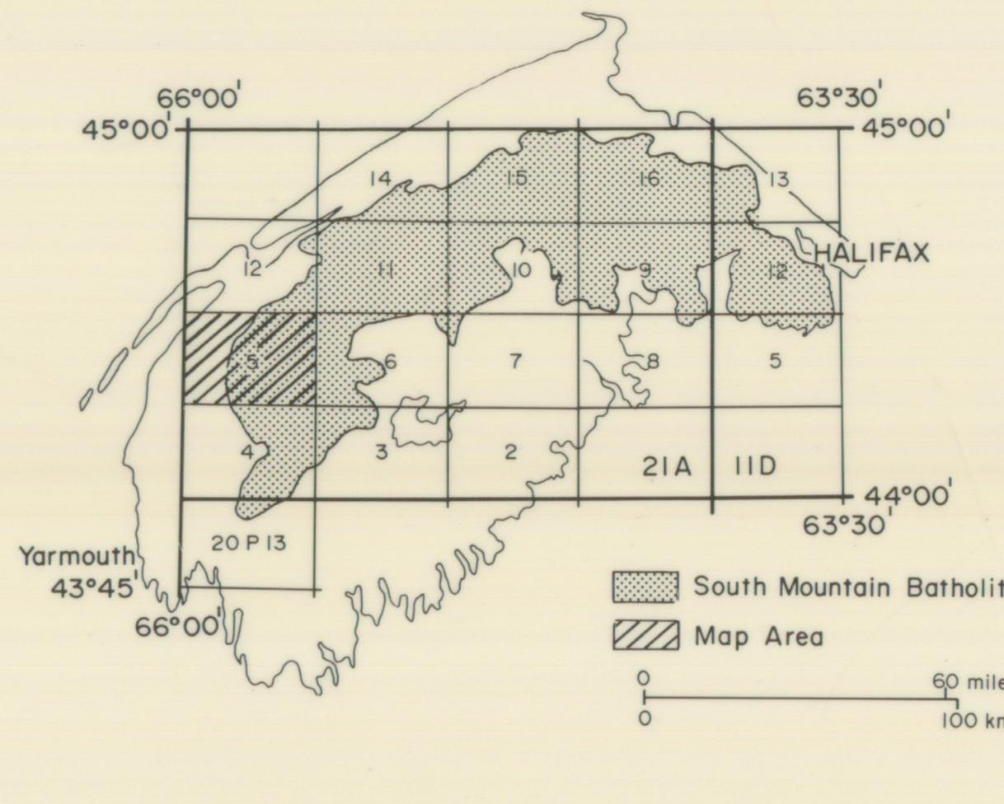
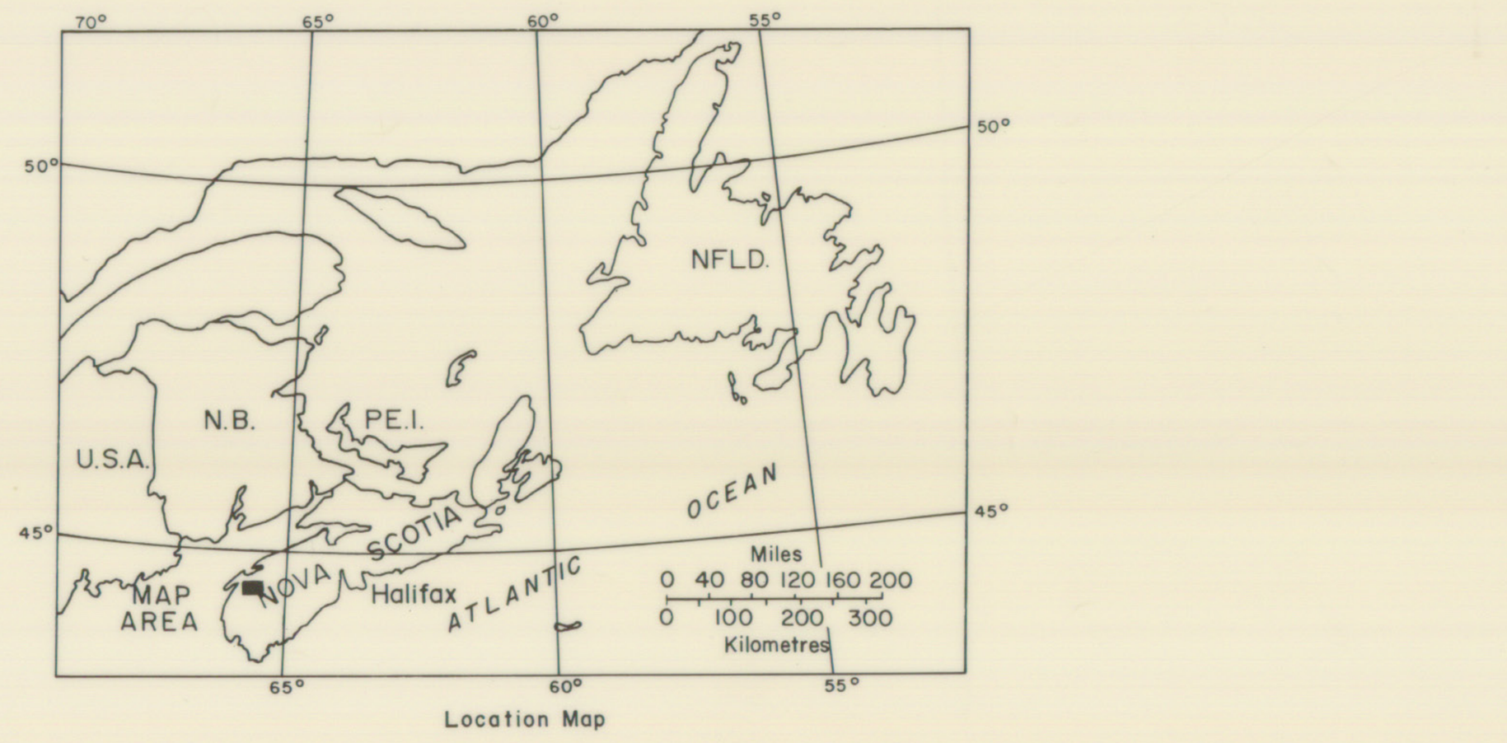


