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Marginal Notes **GEOLOGICAL OVERVIEW** The map area straddles 2 geological domains of the Central Metasedimentary Belt, namely, Harvey-Cardiff domain and Bancroft terrane (Figure 1). Harvey-Cardiff domain consists of a southern subdomain (see Figure 1) dominated by several types of mafic to intermediate gneiss (units 1 to 4, 18), calcite and dolomite marble (units 5 and 6), and tonalite gneiss complexes (unit 16) and a northern subdomain (see Figure 1) dominated by calcite and dolomite marble (units 10 and 11), metavolcanic, metavolcaniclastic, and metasedimentary rocks (units 7 to 9), and gabbro-diorite intrusions (unit 23). Bancroft terrane consists of calcite and dolomite marbles (units 13 and 14), siliciclastic metasedimentary rocks (units 12 and 15), and syenite suite (unit 21) and alkalic gabbro (unit 20) intrusions. Methuen Suite monzogranite intrusions (unit 24) occur throughout the map area. Catchacoma Suite monzogranite intrusions (unit 27) contain elevated thorium contents (>25 ppm) and are among the youngest rocks within the map area and are roughly coeval with the pegmatitic granite bodies (unit 28) that host most of the radioactive mineralization within the map area. The Salerno Creek deformation zone marks the boundary of Harvey–Cardiff domain. Higher strain rocks of indeterminate protolith within the deformation zone are portrayed as unit 25 Areas within the deformation zone where the original protolith can be identified are indicated by the appropriate rock unit code (mainly intrusive rocks of units 20, 23

MINERAL EXPLORATION AND EXTRACTION Exploration for metallic and nonmetallic minerals has been carried out at numerous localities in and around Cavendish Township since before the turn of the century. Bright (1987, 1988) provides a summary of this early exploration history. Since region during the early 1950s, subsequent exploration efforts in Cavendish wnship have focussed on uranium, mainly in 2 spurts. The first, between 1954 and 1956, led to the discovery of several prospects, past-producers, or producers e.g., Nos. 2, 4, 6, 7, 8, 9, 14, 21, 22, 25) and deposits, including the Cavendish Mine (No. 3). Subsequently, many of these prospects, past-producers, or producers, in addition to new ones, were re-evaluated during the next uranium boom between 1974 and 1978, mainly by companies such as Kerr Addison Mines Limited and Imperial Oil Limited (Nos. 16, 17 and 18). In 1974–1979, Insulite Development Corporation Incorporated tested a phlogophite-vermiculite deposit (No. 13) in weathered marbles located along Beaver Lake Road. Subsequent exploration work by Regis Resources Limited led to the discovery of vermiculite mineralization near Horseshoe Lake (No. 29), which had proven and probable reserves of 890 000 tonnes at 21% vermiculite. Production took place between 2005 and 2009, at which time the known reserves were exhausted and operations ceased. Aggregate and dimension stone extraction from Methuen (unit 24) and Catchacoma (unit 27) suite plutons has occurred (Nos. 10, 11 and 15). In addition, several Paleozoic outliers (units 29 and 30) in the southern part of Cavendish ownship are currently being exploited as sources of stone for aggregate and landscaping purposes (Nos. 12 and 19).

and 24). Metamorphic grade in the map area is middle to upper amphibolite facies in the southern subdomain of Harvey–Cardiff domain, and middle amphibolite

facies in Bancroft terrane and the northern subdomain of Harvey–Cardiff domain.

PREVIOUS AND CURRENT WORK Cavendish Township was mapped at 1:15 840 scale by Bright (1981a, 1981b). In addition, detailed mapping at 1:15 840 scale was conducted in the marble and pegmatite belt located south of Picard Lake by Esso Minerals (Lowe 1975). Two different interpretations of the regional geology of the township are provided by 1:50 000 scale compilation maps produced by Bright (1987, 1988) and Lumbers and Vertolli (2000a, 2000b). Henderson (1992) and O'Connor (2010) conducted mapping and structural studies along parts of the Salerno Creek deformation zone. Jessett (2010) conducted geochemical and isotopic studies of the Glamorgan gabbro (unit 20) within the map area in Glamorgan Township. In the 1970s, the Iniversity of Toronto and the Geological Survey of Canada operated a geophysical test range to the west of Salmon Lake. The approximate boundary of this former test range is indicated on the map face. Preliminary reports on mapping in Cavendish Township based on this study were presented in Easton (2007, 2008a, 2008b). A comprehensive summary of the geology and mineral deposits of Cavendish Township is presented in Easton (2011). Geochemical, geophysical and assay data collected as part of this project are presented in Easton (2010).

NOTES REGARDING DATA TYPES PRESENTED ON THE

Outcrop Data Outcrops shown on the map face are of 2 types, and vary in accuracy of position. Outcrops visited during the course of mapping between 2007 and 2009 were all located using GPS (global positioning system) technology. In contrast, outcrops implied from Bright (1981a, 1981b) and Lowe (1975) from paper maps wei originally located using pace and compass methods, and in some instances, outcrop size may have been exaggerated. Thus, both the size and location of nese previously mapped outcrops are less well known. Compiled outcrops are indicated by a "C" in front of the rock code, and are included because they provide important constraints on the location of contacts and the distribution of rock units. even with the uncertainties in their location. Due to access restrictions to the Kawartha Highlands Signature Site Park imposed in 2008, much of the area underlain by the Anstruther gneiss complex was compiled from Bright (1981a, 1981b) in conjunction with the interpretation of airborne magnetic and gamma-ray The geology of the area surrounding Cavendish Township that is shown on the map face is compiled from Armstrong and Gittins (1970a, 1970b), Bright (1987, 988) and Lumbers and Vertolli (2000a, 2000b), supplemented by interpretation of airborne magnetic and gamma-ray spectrometric data available for the area. Map units defined on the basis of geophysical data are indicated by "G" in front of the rock code. The geology of Galway Township in the southwest corner of the

A Friends of the Grenville field trip was run between Buckhorn and Gooderham in September 2009 (Easton and Carr 2009). The majority of the field trip stops from this trip are located within the map area and are indicated on the map face. hese stops are located mainly along Peterborough County Road 507 and the Salmon Lake Road.

