Nova Scotia Department of Natural Resources
Mineral Resources Branch

Open File Map ME 2008-1

Bedrock Geology Map of the Whycocomagh Area, NTS Sheet 11F/14, Inverness County, Nova Scotia

C. E. White and R. C. Boehner

Scale 1:50 000

1 0 1 2 3 4 km

Halifax, Nova Scotia
2008

NOVA SCOTIA Natural Resources

Map Notes

Universal Transverse Mercator Projection (UTM), Zone 20, Central Meridian 63°00' West.

North American Datum (NAD) 1983.

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Disclaimer

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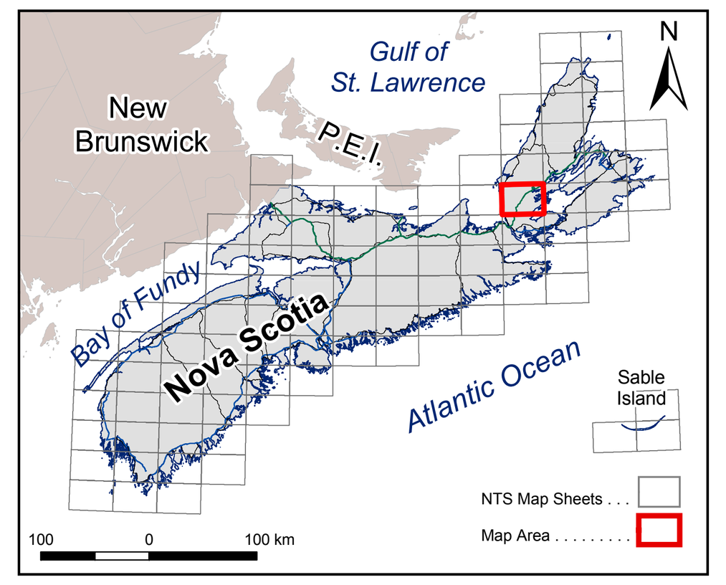

References

These references are published and unpublished maps incorporated into this map, and publications describing the geology and radiometric ages.

[1] Armitage, A.E. 1989: Geology and petrology of the crystalline rocks of the Whycocomagh area, Cape Breton Island, Nova Scotia; unpublished B.Sc. honours thesis, Acadia University, Wolfville, Nova Scotia.

[2] Barr, S.M., Davis, D.W., Kamo, S. and White, C.E. 2003: Significance of U-Pb detrital zircon ages from peri-Gondwanan terranes, New Brunswick and Nova Scotia, Canada; Precambrian Research, v. 126, p. 123-145.

[3] Campbell, J.E.M. 1991: The geology of the northeastern Creignish Hills, Cape Breton Island, Nova Scotia; unpublished M.Sc. thesis, Acadia University, Wolfville, Nova Scotia.

[4] Dallmeyer, R.D. and Keppie, J.D. 1993: $^{40}Ar/^{39}Ar$ mineral ages from the southern Cape Breton Highlands and Creignish Hills, Cape Breton Island, Canada: evidence for a polyphase tectonothermal evolution; Journal of Geology, v. 101, p. 467-482.

[5] Dunning, G.R., Barr, S.M., Giles, P.S., McGregor, D.C., Pe-Piper, G. and Piper, D.J.W. 2002: Chronology of Devonian to Early Carboniferous rifting and igneous activity in southern Magdalen Basin based on U-Pb (zircon) dating; Canadian Journal of Earth Sciences, v. 39, p. 1219-1237.

[6] Horton, D.A. 1994: The geology and petrology of the Skye Mountain Pluton, Cape Breton Island, Nova Scotia; unpublished B.Sc. honours thesis, Saint Mary's University, Halifax, Nova Scotia.

[7] Justino, M. 1991: Geology and petrogenesis of granitoid rocks in the North Mountain area, southwestern Cape Breton Island, Nova Scotia; M.Sc. thesis, Acadia University, Wolfville, Nova Scotia.