Figure 2. Rose diagrams for megacryst alignments (in 10° azimuth intervals) for a) DCgdSG and DCmgSG (N=27) and b) DCmgDL (N=15).





DESCRIPTIVE NOTES

INTRODUCTION

Geological mapping focused on the Devono-Carboniferous granitoid rocks of the South Mountain Batholith (SMB). The surrounding country rocks received cursory inspection with the exception of a well exposed section of metasedimentary and metavolcanic rocks, along the upper Sissiboo River near "The Bend", that was mapped in detail.

Cambro-Ordovician country rocks of the Meguma Group comprise metagreywackes and minor slates of the Goldenville Formation (COG) and overlying slates and siltstones of the Halifax Formation (COH; Taylor, 1969, Smitheringale, 1973). The Meguma Group is conformably overlain by slates, quartzites and metavolcanic rocks of the Ordovician-Silurian White Rock Formation (OSW; Taylor, 1969).

Previous mapping by Taylor (1969) indicated that the area near Shortliff Lake, in the north-central part of the map, was underlain solely by OSW. However, recent diamond drilling and detailed boulder mapping by Shell Canada Resources (Dakers, 1982) outlined an area, near the southeast corner of Shortliff Lake, that contains brachiopod-bearing, limy sediments that do not belong in the OSW. Taylor (1969) observed similar fossiliferous sediments near Bear River, on map sheet 21A/12. He assigned these rocks to the Kentville Formation and grouped them into an undivided unit with OSW. For the purpose of this map, the fossiliferous strata at Shortliff Lake have been combined with OSW into an undivided unit (ODWK) which is consistent with Taylor's (1969) interpretation.

The above rock sequence was folded into large, northeast-trending, upright folds and underwent greenschist facies regional metamorphism during the Devonian Acadian Orogeny (Taylor, 1969). Regional metamorphic grade progressively increases from chlorite grade in the north of the map sheet, to biotite grade in central regions and garnet grade in the south (Keppie and Muecke, 1979).