map face is poorly known, and is the least reliable portion of the compiled

U/Pb zircon, titanite and monazite geochronology data collected as part of this study are summarized in Easton and Kamo (2008, 2009, 2011) and are indicated on the map face, along with data from previous U/Pb, Nd/Sm and Ar/Ar geochronologic studies (Berger and York 1981; Burr and Carr 1994; Jessett 2010; Mezger et al. 1993; Turner 1999). Lake Sediment Geochemistry The map area is covered by a lake sediment geochemical survey (Geological Survey of Canada 2009). Most of the stations within the study area showed no responses for elements such as As, Co, Cu, Ni, Pb and Zn; unfortunately, Au was not analyzed. Stations showing above background levels for various metals. predominantly U, are indicated on the map face. Multi-element anomalous eadings from large, populated lakes such as Catchacoma, Fortescue and

Geochronological Data

Mississagua lakes may reflect anthropogenic contamination and thus may not be geologically significant. The magnetic field in the map area (Figure 2) is dominated by 2 main geologic units. The first is a linear, approximately 1 to 1.5 km wide, north- to northeast trending, magnetic and associated Bouguer gravity high that is coincident with the metavolcanic belt (units 7 and 8) present within the northern subdomain of Harvey–Cardiff domain. Magnetic susceptibility measurements of rocks within ne metavolcanic belt indicate magnetic susceptibilities of 10 to 100 x 10⁻³ SI Easton 2010) in contrast to much lower values (<2 x 10⁻³ SI) observed in mos other rock units within the northern subdomain (Easton 2010). This magnetic and gravity high can be traced to the south beneath gneissic rocks (units 1 to 4, 9) of the southern subdomain (see Figure 2), although the magnetic character

of the anomaly becomes more diffuse because of both the thickness of the

overlying rock units and the presence of a large Methuen Suite granite intrusion

(unit 24j) within the exposed southern subdomain rocks. Mineral Deposit Data Mineral deposit data shown on the map consists of occurrences (not numbered), prospects (numbered), past-producers (numbered), and producers (numbered). In addition to historic occurrences compiled from Bright (1981a, 1981b) and Ontario Geological Survey (1983), new occurrences based on assay data contained in Easton (2010) are also shown on the map face. Where available, Mineral Deposit Inventory (MDI) numbers are included in the list of prospects. ast-producers, and producers in the map legend. Easton (2010) provides additional details regarding the selection and the location of historic mineral occurrences within the map area. Mineral Deposit Inventory occurrences with uncertain locations, or which could not be located during the course of the mapping program, are not shown on the map, and are identified as problematic in Easton (2010). Diamond-drill hole data shown on the map face are from Ontario Geological Survey (2005). Where available, company drill-hole numbers are presented beside the respective diamond-drill hole. Numerous overburder drill holes are present in the area around Vermiculite Canada (No. 29) and in the

Beaver Lake area (No. 13), but are not indicated on the map face. Radiometric Data The map area is covered by a high-resolution, airborne, gamma-ray spectrometric survey (Carson et al. 2004a, 2004b, 2004c). Two types of airborne gamma-ra spectrometric anomalies are highlighted on the map face. The first consists of combined uranium and thorium anomalies that are associated with large bodies of pegmatitic granite (unit 28). Most of the historic major radioactive mineral rences in the area are associated with these anomalies. The second consists of thorium anomalies (Figure 3) that are associated with the Catchacoma suite of late, monzogranite intrusions (unit 27) that occur within the southern subdomain of the Harvey-Cardiff domain. Some historic, thorium-dominated, radioactive mineral occurrences and prospects occur within the Catchacoma Suite intrusions (e.g., No. 25).

In addition to the airborne radiometric anomalies shown on the map face, also displayed are significant spot assay mode scintillometer readings for U and T collected by field party personnel, mainly from radioactive mineral occurrences. A complete listing of all the ground scintillometer data collected during the mapping program is found in Easton (2010).

Many rock units within the map area have been subjected to intense chemical weathering. Areas where weathering is most abundant are located southsouthwest of the Anstruther and Burleigh gneiss complexes. The gneiss

Zones of Weathering

complexes likely formed topographic highs during the Pleistocene which served to protect areas down-ice from erosion during Pleistocene glaciation. Units most usceptible to chemical weathering are units 5, 6, 10, 11, 18, 19 and 24e. because intense chemical weathering is a critical factor in the generation of vermiculite deposits in the map area, areas of intense weathering observed during the mapping program are indicated on the map face by the letter S, which stands for saprock and saprolite. A continuum exists from unaltered but fractured rock, to rock that has been intensely altered along fractures (e.g., outcrops at UTM 704624E, 4953215N on Galway Forest Access Road), to saprolite (claydominated material that preserves original features of the unaltered rock such as gneissosity) (e.g., Stop 1-5, Easton and Carr 2009, UTM 708923E 4951587N on alway Forest Access Road) to lateritic soil. Within the map area all instances of saprock and saprolite in the map area appear to be oxidized; there does not appear to be a separation into the reduced, greenish coloured, lower saprolite zone (Fe²⁺) and the oxidized, buff to reddish coloured, upper saprolite zone (Fe³⁺) common in modern environments. The timing of this weathering event is nknown, other than that it is older than the latest glaciation in the area (circa 10 000 ya), and younger than the end of Grenville deformation and metamorphism. TECTONIC HISTORY OF CAVENDISH TOWNSHIP

