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GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA

QUETICO SUBPROVINCE

WAWA SUBPROVINCE

JIM LAKE SYNFORM

BLACKMAN LAKE ANTIFORM

RABBITSKIN LAKE FAULT

MANITOUWADGE SYNFORM

BANANA LAKE ANTIFORM

EVEREST LAKE PLUTON

BLACK PIC BATHOLITH

NAMA CREEK PLUTON

LOKEN LAKE PLUTON

BANANA PLUTON

CADAWAMA FAULT

NAMA CREEK SHEAR ZONE

AGAM LAKE SYNCLINE

AGAM LAKE FAULT

MOSE LAKE FAULT

FOX CREEK FAULT

TABLE 2: MINERAL OCCURRENCES (> 0.05% Cu or Zn)

No.	NAME	MINERALIZATION OVER DRILL-CORE LENGTH	LOCATION	REFERENCE
18	Gavan Mines Ltd.	Minor chalcopyrite and sphalerite in sulphidic iron-formation and garnet-amphibolite rocks	85°42'42"W 49°10'08"N	Pye, 1957
19	Falconbridge zone (Herbert Township Zn-Cu-Ag)	0.62% Cu, 0.73% Zn, 51 g/t Ag over 2 m; 0.27% Cu, 0.96% Zn, 1.69% Pb over 2 m	85°04'09"W 49°11'42"N	McKay, 1984
20	One Otter Lake (East)	0.07% Zn over 1.5 m, 0.83% Zn in surface samples	85°31'55"W 49°13'19"N	Wolfson, 1991; Lockwood, 1994; McKay, 1994
21	Jim Lake (East Lake) Lens	0.58% Zn over 1.1 m, 0.5% Cu and 1.2% Zn in surface samples	85°13'30"W 49°14'33"N	Mackasey, 1985
22	Straight Lake	0.27% Cu over 0.26 m, 2.03% Zn over 0.5 m	85°09'30"W 49°12'47"N	Noranda Mines Ltd. (Geco Division), 1985; Noranda Incorporated (Geco Division), 1988
23	Husak Road #1	0.17% Cu	85°44'35"W 49°18'30"N	Schneiders and Smyk, 1990; McKay, 1994
24	Husak Road #2	0.33% Cu, 0.06% Zn	85°44'35"W 49°18'03"N	McKay, 1994
25	Husak Road #3	0.15% Cu	85°44'53"W 49°18'34"N	Schneiders and Smyk, 1990; McKay, 1994
26	Otter Lake	0.16% Cu	85°46'18"W 49°18'03"N	
27	Little Nama Lake	0.10% Cu, 0.08% Zn	85°50'20"W 49°17'56"N	McKay, 1994
28	Swill Lake West	0.05% Cu, 0.11% Zn	85°57'40"W 49°07'55"N	
29	Swill Lake East	0.08% Zn	85°56'53"W 49°06'12"N	
30	Swill Lake South-1	0.10 – 0.15% Zn over 1.4 m, 0.13% Cu, 0.90% Zn in surface samples	85°56'31"W 49°07'39"N	
31	Swill Lake South-2	0.08% Zn over 0.5 m, up to 0.51% Zn in surface samples	85°56'02"W 49°07'55"N	Kissel, 1991
32	Swill Lake South-3	0.17 – 0.74% Zn over 0.5 m, 0.19 – 0.59% Zn over 4 m	85°55'19"W 49°07'32"N	

The map locations are based on surface samples and the approximate up-dip projections on mineralized intervals in drill cores. In some cases, the centre or the two ends of the mineralized zone are shown. The names, Swill Lake South-1 to Swill Lake South-3, are used for previously unnamed mineralized zones. Many additional references to assessment work are given by McKay (1994). For orebodies at the Geco (51 – 53), Willroy (161 – 166), Nama Creek (NC), and Willecho (E1 – E3) mines, and subeconomic occurrences 1 – 17, see Table 1 on Figure 1.

SYMBOLS

- Geological boundary (defined, approximate, assumed)
- D_1 ductile Garnet Lake fault (interpreted)
- Other ductile to brittle faults (defined, interpreted)
- Isograd, orthopyroxene-in
- Isograd, K-feldspar-sillimanite-in
- Outcrop area mapped
- Isolated outcrop mapped
- Massive sulphide orebody — G1
- Mineral occurrence (surface, projected)
- Pillows (top known, top unknown)
- U-Pb zircon age (Ma) — 2677 ± 2