Mafic sills (ODM), of Ordovician and Devonian age (Barr et al., 1983), intrude the above rock sequence on map sheets to the north (21A/12) and northeast (21A/14; Smitheringale, 1973; Ham, 1989; MacDonald and Ham, 1989), however, no ODM rocks were indicated on previous geological maps of 21A/05 (e.g. Taylor, 1969). Detailed boulder mapping by Shell Canada Resources (Dakers, 1982) outlined a northeast-trending area (0.5 x 3.5 km), to the northwest of Shortliff Lake, containing abundant diabase and amygdaloidal basalt (ODM) boulders. This area is indicated on this map. Smitheringale (1973) noted that the sills generally range in width from "2 to 250 feet". The area of ODM on this map is clearly much wider than 250 feet and therefore may reflect a concentration of sills.

Devono-Carboniferous granitoid rocks of the SMB intruded the above rock sequences resulting in the development of thermal contact metamorphic aureoles of variable width (Taylor, 1969; Keppie and Muecke, 1979). These aureoles are characterized by porphyroblasts of andalusite and cordierite (≤2 mm, except ≤2 cm in a few outcrops along the Sissiboo River).

Geological contacts and descriptions for the non-granitic lithologies are compiled from Taylor (1969), Keppie (1979) and Dakers (1982).

GRANITIC ROCKS

Previous geological mapping of the SMB on this map sheet includes a reconnaissance survey by Taylor (1969) and a detailed boulder survey by Shell Canada Resources in the Shortliff Lake area (Dakers, 1982). Taylor (1969) described the rocks as porphyritic[1] (i.e. megacrystic[2]) with biotite as the most abundant mica and noted the presence of non-granitic xenoliths. Dakers (1982) outlined a foliated, biotite-rich (50-60%) band at the nose of an embayment in the granite/metasediment contact near Shortliff Lake. He concluded that the foliation is a relict feature of assimilated metasediment. This foliated contact zone was not confirmed during this study, however, the geological boundaries of the zone have been adopted from Dakers (1982).

DESCRIPTION OF UNITS
(listed in increasing mafic content)

Leucomonzogranite[3] (DClm) - Three small (approx. 1 km^2) plugs (?) of fine- to medium-grained, equigranular or slightly porphyritic leucomonzogranite were outlined on the basis of till clast composition in locally derived till (Graves and Finck, unpubl. data). These three bodies occur 2 km west of Danvers, near the west end of Lake Joli and along the Caribou River. Outcrops of these intrusions are not exposed, however, subangular boulders in a ditch along Route # 340, near the road to Danvers, may represent frost-heaved bedrock. The Danvers body is assumed to be in intrusive contact with COG, whereas the contact relationships of the other two bodies and their host rocks (DCmgSG and DCgdSG) are unknown. Boulders of DClm and concentrations up to 10-20% of DClm clasts in glacial tills were noted near the Tusket, Sissiboo Grand and Big Uniacke chain of lakes (Graves and Finck, unpubl. data) and also along the western shores of Fourth Lake Flowage. These occurrences may reflect abundant dyking of DClm in DCgdSG and DCmgSG.

Davis Lake Monzogranite[4] (DCmgDL) - The DCmgDL is the dominant unit in the southeastern portion of the map sheet and extends southeastward onto map sheets 21A/03 (Corey and Horne, 1989), southward onto 21A/04 (Ham and MacDonald, 1989) and eastward onto 21A/06 (Horne and Corey, 1989). No geological contacts between DCmgDL and the adjacent Scrag Lake units (DCgdSG and DCmgSG) are exposed.

Modal proportions of quartz, alkali feldspar and plagioclase (QAP) plot predominantly in the monzogranite field of Streckeisen (1976), however, a few samples plot in the syenogranite[4] field because of their abundance of alkali feldspar megacrysts[2].

DCmgDL is distinguished from DCgdSG and DCmgSG by: the higher modal amounts of cordierite[5] and muscovite[6]; the lower modal amounts of biotite; and the abundance of large alkali feldspar (and minor plagioclase) megacrysts that average 2 x 5 cm and may attain lengths of 12 cm. Rapakivi textures with plagioclase (albite ?) rimming alkali feldspar megacrysts are also common features in the DCmgDL.

The feldspar megacrysts in DCmgDL have some features that are unique within the SMB. Firstly, alkali feldspar megacrysts commonly have a mottled, steel-grey to whitish-grey colouration. Secondly, plagioclase megacrysts may have abundant inclusions of quartz, often with graphic texture, or quartz and biotite that may occur along growth planes within individual crystals.