It is thought that the present configuration of Bancroft terrane and Harvey–Cardiff domain (see Figure 3) formed by the following process: • Deposition or intrusion of the older rocks (units 1 to 6) present within the southern subdomain of Harvey–Cardiff domain. • Deposition of mafic and intermediate metavolcanic rocks and volcaniclastic rocks of the northern subdomain of the Harvey–Cardiff domain (units 7 and 8) as well as siliciclastic and carbonate metasedimentary rocks (units 9, 10 and 11). Relationship of these rocks to the southern subdomain during deposition is uncertain. Deposition of siliciclastic and carbonate metasedimentary rocks of Bancroft terrane (units 12, 13, 14 and 15). Relationship of these rocks to Harvey-Cardiff domain during deposition is uncertain. • Circa 1290 Ma – emplacement of tonalite and granodiorite (unit 16) of the Anstruther and Burleigh gneiss complexes into pre-existing supracrustal and gneissic rocks (units 1 to 6) of the southern subdomain and likely deformation and metamorphism of the host rocks (units 1 to 6). Relationship of these rocks to those of the northern subdomain of Harvey-Cardiff domain during emplacement is uncertain. • Emplacement of mafic and felsic rocks of the syenite suite (units 18, 19, 21),

predominantly within Bancroft terrane. Timing of emplacement of these

rocks is uncertain, and may have occurred in 2 pulses: at circa 1254 Ma

Glamorgan gabbro) and circa 1170 Ma (nepheline syenite). Relationship of

Bancroft terrane to Harvey–Cardiff domain during syenite suite emplacement • Circa 1250 to 1225 Ma – predeformational and syndeformational emplacement of mafic dikes (unit 17) and mafic and felsic plutons within Harvey-Cardiff domain and Bancroft terrane (units 22, 23 and 24). Likely deformation and metamorphism of the host rocks (units 1 to 18) to these plutons. It is possible that the northern and southern subdomains of Harvey-Cardiff domain are juxtaposed just prior to pluton emplacement. • Between 1220 and 1060 Ma – development of the Salerno Creek deformation zone, with Harvey–Cardiff domain thrust west-northwestward over Bancroft • Circa 1070 to 1060 Ma – emplacement of granite plutons of the Catchacoma Suite (unit 27) and radioactive granite pegmatite veins (unit 28) into Harvey– • Circa 1060 to 1030 Ma – regional metamorphism and deformation in Harvey– Cardiff domain and Bancroft terrane.

Zinc mineralization within the Composite Arc Belt is typically associated with dolomitic marble (Easton 1992). In northern Harvey-Cardiff subdomain, the on both flanks of the metavolcanic belt (see Figure 1). This area also contains several zinc in soil and zinc assay anomalies. Within Bancroft terrane, there are few wide expanses of dolomitic marble (unit 14); however, exploration diamond drilling in the area northeast of Fortescue Lake indicates the presence of intercalated calcitic, dolomitic and silicate-rich marbles (Northgate Exploration Limited 1989). Consequently, the Bancroft terrane marble belts (unit 13) are prospective targets for zinc mineralization even though the surface exposure of dolomitic marble is

ECONOMIC GEOLOGY

The Imperial Oil Ganymede prospect, past-producer or producer (No. 18) warrants further exploration, as it lies at the eastern margin of a large, moderate U and Th airborne gamma-ray spectrometric high (map face), and yielded favourable spot assay results (see map face and Easton 2010), considerably higher than those from the neighbouring Imperial Oil Asarco occurrence (occurrence 17) to the north. Ganymede is located at the edge of a large, poorly exposed pegmatite body which underlies most of the extent of the airborne anomaly. The pegmatite body associated with Ganymede may be the southern extension of the pegmatite body hosting the Cavendish Mine that has been offset 1.5 km to the southwest along a major north-northeast-trending fault. Exploration of this pegmatite at this time is difficult, however, as it lies in the 500 to 600 m wide zone of blow-down that occurred in the summer of 2006 across much of south-central Cavendish Township. The northernmost equivalent uranium anomaly near the Cavendish–Anstruther township boundary is as large as the anomaly found near the Cavendish Mine, yet there are no historic radioactive occurrences within this anomaly (see map face) Normally, this anomaly would be a prime target for further exploration; however, most of this anomaly lies within the Kawartha Highlands Signature Site. The Kelbee prospect, past-producer or producer (No. 20), just to the southwest, yielded favourable spot assay results (see map face and Easton 2010), but it also lies within the Kawartha Highlands Signature Site.

Marble belts (units 5 and 6) located in the southern subdomain of Harvey-Cardiff domain appear to have the highest potential for hosting additional vermiculite deposits. Exploration should take into account the antiformal character of these marble belts as well as the fact that they may be offset up to 1 km across major east-northeast-trending faults in the area. The vermiculite deposits at Vermiculite Canada and the historic showings along the Beaver Lake road are hosted by a chemically distinctive calc-silicate rock (unit 6c) that occurs in close proximity to a unit of relatively pure dolomite marble The calc-silicate rock of unit 6c is dominated by talc-tremolite-guartz-calcite, and has a pink-green colour on weathered surfaces. It is characterized by low Al₂O₃, high MgO, moderate SiO_2 , CO_2 and K_2O contents, low values for all of the other alkali elements (Ba, Na, Rb, Sr), and negligible total rare earth element (REE) contents. This chemical composition suggests primary deposition of the calc silicate protolith as a glauconite-silica-carbonate mud that was subsequently metamorphosed to form the assemblage talc-tremolite-quartz-calcite, an ideal precursor for forming the low-iron vermiculite present at Vermiculite Canada (Easton 2008a, 2011). Rocks of unit 6 appear to be more abundant west of the northerly trending thrust fault near Peterborough County Road 507 that appears to divide the southern subdomain of Harvey–Cardiff domain into 2 lithologically

In addition to bulk rock composition, another factor critical with respect to

Anstruther and Burleigh gneiss complexes (Easton 2007, 2011).