PLANAR STRUCTURES/FABRICS

- Compositional layering (including transposed bedding and transposed sheets or layering in plutonic rocks and in metasomatically altered rocks (inclined)) — S_0
- Lamination in straight gneiss, annealed mylonitic layering (S_1) (inclined) — S_1
- Dominant layer-parallel mineral foliation (S_2), migmatitic layering in Quetico Subprovince (inclined, vertical) — S_2
- Crenulation cleavage and mineral foliation (S_3) (inclined) — S_3
- Oblique biotite and/or hornblende foliation (post-D_2, pre-D_3) (inclined, vertical) — S_{2-3}
- Crenulation cleavage (S_4) (inclined) — S_4
- Shear surface (uncertain sense of movement; oblique dextral; oblique sinistral) (inclined, vertical) — S_{ss}, S_{ds}, S_{ss}

LINEAR STRUCTURES/FABRICS

- Mineral/stretching lineation (L_2) — L_2
- L_2-S lineation, pronounced nodding (L_2) — L_2
- Crenulation axis (F_3) — F_3
- Crenulation axis (F_4) — F_4

MACROSCOPIC FOLDS

- Axial surface trace, F_2 anticline (upright; overturned) — F_2
- Axial surface trace, F_2 syncline (upright; overturned) — F_2
- Axial surface trace, F_2 antiform (upright) — F_2
- Axial surface trace, F_2 antiform (upright; overturned) — F_2
- Axial surface trace, F_2 synform (upright; overturned) — F_2
- Axial surface trace, F_3 fold — F_3
- Trend and plunge of axis of upright fold — 45
- Trend and plunge of axis of overturned fold — 25

MESOSCOPIC FOLDS

- F_2 axial plane, (S_2) (inclined, vertical) — F_2
- F_2 axis (S-asymmetry, Z-asymmetry, symmetrical, symmetry unknown) — F_2
- F_2 axial plane, (including transposed F_1 in Swill Lake area) (inclined) — F_2
- F_3 axis (S-asymmetry, Z-asymmetry, symmetrical, symmetry unknown) — F_3
- F_4 kink axial plane (dextral-inclined; vertical; sinistral-inclined, vertical) — F_4
- F_4 kink axis — F_4

LEGEND

PROTEROZOIC

- Pd / Pd — Diabase dykes

ARCHEAN

WAWA AND QUETICO SUBPROVINCES

- Ab — Alkalic intrusions: Syenite to alkali gabbro and hornblendite in dykes, irregular minor intrusions and as matrix of intrusion breccia, local hybrid mixtures of feldspathic and melanocratic phases, massive to foliated, typically characterized by K-feldspar with phenocrysts of hornblende, biotite ± clinopyroxene
- Ao — Pegmatite, aplite, foliated granite: Dykes, sheets, and irregular intrusions, homogeneous or with textural variation defining zoning in diffuse patches, massive to foliated, locally transitional to porphyroclastic pegmatite and straight gneiss, locally with sillimanite on sheared surfaces
- Black Pic batholith and related rocks: Biotite, granite, monzodiorite, layered amphibolite-tonalite gneiss
- As — Undivided, dominantly hornblende-biotite multiphase intrusions, collectively belonging to the Black Pic batholith, in some cases with mafic enclaves or layers and inclusions of supracrustal rocks, locally abundant magnetite porphyroblasts
- Asb — Banana pluton — Foliated ca. 2677 Ma hornblende-biotite monzodiorite, coarse-grained, homogeneous
- Ase — Everest Lake pluton — Foliated ca. 2679 Ma hornblende-clinopyroxene-biotite monzodiorite to diorite, layering defined by variable proportions of mafic minerals from about 10–50%, interleaved with biotite-rich pangneiss of the Quetico Subprovince, commonly migmatitic and net-veined by diffuse segregations
- Ast — Tonalite — Foliated plagioclase-porphyritic biotite±hornblende tonalite mainly as concordant dykes and sheeted intrusions in supracrustal rocks
- Asd — Tonalite — Foliated hornblende-biotite tonalite to diorite in supracrustal rocks
- Abm — Black Pic monzodiorite — Foliated ca. 2669 Ma hornblende-biotite monzodiorite forming the oldest phase of the Black Pic batholith, coarse-grained plagioclase commonly imparts weakly porphyritic or augen gneissic texture, mafic enclaves (isograd? inclusions) and local supracrustal inclusions (mafic sheets or septa, iron-formation)
- Ank — Foliated microcline-megacrystic porphyry: Nama Creek pluton — ca. 2680 Ma hornblende-biotite granodiorite to monzodiorite with microcline phenocrysts or augen (1–5 cm in length)
- ALk — Loken Lake pluton — ca. 2667 Ma granodiorite with microcline megacrysts or augen (to 15 cm), minor biotite±hornblende, local irregular or folded biotite-pyroxenite mafic enclaves, typically strong L>S tectonic fabric