DCmgDL is generally medium- to coarse-grained and megacrystic (20-30%), however, several outcrops (e.g. along White Sand Stream, SE of 5th Lake Flowage) are texturally heterogeneous with both medium grained, megacryst-poor, biotite-rich and coarse grained, megacryst-rich textures.

Most outcrops of DCmgDL are devoid of xenoliths, however, a few small (<10 cm in diameter), well-digested, metasedimentary (?) xenoliths were noted near Fifth Lake Flowage and on Western Lake. A fine- to medium-grained, equigranular, leucomonzogranite xenolith (20 x 40 cm) was noted along the shore of Little Pine Lake. This xenolith has abundant garnet crystals at its margin.

Kejimkujik Monzogranite (DCmgKJ) - Rocks of the DCmgKJ are restricted to a single area (approximately 2 x 3 km) near the east end of Fifth Lake Flowage. There are no known outcrops of DCmgKJ in this area but the unit was delineated on the basis of abundant, large (≥1 m) boulders that have a characteristic whitish-grey weathered surface with uniformly-sized, euhedral, alkali feldspar megacrysts (1 x 2-2.5 cm). These features are diagnostic of the DCmgKJ on map sheet 21A/06 (Horne and Corey, 1989). Attempts to further delineate DCmgKJ by using clasts (1-5 cm) in the glacial tills were unsuccessful because the major differences between DCmgKJ and DCmgSG/DCgdSG can only be seen in large weathered boulders or large hand specimens (Graves pers. comm.).

Scrag Lake Monzogranite (DCmgSG) and Granodiorite (DCgdSG)- The Scrag Lake units (DCmgSG and DCgdSG) are the dominant units in the northern and western sections of the map sheet and extend northward onto map sheet 21A/12 (Ham, 1989), southward onto 21A/04 (Ham and MacDonald, 1989) and eastward onto 21A/06 (Horne and Corey, 1989). No contacts with other granitoid units or the surrounding country rocks are known.

It was not possible to distinguish between the two units by field mapping. Their delineation is by modal QAP proportions and airborne gamma-ray spectrometric response for eTh/K (Ford et al., 1989) and eTh (G.S.C., 1979).

Both units contain small feldspar megacryst pods (≤0.5-1 m) with minor metasedimentary (?) xenoliths. These pods are interpreted as flow concentration features produced by convection within a partially crystallized magma. One such pod (approximately 1 m in diameter) on Franklin Lake also has tourmaline, cordierite and muscovite and displays a graphic granite texture. The origin of this pod is not clear.

Partially assimilated, metasedimentary (?) xenoliths are common to abundant in both units. Local areas of abundant metasedimentary xenoliths were observed at several localities (e.g. western shore of Fourth Lake Flowage, Third Lake Rip). Medium grained, equigranular leucomonzogranite xenoliths (≤2 m) were noted in several locations (e.g. near the east end of Fifth Lake Flowage). These xenoliths do not resemble any of the leucomonzogranite units and, therefore, their origin is unclear.

STRUCTURE

In general, all of the granitoid rocks of the map sheet are massive and display no evidence of pervasive deformation. However, several megascopic structural features were observed.

A major northeast-trending fault extends from the Wallace River-Sissiboo River area onto map sheet 21A/12 (Ham, 1989). The fault has a pronounced topographic expression easily recognizable as air photo lineaments (Finck, unpubl. data) but there is little sign of deformational features in the surrounding outcrops. The presence of this fault explains the apparent displacement of the ODWK, COH and the regional synclinal fold axis within the Ordovician-Devonian units along its trace.

Another northeast-trending fault is exposed near the dam at the west end of Sissiboo Grand Lake. This fault occurs along a major NE-trending air photo lineament that cross-cuts the entire map sheet. Several outcrops display intense deformational features (brecciation and shearing) and moderate to intense hydrothermal alteration (hematization, silicification and chloritization). Some outcrops (and large boulders) show evidence of intense ductile (?) deformation such as highly contorted alkali feldspar megacrysts.

Numerous other lineaments, of varying orientations, are shown on the map and are compiled from a series of 1:33 000 black and white air photos (Finck, unpubl. data). These lineaments are interpreted as reflecting structural features (shear zones, dominant joint sets, etc.) in either exposed bedrock or bedrock that has a thin glacial till veneer (Finck, pers. comm.).