[8] Justino, M. and Barr, S.M. 1994: Petrology, petrogenesis, and tectonic setting of plutonic rocks in the North Mountain area, west-central Cape Breton Island, Nova Scotia; Atlantic Geology, v. 30, p. 47-64.

[9] Kelly, D.G. 1967: Baddeck and Whycocomagh map-areas with emphasis on Mississippian stratigraphy of central Cape Breton Island, Nova Scotia (11K/02 and 11K/14); Geological Survey of Canada, Memoir 351.

[10] Kelly, D.G. 1968: Geology, Whycocomagh, Nova Scotia; Geological Survey of Canada, A Series Map, 1212A, scale 1:63 360.

[11] Keppie, J.D., Dallmeyer, R.D. and Murphy, J.B. 1990: Tectonic implications of $^{40}Ar/^{39}Ar$ hornblende ages from late Proterozoic-Cambrian plutons in the Avalon Composite Terrane, Nova Scotia, Canada; Geological Society of America Bulletin, v. 102, p. 516-528.

[12] Keppie, J.D., Davis, D.W. and Krogh, T.E. 1998: U-Pb geochronological constraints on Precambrian stratified units in the Avalon Composite Terrane of Nova Scotia, Canada: tectonic implications; Canadian Journal of Earth Sciences, v. 35, p. 222-236.

[13] Keppie, J.D., Dostal, J., Dallmeyer, R.D. and Doig, R. 2000: Superimposed Neoproterozoic and Silurian magmatic arcs in central Cape Breton Island, Canada: geochemical and geochronological constraints; Geological Magazine, v. 137, p. 137-153.

[14] Keppie, J.D., Dostal, J., Davis, D.W. and Horton, D.A. 1998: Earliest Silurian supra-subduction magmatism in central Cape Breton Island; Atlantic Geology, v. 34, p. 113-120.

[15] Lynch, G. and Brisson, H. 1996: Bedrock geology, Whycocomagh (11F/14); Geological Survey of Canada, Open File 2917, scale 1:50 000.

[16] MacDougall, G.A. 1994: Field relations and petrology of the Fisset Brook Formation and associated rocks, southern Creignish Hills, Nova Scotia; unpublished B.Sc. honours thesis, Acadia University, Wolfville, Nova Scotia.

[17] Milligan, G.C. 1970: Geology of the George River Series, stratigraphy, structure, and economic geology; Province of Nova Scotia, Department of Mines, Memoir 7.

[18] Sangster, A.L., Hunt, P.A. and Mortensen, J.K. 1990: U-Pb geochronology of the Lime Hill Gneissic Complex, Cape Breton Island, Nova Scotia; Atlantic Geology, v. 26, p. 229-236.

[19] Sangster, A.L., Justino, M.F. and Thorpe, R.I. 1990: Metallogeny of the Proterozoic marble-hosted zinc occurrences at Lime Hill and Meat Cove, Cape Breton Island, Nova Scotia; *in* Mineral Deposit Studies in Nova Scotia, volume 1, ed. A.L. Sangster; Geological Survey of Canada, Paper 90-8, p. 31-66

[20] Wessel, Z.R. 2004: Structural analysis of a potential Peri-Gondwana detachment: George River Suite-Bras d'Or Gneiss contact relations in the Creignish Hills, Cape Breton, Nova Scotia; M.Sc. thesis, Ohio University, Ohio.

[21] White, C.E., Barr, S.M. and Campbell, R.M. 1990: Petrology of the Creignish Hills Pluton, Cape Breton Island, Nova Scotia; Atlantic Geology, v. 26, p. 109-123.

[22] White, C.E., Barr, S.M. and Ketchum, J.W.F. 2003: New age controls on rock units in pre-Carboniferous basement blocks in southwestern Cape Breton Island and adjacent mainland Nova Scotia; *in* Mineral Resources Branch, Report of Activities 2002, ed. D.R. MacDonald; Nova Scotia Department of Natural Resources, Mineral Resources Branch, Report ME 2003-1, p. 163-178.