development of significant vermiculite mineralization in Harvey-Cardiff domain is

the presence of topographically low areas, which were protected from erosion

during Quaternary glaciation by the topographically higher and more resistant

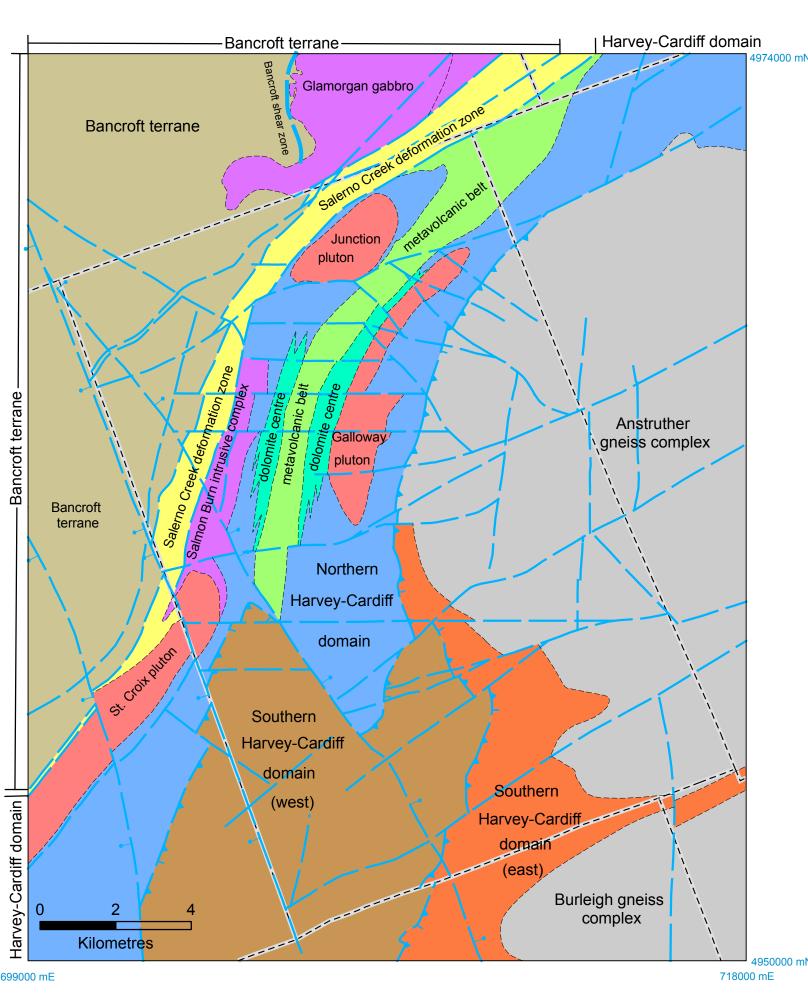


Figure 1. Main tectonic elements of the Cavendish map area. The location of thrust faults denoting the boundary between northern and southern Harvey-Cardiff subdomain are based on their infered position prior to emplacement of felsic intrusive rocks of units 20, 24 and 28.

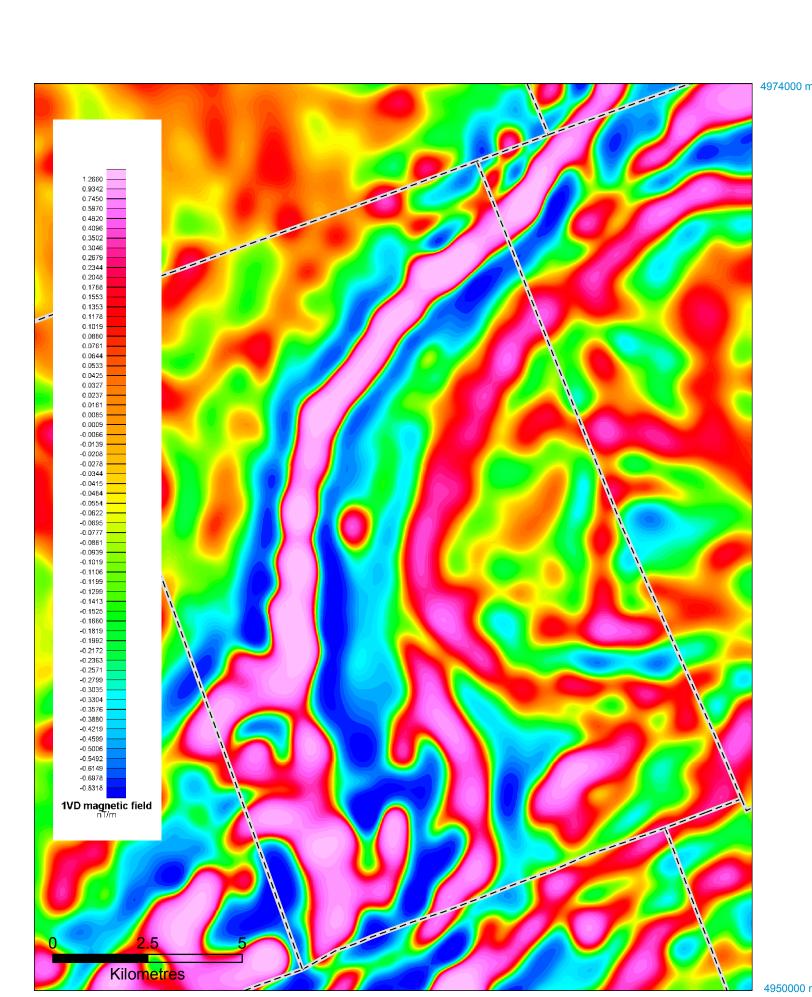


Figure 2. Airborne first-vertical derivative of the total magnetic field of the Cavendish area. Township boundaries are shown for reference. Data from Ontario Geological Survey (2003).