Joints in the granitic rocks of the map sheet have distinct orientations as shown in a plot of 180 poles to joint surfaces (Fig. 1). There are three maxima in Figure 1 that correspond to three sets of near-vertical joints with the approximate azimuths 085°, 100° and 175°. Horne et al. (1988) describe a conjugate set of near-vertical joints in the eastern SMB that also have three maxima, however, their azimuths are 040°, 065° and 145° respectively. Therefore, the orientations of major joints in the granitic rocks of this map sheet deviate by approximately 35° (clockwise) from the eastern SMB trend.

Preferred alignment of feldspar megacrysts has been observed in numerous granite units throughout the SMB. Most of the orientations in the central part of the batholith are northeast-trending (e.g. 040°-065°; Horne et al., 1988). Rose diagrams for near-vertical megacryst alignment from the DCgdSG/DCmgSG (N=27) and DCmgDL (N=15) units are presented in Figures 2a and 2b. Orientations in DCmgSG and DCgdSG cluster around 020° to 040° whereas the orientations are mostly 000° to 010° in the DCmgDL. This deviation in megacryst alignment mirrors the change in the regional structural trends from northeast in most of the central and eastern portions of the Meguma Zone to north-northeast in the westernmost part of the Meguma Zone between Digby and Yarmouth as shown on the geological map of Nova Scotia (Keppie, 1979). These similarities suggests that the same stresses may have contributed to the observed structural features displayed in both the SMB and the Meguma Zone lithologies. The variation in joint trends on this sheet may also be related to these stresses.

MINERAL OCCURRENCES

A05-01[7] Sissiboo River - A reported quartz "dyke" (30-50 cm wide) cuts metasediments of the White Rock Formation along the Sissiboo River, approximately 300 m east of Provost Brook. This dyke was first prospected for gold mineralization in the early 1940's, however, subsequent attempts to confirm mineralization were unsuccessful (Goudge, 1940). This quartz vein was not located during the present survey.

1) Shortliff Lake - Anomalous uranium levels (≤7 ppm) were encountered during a regional soil survey in the Shortliff Lake area Dakers (1980). Airborne radiometric surveys and detailed prospecting (Dakers, 1982) resulted in the discovery of U, Cu and Ag mineralization in veined and brecciated boulders of Kentville (?) Formation. Mineralization included pyrite, covellite, chalcocite, chalcopyrite, bornite, native copper and specular hematite (Dakers, 1982). On the basis of this work, a program of 12 diamond-drill holes was conducted (Dakers, 1982). Uranium and copper mineralization in "siliceous and carbonaceous veins and breccias" (± associated hematization) within metasediments were encountered in several drill holes (Dakers, 1982).

[1]**PORPHYRY:** A rock with predominantly fine grained groundmass and medium- to coarse-grained phenocrysts (i.e. bimodal grain size distribution). Phenocrysts rarely exceed 2 cm. (adj. porphyritic)

[2]**MEGACRYST:** A nongenetic term for a crystal that is significantly larger than the surrounding groundmass. In the South Mountain Batholith megacrysts are predominantly subhedral to euhedral K-feldspar, and rarely plagioclase, crystals (generally between 2.5-7 cm in length.) in medium- to coarse-grained rocks. (adj. megacrystic)

[3]**LEUCOMONZOGRANITE:** A rock of monzogranitic composition with 2-6% combined mafic minerals (i.e. biotite, chlorite, cordierite and garnet).

[4]**GRANODIORITE- MONZOGRANITE- SYENOGRANITE- TONALITE:** After Streckeisen (1976).

[5]**CORDIERITE:** Cordierite is extensively altered or pseudomorphed by pinite +/-chlorite +/-muscovite.

[6]**MUSCOVITE:** Percentages of muscovite are from visual modal estimates and point counting of stained slabs. Point counting of thin sections generally yields much higher modal percentages.

[7]Nova Scotia Department of Mines and Energy Metallic Mineral Occurrence Card Number.

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OPEN FILE MAP 89-012

PRELIMINARY GEOLOGICAL MAP OF WEYMOUTH

NTS SHEET 21 A/05

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1989