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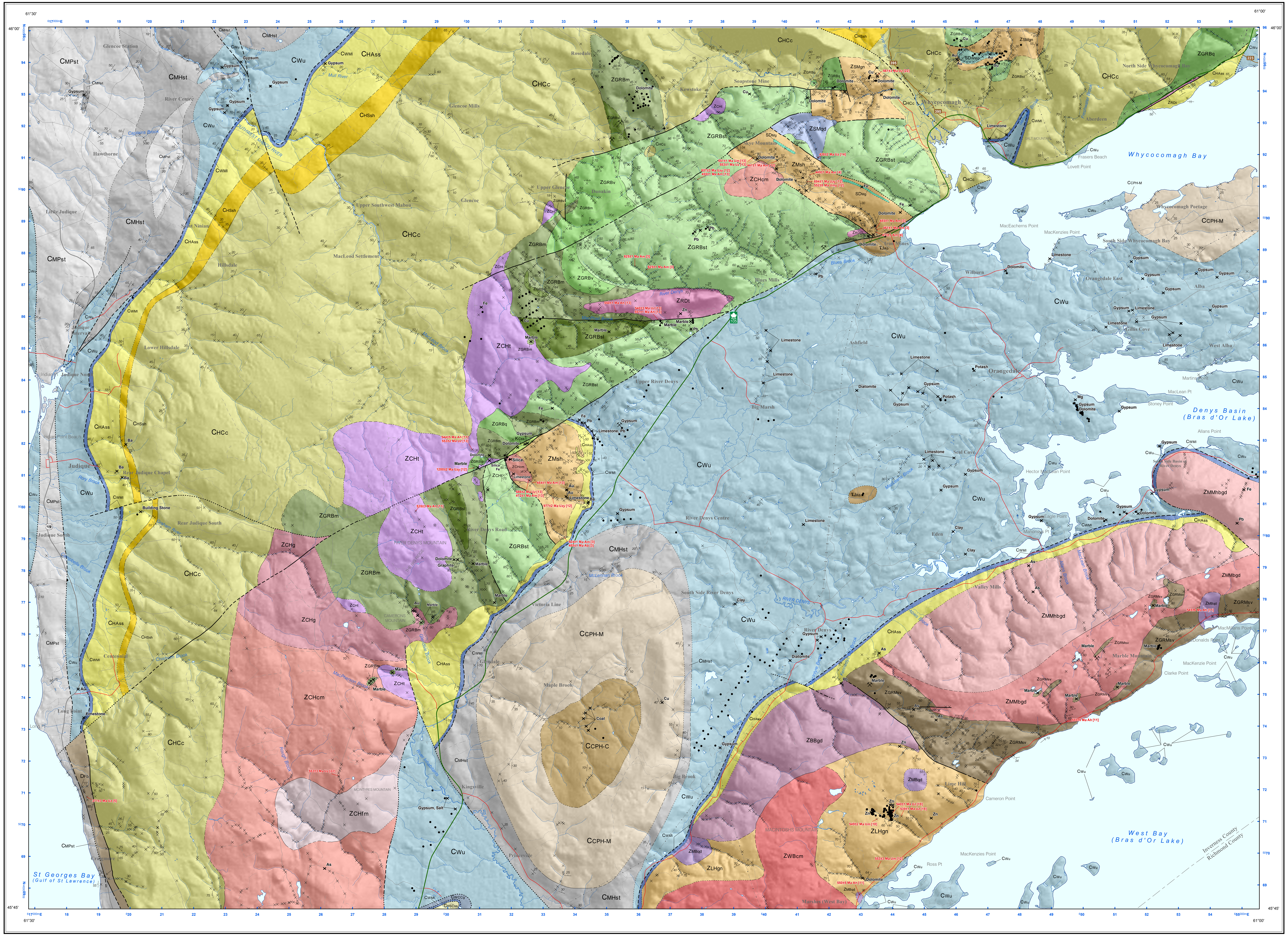

Legend

MESOZOIC

CRETACEOUS

KCss — *CHASEWOOD FORMATION* (KCss): grey sand(stone), dark grey clay with minor lignite beds