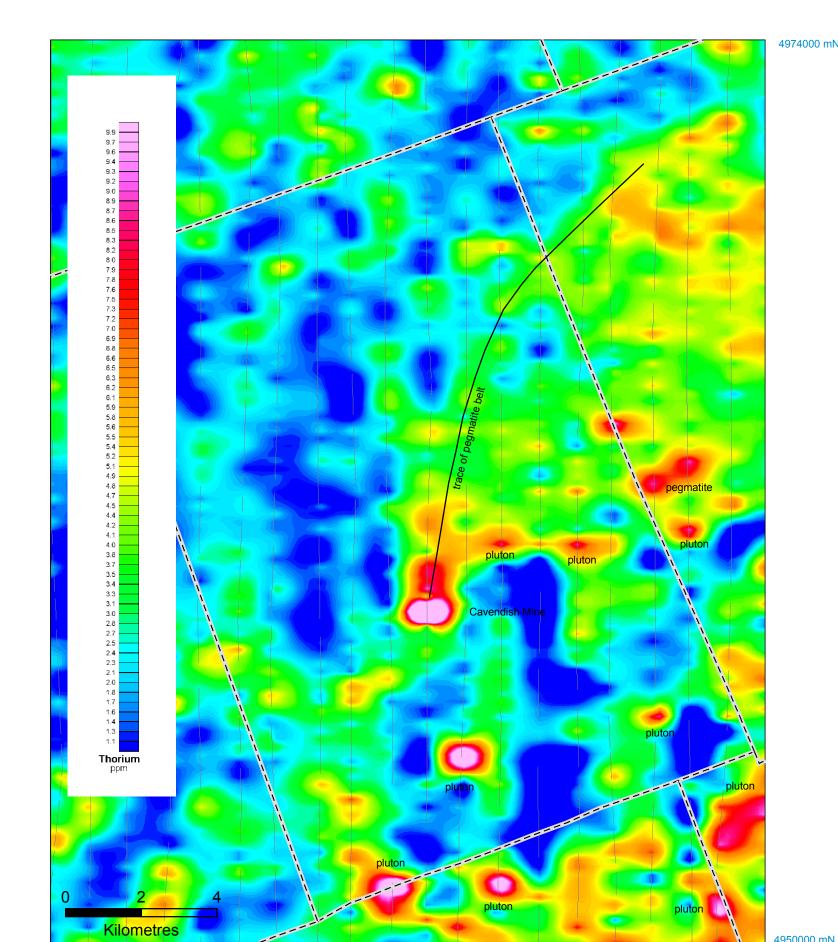
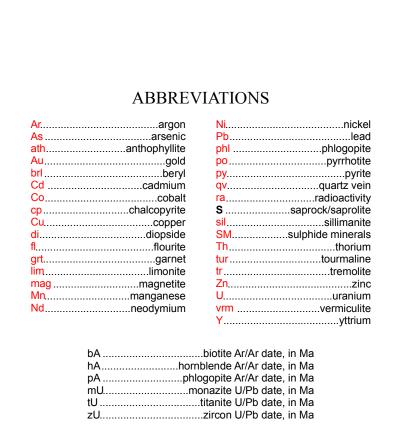


Figure 3. Airborne equivalent Thorium map of the Cavendish area. Grey, vertical lines indicate the location of flight lines. Township boundaries are shown for reference. Data from Carson et al. (2004c).



PROSPECTS, PAST-PRODUCERS AND PRODUCERS^a Briar Court sulphides (cp, po, py) MDI31D16SW00108 2. Briar Court uranium (U, Th) Cavendish Mine (U, Th), past-producer MDI31D16SW00099 Cavendish North (U, Th) MDI31D16SW0105 Cavendish Test Range (po, py) 6. Drude (Buckhorn, Newlund) (U, Th) MDI31D09NW00070 Drude (Higgins Lake) (U, Th) 8. Drude (Mississauga Lake) (Ú, Th) MDI31D09NW00074 9. Drude (Picard Lake) (U, Th) 10. FPL-1 (Floyd Preston Limited) (granite) 11. FPL-2 (Floyd Preston Limited) (granite) 12. FPL-3 (Floyd Preston Limited) (limestone) 13. Green (Goshawk, Insulite) (vrm) MDI31D16SW00008 15. G3-79 (granite) MDI31D16SW00070 16. Imperial Oil, Asarco (Twin Lake) (U, Th) MDI31D09NW00072 17. Imperial Oil, Cromwell (U, Th) MDI31D09NW00073 18. Imperial Oil, Ganymede (U, Th) MDI31D09NW00075 19 Jeff Parnell Contracting Limited (limestone) 20. Kelbee (Mountainview, Weldon) (U, Th) MDI31D16SW00096 21. Louvicourt, Goldfield (Greene) (U, Th) MDI31D09NW00083 22. Louvicourt, Silanco (Windover) (U. Th) 23. Northgate Exploration Limited (Zn) MDI31D16SW00166 24. Pitman (Zn) MDI31D16SW00180 25. Quebec (Th, U) 26. Rapski (Au, py, qv) 27. Ross-Jones (gemstones) 29. Vermiculite Canada (Regis Resources) (vrm), past-producer

DIAMOND-DRILL HOLE ABBREVIATIONS Only drill holes recorded in the Ontario Drill Hole Database (Ontario Geological Survey 2005) are numbered. Drill holes from other data sources or located by field party personnel are not numbered. Overburden drill holes are not indicated. CAV 1045839 Ontario Limited Copper Lake Explorations Limited

^a Mineral Deposit Inventory file numbers provided where applicable.