TRIASSIC TO JURASSIC

TJAb — *ASHDALE FORMATION* (TJAb): amygdaloidal to vesicular basalt; occurs only in the subsurface (whole-rock $^{40}Ar/^{39}Ar$ age of ca. 202 Ma; unpublished NSDNR data)

PALEOZOIC

CARBONIFEROUS

CUMBERLAND GROUP

PORT HOOD FORMATION

CCPH-C — COLINDALE MEMBER (CCPH-C): grey sandstone, shale and siltstone with thin coal seams

CCPH-M — MARGAREE MEMBER (CCPH-M): grey sandstone in thick multistoried bodies with interbedded red siltstone and shale

major macro- and microfloral change

MABOU GROUP

CMPst — *POMQUET FORMATION* (CMPst): red-brown siltstone and shale with minor sandstone (may include Hastings Formation)

CMHst — *HASTINGS FORMATION* (CMHst): grey and dark grey siltstone and shale with buff, thin stromatolitic limestone; minor anhydrite and gypsum in the subsurface (may include Pomquet Formation)

WINDSOR GROUP

CWu — UNDIVIDED MAINLY UPPER AND MIDDLE WINDSOR GROUP (CWu): anhydrite and gypsum with interbedded siltstone and carbonate rocks; typically highly deformed (substantial salt occurs deep in the subsurface)

local and regional fault

LOWER WINDSOR GROUP

CWCCg — *CARROLLS CORNER FORMATION* (CWCCg): gypsum and anhydrite, with minor interbedded carbonate rocks and rare grey siltstone (overlain by thick halite interval in subsurface); locally identified near Big Brook, Malagawatch, Upper River Denys and Alba; occurs above Macumber Formation in the subsurface where not truncated by detachment faulting

CWMl — *MACUMBER FORMATION* (CWMl): grey and grey-green, laminated pelloidal limestone

disconformity to angular unconformity

HORTON GROUP

CHSCss — *STEEP CREEK FORMATION* (CHSCss): grey sandstone with conglomerate and minor maroon and black siltstone

CHAss — *AINSLIE FORMATION* (CHAss): grey sandstone with red and minor grey siltstone and shale

CHSsh — *STRATHLORNE FORMATION* (CHSsh): grey to minor red shale with thin interbeds of oolitic limestone; grey, micaceous and quartz-rich sandstone is interbedded and may dominate in significant intervals of the formation

CHCc — *CREIGNISH FORMATION* (CHCc): grey and greenish-grey, pebble to boulder conglomerate and sandstone; pale green, moderately sorted with abundant rock fragments; reddish-brown conglomerate, pebble sandstone and coarse sandstone, or tan, brown and reddish-brown, micaceous, quartz-rich and arkosic, fluviatile sandstone with minor grey shale (Judique Facies); abundant gabbroic dykes and sills

regional unconformity

LATE DEVONIAN

DFb — *FISSET BROOK FORMATION* (DFb): amygdaloidal to vesicular basalt interbedded with grey conglomerate and sandstone; minor rhyolite and basaltic lithic tuff

regional unconformity

SILURIAN TO DEVONIAN(?)

SDWMg — WHYCOCOMAGH MOUNTAIN GRANITE (SDWMg): porphyritic granite with phenocrysts of plagioclase and hornblende

SDMg — MCASKILL BROOK GABBRO (SDMg): fine- to medium-grained, locally porphyritic hornblende gabbro

PROTEROZOIC

LATE NEOPROTEROZOIC (maybe in part Silurian)

ZSMqd — SKYE MOUNTAIN QUARTZ DIORITE (ZSMqd): medium- to coarse-grained, inequigranular diorite to quartz diorite