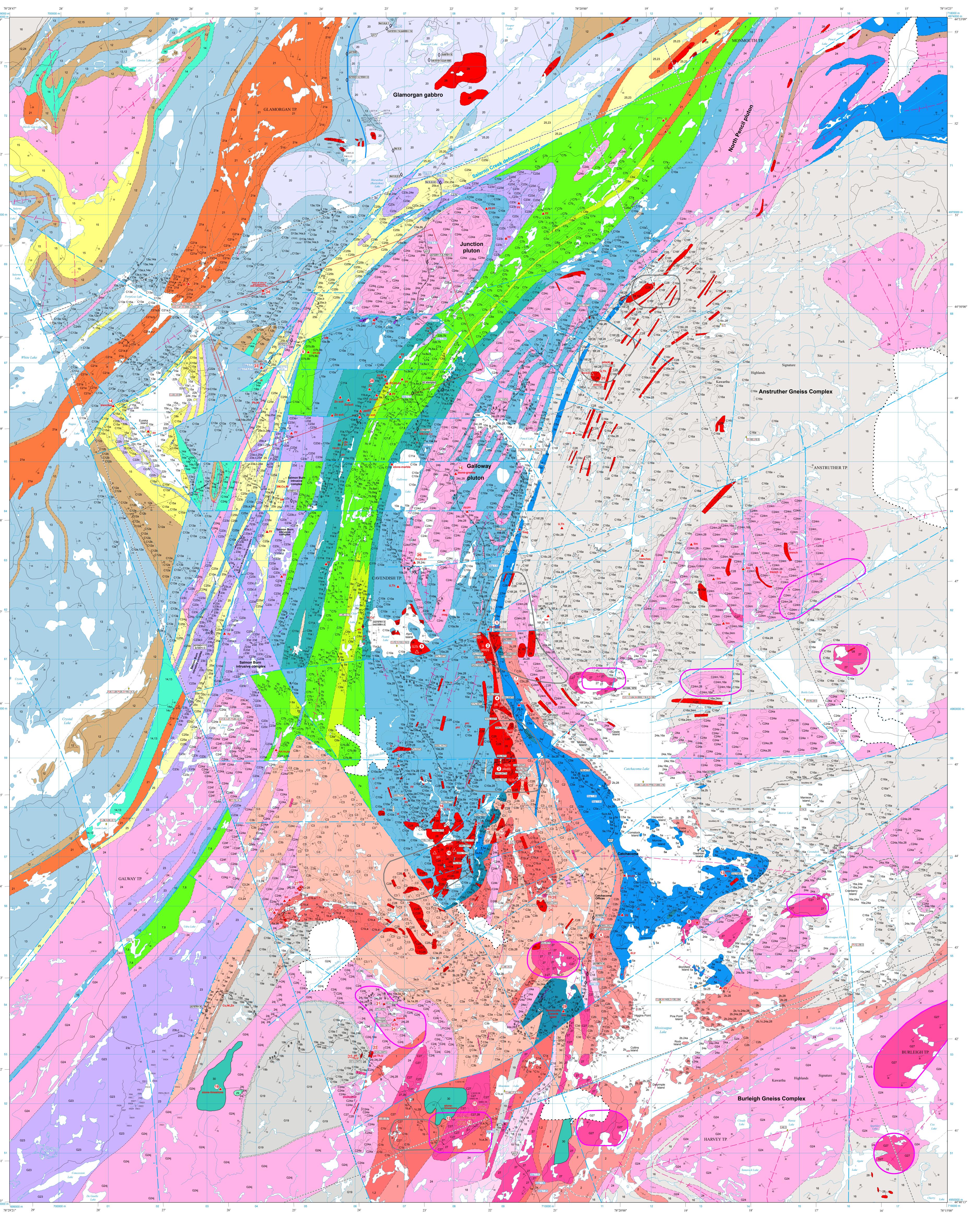
Teck Exploration Limited Edgewood Exploration Incorporated Fin Resources Incorporated Garland Mining and Development Company Limited Glen Exploration Limited

Higgins Uranium Mining Company Limited

Newkirk Mining Corporation

St. Joseph Exploration Limited

Nu-World Uranium Mines Limited



Ontario Geological Survey MAP P.3605

LEGEND abcd

PLEISTOCENE AND RECENT

moraines, and organic deposits

UNCONFORMITY

Simcoe Group, Gull River Formation

Basal Group, Shadow Lake Formation

Red and green calcareous mudstones, siltstones, sandstone, arkosic grit, minor limestone, dolostone

UNCONFORMITY

Potassic Pegmatitic Intrusive Rocks (1030–1060 Ma)

Felsic Intrusive Rocks (Catchacoma Intrusive Suite d,

Biotite monzogranite, fine to medium grained, high thorium

INTRUSIVE CONTACT

content as determined in the field by scintillometer

INTRUSIVE CONTACT

Amphibolite Facies Metamorphism between 1035 and 1070 Ma

INTRUSIVE CONTACT

Deformed Rocks: Straight Gneiss, Irregularly Layere

25a Hornblende-plagioclase and biotite-hornblende

23a, 23b, 23c, 23d, "straight-layered gneiss" 25b Intermediate composition straight gneiss

25c Hornblende-plagioclase and biotite-hornblende

23c, 23d and 24, "straight-layered gneiss"

TECTONIC CONTACT

25d Unit 25b, rusty weathering

Gneiss, Block Tectonites (Salerno Creek Deformation

plagioclase gneiss, fine grained, very thinly to thinly layered, derived from mylonitization of rocks of units

plagioclase gneiss, fine-grained, very thinly to thinly

interlayered with biotite-quartz-plagioclase gneiss

derived from mylonitization of rocks of units 23a, 23

25e Unit 25c, containing variably deformed pods of unit 23c

Felsic Intrusive Rocks (Methuen Suite)^d (1210–1245 Ma)

24c Biotite granodiorite to monzogranite, composition varies

24d Granodiorite gneiss, fine-grained, dike-like intrusions

24e Hornblende-biotite svenite to granodiorite, composition

24f Biotite granodiorite to monzogranite, foliated to

containing mafic country rock xenoliths

24j Biotite quartz syenite to monzogranite, foliated to

24k Intermediate to felsic gneiss, fine to medium grained,

24m Biotite granodiorite to monzogranite, composition

INTRUSIVE CONTACT

24h Unit 24g, sheared to mylonitic

gneissose, fine grained

across the outcrop, foliated to gneissose, fine to medium

varies across the outcrop, foliated to gneissose, fine to

gneissose, fine to medium grained, intrusion breccia

24g Biotite granodiorite to monzogranite, potassium feldspar

megacrystic, foliated to gneissose, medium grained

probably derived from granodiorite to monzogranitic

varies across the outcrop, gneissose, fine to medium

grained, metatextitic with up to 10% granitic and

Mafic Intrusive Rocks (Salmon Burn Intrusive Complex,

23a Biotite-hornblende-plagioclase gneiss, fine to medium

23c Hornblende-plagioclase gneiss, fine to medium grained,

derived from gabbro and melagabbro 23d Hornblende-plagioclase gneiss (amphibolite), fine to

23e Hornblende-plagioclase gneiss, medium to coarse

grained, derived from gabbro, leucogabbro and

22b Metagabbro, foliated, fine to medium grained, derived

medium grained, protolith indeterminate

INTRUSIVE CONTACT

22a Mafic dikes, fine to medium grained, foliated

Mafic Intrusive Rocks (1210-1245 Ma)

from gabbro and melagabbro

grained, derived from diorite and meladiorite

23b Unit 23a, exhibiting intrusion breccia or magma-

24a Biotite monzogranite, foliated to gneissose, fine to

24b Biotite granodiorite, foliated to gneissose, fine to

Mafic Intrusive Rocks (<1210 Ma)

26a Mafic dikes, fine to medium grained, foliated

Granite to syenite, pegmatitic, commonly graphic textured

locally contains concentrations of magnetite; generally pink

to brick-red coloured, but green and white varieties are also

BANCROFT TERRANE AND HARVEY-

CARDIFF DOMAIN

Late Tectonic to Posttectonic Intrusive Rocks

Sand, gravel, mainly glaciofluvial deposits; till, ground

blithographic to lithographic limestone, minor dolostone

PHANEROZOIC

CENOZOIC

PALEOZOIC

PRECAMBRIAN

MESOPROTEROZOIC

Syntectonic Intrusive Rocks

Zone) (<1210 Ma)

MIDDLE ORDOVICIAN

Chemical Sedimentary Rocks

9 Clastic Sedimentary Rocks

QUATERNARY

PRECAMBRIAN GEOLOGY CAVENDISH TOWNSHIP and ENVIRONS, GRENVILLE PROVINCE

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SYMBOLS

and/or parallel tectonic

Area of bedrock generation (inclined, outcrop Shoal ☐ Geological contact Foliation, unknown (interpreted) generation (inclined, Geological contact through water (interpreted) Vein (inclined) Geophysical anomaly aeromagnetic high only, interpreted) • Area of drift → with "Prospects, Pas Producers" list) ¬ pit, trench (number) Fault, dextral Fault, sinistral horizontal componer (interpreted, trend only) | and hole number; see Normal fault, abbreviations for ─ (ornamentation on) company name. Dat downthrown side) Geological Survey (2005) Thrust fault (interpreted, upper plate) scintillometer assay from outcrop, expressed as ppm U and ppm Th, generation, limbs dip in opposite direction, respectively; additional ─ interpreted) data are present in Easton (2010). Anticline, unknown generation, limbs dip in opposite direction, sediment sample wit interpreted content, in ppm. Data Approximate trace of are from Geological marble mylonites associated with the Survey of Canada Bancroft shear zone determination and value equivalent thorium high

stop (day and stop

─ number) from Eastor

and Carr (2009)

equivalent uranium high

Magnetic declination for center of the map area approximately

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22c Melagabbro, red-brown weathering, fine to medium Approximate boundary grained, locally olivine bearing of former University of Toronto-Geological INTRUSIVE CONTACT Survey of Canada Cavendish geophysical Pretectonic to Syntectonic Intrusive Rocks Alkalic Felsic Intrusive Rocks (Nepheline Syenite Suite^d, 21a Biotite syenite, foliated to gneissose, fine to medium grained, generally pink weathering 21b Biotite monzodiorite, foliated to gneissose, fine to medium grained, generally white weathering SOURCES OF INFORMATION 21c Biotite monzodiorite and syenite, foliated to gneissose, banded, white and pink weathering Base map information derived from Ontario Land Information Warehouse, 21d Biotite monzodiorite and syenite, foliated to gneissose, Land Information Ontario, Ontario Ministry of Natural Resources, nepheline-bearing INTRUSIVE CONTACT Map datum: North American Datum 83 (NAD83), Zone 17. 20 Alkalic Mafic Intrusive Rocks (Glamorgan Gabbro, Metric conversion factor: 1 foot = 0.3048 m [」] Nepheline Syenite Suite^d, ∼1245 Ma) Hornblende-plagioclase gneiss, medium to coarse grain Geology not tied to surveyed lines.

primary igneous texture, derived from gabbro and INTRUSIVE CONTACT 19 Felsic to Intermediate Intrusive Rocks, Elzevir Suite^d (1245–1275 Ma) 19a Tonalite to granodiorite gneiss, foliated to gneissose, fine to medium grained 19b Tonalite to granodiorite gneiss, metatextite, layered to veined (stromatic to phlebitic), less than 15% leucosome INTRUSIVE CONTACT 18 Felsic to Intermediate Intrusive Rocks^d (Quartz Monzodiorite Suite, 1245–1275 Ma) Quartz monzodiorite gneiss, medium to coarse grained commonly hematite stained, green-red weathering, friable INTRUSIVE CONTACT Mafic Intrusive Rock (1245 Ma)

commonly foliated to gneissose, but locally preservin

7a Amphibolite, fine grained, derived from mafic dikes 17b Amphibolite, fine to medium grained, plagioclase-phyric, derived from mafic dikes INTRUSIVE CONTACT Felsic to Intermediate Intrusive Rocks^d (Anstruther Gneiss Complex, ~1290 Ma) 16a Tonalite to granodiorite gneiss, metatextite, layered (stromatic), less than 15% leucosome 16c Unit 16a with boudinaged layers of fine- to medium-

grained migmatite (disrupted mafic dikes?) 16e Tonalite to granodiorite gneiss, fine grained, thin layered 16f Mafic to intermediate gneiss, thin to very thin layered INTRUSIVE AND/OR TECTONIC CONTACTS BANCROFT TERRANE (units 12 to 15) **GRENVILLE SUPERGROUP** Metasedimentary Rocks Siliceous Clastic Metasedimentary Rocks 15a Metasandstone, medium grained, commonly medium to thick layered, locally muscovite bearing, derived from quartz arenite and feldspathic litharenite 15s Unit 15a, sheared and deformed UNCONFORMITY OR TECTONIC CONTACT **Dolomitic Carbonate Metasedimentary Rocks** 4a Dolomite marble, commonly massive, layered, medium to coarse grained, commonly less than 10% silicate

14b Dolomite marble, siliceous, massive to thin layered, medium to coarse grained, commonly 10 to 50% silica 14c Calc-silicate 13 Calcitic Carbonate Metasedimentary Rocks 13a Calcite marble, massive to foliated, medium to coarse grained, 5 to 15% silicate impurities 13s Unit 13a, with grey to black, fine-grained marble Siliceous Clastic Metasedimentary Rocks 12a Intermediate to felsic gneiss to schist, fine to medium grained, commonly thin to medium layered, commonly biotite bearing, commonly rusty weathering, derived from metasedimentary rocks (siltstone, wacke) 12b Unit 12a with calcareous or calcite marble layers