LATE NEOPROTEROZOIC

All Late Neoproterozoic units cut by gabbroic dykes and sills

ZCHfm ZCHcm ZCHg ZCHt — CREIGNISH HILLS PLUTON and related intrusions (ZCH): (ZCHfm): fine grained and locally porphyritic biotite monzogranite with phenocrysts of plagioclase and quartz; (ZCHcm): coarse grained, equigranular to slightly porphyritic biotite to biotite-hornblende monzogranite; (ZCHg): fine- to medium-grained, inequigranular, weakly foliated granodiorite and monzogranite; (ZCHt): fine- to medium-grained, locally porphyritic tonalite gradational to quartz diorite and diorite

ZRDt — RIVER DENYS TONALITE and related intrusions (ZRDt): fine- to medium-grained, locally porphyritic tonalite gradational to quartz diorite and diorite

ZWBcm — WEST BAY MONZOGRANITE (ZWBcm): coarse grained, equigranular to slightly porphyritic biotite-hornblende monzogranite

ZMMhbgd ZMMbgd — MARBLE MOUNTAIN PLUTON (ZMM): (ZMMhbgd): medium- to coarse-grained, locally porphyritic hornblende-biotite granodiorite to tonalite; (ZMMbgd): medium- to coarse-grained, locally porphyritic biotite granodiorite to tonalite

ZBBgd — BIG BROOK GRANODIORITE (ZBBgd): medium grained, equigranular, hornblende-biotite granodiorite to tonalite

ZMBqd — MILL BROOK QUARTZ DIORITE and related instrusions (ZMBqd): medium- to coarse-grained, inequigranular quartz diorite to tonalite

ZSMgn ZLHgn ZMsh — BRAS D'OR GNEISS: Skye Mountain Metamorphic Suite (ZSMgn) and Lime Hill Gneissic Complex (ZLHgn): biotite, biotite-cordierite, and sillimanite-bearing paragneiss, migmatitic paragneiss, marble, quartzite, amphibolite and minor tonalitic orthogneiss; *Melford Formation* (ZMsh): biotite, biotite-cordierite, sillimanite and garnet-bearing schist, marble, quartzite and granitic orthogneiss

NEOPROTEROZOIC

GEORGE RIVER METAMORPHIC SUITE (all units cut by gabbroic dykes and sills)

ZGRMsv — *MALAGAWATCH FORMATION* (ZGRMsv): undivided metasiltstone, slate, calcitic and dolomitic carbonate-bearing rocks, minor quartzite and basaltic metavolcanic rocks

ZGRBsl ZGRBm ZGRBq ZGRBv ZGRBst — *BLUES BROOK FORMATION* (ZGRB): (ZGRBsl): mainly slate interbedded with minor metasandstone, metasiltstone and carbonate rocks; (ZGRBm): mainly carbonate rocks interbedded with minor metasandstone, metasiltstone, slate and quartzite; (ZGRBq): mainly quartzite interbedded with minor carbonate rocks; (ZGRBv): mainly andesitic to basaltic lithic and lithic crystal tuff, minor basalt flows; (ZGRBst): mainly metasandstone and metasiltstone interbedded with minor slate, carbonate rocks, quartzite and rare basaltic lithic tuff

Symbols

- Outcrop, float
- Operating quarry
- Mineral occurrences (Fe)
- Drillholes
- Radiometric ages[1] (550±5 Ma Ah [7])
- Bedding; tops known (inclined, vertical, overturned)
- Bedding; tops unknown (inclined, vertical)
- Cleavage (inclined, vertical)
- Crenulation cleavage (inclined)
- Intersection lineation
- Fold axis (inclined)
- Mineral lineation; first generation
- Geological boundary (defined, approximate, assumed)
- Fault (defined, approximate, assumed)

[1] U = U-Pb mineral age; *z* = zircon, *m* = monazite, *y* = youngest detrial age
A = $^{40}Ar/^{39}Ar$ mineral age; *m* = muscovite, *b* = biotite, *h* = hornblende
[7] = reference affiliated with age date

- Trans-Canada Highway (104)
- Trunk Highway (4)
- Collector Highway (333)
- Hard surface road
- Loose surface/Resource access road
- Vehicle track
- Railway (active, inactive)
- Coastline
- Rivers, streams
- County boundary
- Transmission lines (multi, single lines)
- Lakes

May 08, 2008