HARVEY-CARDIFF DOMAIN, NORTHERN SUBDOMAIN (units 7 to 11) **GRENVILLE SUPERGROUP** Metasedimentary Rocks **Dolomitic Carbonate Metasedimentary Rocks** olomite marble, commonly massive, layered, medium to coarse grained, commonly less than 10% silicate 11b Dolomite marble, siliceous, massive to thin layered, medium to coarse grained, commonly 10 to 50% silica 11c Unit 11b, containing relict algal mats (stromatolites) 11d Unit 11a, fine to medium grained, sulphurous odor when

TECTONIC CONTACT

11e Calc-silicate 10 Calcitic Carbonate Metasedimentary Rocks 10a Calcite marble, commonly thin to medium layered, medium to coarse grained, 5 to 15% silicate impurities 10b Calc-silicate Siliceous Clastic Metasedimentary Rocks grained, commonly thin to medium layered, commonly biotite bearing, possibly derived from metasedimentary 9b Unit 9a, commonly schistose and rusty weathering DISCONFORMITY AND/OR INTERFINGERING CONTACTS Metavolcanic and Volcaniclastic Metasedimentary Rocks

> Intermediate to Felsic Metavolcanic and Volcaniclastic Metasedimentary Rocks 8a Intermediate to felsic gneiss, fine to medium grained, commonly thin to medium layered, possibly derived from tuffs or volcaniclastic rocks 8b Intermediate to felsic gneiss, fine to medium graine bearing, possibly derived from metasedimentary rocks Mafic to Intermediate Metavolcanic and Volcaniclastic Metasedimentary Rocks 7a Mafic gneiss, fine to medium grained, commonly thin to medium layered, possibly derived from mafic tuffs or volcaniclastic rocks 7b Mafic gneiss, fine to medium grained, commonly thin to

medium layered, undetermined protolith 7c Mafic and intermediate gneiss, fine to medium grained, commonly thin to medium layered, commonly with layer parallel thin quartz stringers, possibly derived from mafic tuffs or volcaniclastic rocks TECTONIC CONTACT HARVEY-CARDIFF DOMAIN, SOUTHERN SUBDOMAIN (units 1 to 6) GRENVILLE SUPERGROUP

Metasedimentary Rocks Dolomitic Carbonate Metasedimentary Rocks Sa Dolomite marble, commonly massive, lavered, medium to coarse grained, commonly less than 10% silicate 6b Marble breccia, matrix of dolomite marble, massive to foliated, medium to coarse grained, variety of silicate 6c Tremolite-actinolite-calcite rock, thin to medium layered, commonly pale pink to pale green weathering 6d Dolomite marble, siliceous, massive to thin layered medium to coarse grained, commonly 10 to 50% silica alcitic Carbonate Metasedimentary Rocks a Calcite marble, massive to foliated, medium to coarse grained, 5 to 15% silicate impurities 5b Marble breccia, matrix of calcite marble, massive to foliated, medium to coarse grained, variety of silicate rock fragments

Gneisses Derived from Siliceous Clastic Metasedimentary Rocks 4a Intermediate to felsic gneiss, fine to medium grained, commonly thin to medium layered, commonly biotite pearing, possibly derived from metasedimentary rocks 4b Intermediate to felsic gneiss, fine to medium grained, commonly thin to medium layered, commonly biotite bearing, possibly derived from metasedimentary rocks (siltstone, wacke), commonly interlayered with units 5 4c Unit 4b, rusty weathering UNKNOWN CONTACT

Gneissic Rocks Intermediate to Felsic Orthogneiss 3a Intermediate gneiss, layered, fine to medium grained, possibly derived from meladioritic, dioritic and granodioritic rocks of either volcanic or plutonic protolith 3b Unit 3a, with epidotized clots or boudinaged fragments, imparting a pseudofragmental appearance to the rock 3c Intermediate orthogneiss, fine to medium grained, derived from dioritic to granodioritic protolith 3d Felsic orthogneiss, thin to very thin layered, fine to medium grained, derived from rhyolitic or granitic protolith 3e Quartzofeldspathic gneiss, brown weathering, weathered, thin layered, medium grained, possibly relict granulite Intermediate to Felsic, Highly Strained Gneiss

2a Intermediate gneiss, thin to very thin layered, fine to medium grained, minor layers of mafic and felsic gneiss, minor calc-silicate gneiss, protolith unknown 2b Intermediate gneiss, thin to very thin layered, fine to medium grained, grey weathering, metatexitic, less than 10% leucosome, protolith unknown 2c Intermediate gneiss, thin to very thin layered, fine to medium grained, hornblende-biotite, locally streaky textured, grey weathering, protolith unknown Mafic to Intermediate, Highly Strained Gneiss 1a Mafic gneiss, thin to very thin layered, fine to medium grained, minor layers of intermediate and felsic gneiss, minor calc-silicate gneiss, protolith unknown 1b Mafic gneiss, thin to very thin layered, fine to medium grained, minor layers of intermediate and felsic gneiss, minor calc-silicate gneiss, derived from gabbro, leucogabbro and anorthosite 1c Mafic gneiss, fine to medium grained, protolith unknown

^a This legend is a field legend that incorporates the results of laboratory investigations, including petrography and geochemistry. All Precambrian rocks have been subjected to regional metamorphism; many nonmetamorphic terms are used for the sake of brevity and where the protolith is established. ^b The Precambrian legend is a lithotectonic one, and stratigraphic order is only in part implied by numerical order. ^c The letter "C" preceding a code refers to data interpreted from geological maps listed under "Sources of Information". The letter "D" preceding a code refers to data compiled from The letter "G" preceding a code refers to data interpreted from geophysical maps listed under "Sources of Information". Note that the location and shape of compiled outcrops may be less precise than for outcrops mapped by the author.

^d Igneous rock suites and their age ranges are adapted from Easton

and Pehrsson, Hanmer and van Breemen (1996).

(1992), based on additional geochronological data found in Easton

and Kamo (2011, in press), Burr and Carr (1994), Mezger et al. (1993),

Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.