- Awg — Tectonic straight gneiss: Laminated quartzofeldspathic gneiss interpreted as annealed mylonite, fine-grained to aphanitic, continuous to streaky quartz and feldspar lamellae, locally mimesence or hornblende-rich, protolith mostly felsic volcanic rocks and pegmatite, relative age with respect to units Awb, Awq and Awg unknown
- Awb — Metagreywacke: Monotonous metagreywacke and biotite±hornblende and biotite-garnet ±sillimanite schist, transposed bedding, local quartz and plagioclase crystal clasts and conglomeratic beds
- Awq — Quartzofeldspathic or quartz-rich schist
- Awg — Migmatitic metagreywacke, monotonous biotite±hornblende schist with local biotite-hornblende±clinopyroxene in more pelitic layers, abundant tonalitic migmatitic bodily containing garnet and cordierite, compositional layering defines modified bedding
- Aog — Orthorhombite-garnetcordierite gneiss (metamorphosed synvolcanic Fe-Mg alkali-depleted metasomatic alteration zones): Orthorhombite-garnetcordierite±sillimanite±gedrite±anthophyllite and orthopyroxene-hornblende-garnet±cordierite±sillimanite±gedrite layers (0.3 m to several metres thick) interbedded with sillimanite-garnet-biotite±cordierite schist, also contains magnetite, biotite, staurolite (rhentied by cordierite or orthoamphibole) and minor sulphide minerals, metre-scale layering is defined by variations in mineral assemblages, proportions, textures, and grain sizes, with second-order layering (cm to metre) as lamellae or lenticules overgrown by orthoamphibole-garnet-cordierite
- Aa — Sillimanite-muscovite-quartz schist (metamorphosed synvolcanic aluminous, potassic, and siliceous metasomatic alteration zones): Includes quartz-muscovite±sillimanite/gamet±biotite schist, sillimanite-knot felsic schist, and quartzose schist
- At — Foliated trondhjemite and associated rocks: Synvolcanic trondhjemite — ca. 2720 Ma coarse-grained quartz-rich trondhjemite with magnetite porphyroblasts and minor biotite, varies to tonalite-trondhjemite approaching the Dead Lake suite (unit Ado), locally garnetiferous or with garnet-orthoamphibole seams near orthoamphibole-bearing rocks (unit Aog)
- Ado — Dead Lake suite — Interleaved foliated metagabbro, metadiorite, and layered mafic to intermediate rocks, includes a distinctive group of strongly magnetic rocks containing 10–30% orthoamphibole±cummingtonite±garnet±cordierite±anthophyllite and minor to 50% quartz in eyes and irregular lenticules, locally transitional to trondhjemite or hornblende tonalite
- Al — Metamorphosed iron-formation: Includes quartz-magnetite-silicate banded iron-formation, magnetite-silicate iron-formation, and sulphidic iron-formation with disseminated or stockwork pyrite-pyrrhotite in quartz-magnetite-silicate host rock

- Awb — Quartz-porphyritic felsic metavolcanic rocks
- Afq — Coarsely quartz-porphyritic felsic metavolcanic rocks — Abundant quartz phenocrysts (up to 20%, 1–3 mm in diameter) in fine-grained leucocratic matrix, homogeneous to fragmental, monolithic and heterolithic volcanic breccia, minor biotite and muscovite, patchy microcline, minor to locally abundant ratio-altitude minerals
- Afq — Finely quartz-porphyritic felsic metavolcanic rocks — Variable and sparsely distributed quartz phenocrysts or quartz eyes typically less than 1 mm in diameter, minor biotite and muscovite, patchy microcline, minor to locally abundant ratio-altitude minerals
- Af — Aphyric felsic metavolcanic rocks: Monolithic and heterolithic volcanic breccia, typically with abundant garnet-hornblende in matrix
- Afi — Felsic to intermediate metavolcanic rocks: Undivided heterogeneous breccia, schist, and straight gneiss, minor to abundant ratio-altitude minerals (Ca-amphibole, epidote, garnet) or minor local sillimanite-muscovite
- Amf — Mixed mafic and felsic metavolcanic rocks: Interlayered mafic and felsic (including quartz-porphyritic) schist, epidote locally abundant, commonly transitional to garnet-orthoamphibole gneiss (unit Aog)
- Ami — Intermediate to mafic metavolcanic rocks: Undivided, commonly heterogeneous hornblende-biotite schist, gneiss, layered rocks, and foliated diorite, garnet-hornblende±clinopyroxene patches
- Am — Mafic metavolcanic rocks: Undivided mafic metavolcanic rocks
- Amv — Fine-grained mafic schist — Dark laminated to schistose hornblende-plagioclase amphibolite, local minor to abundant cummingtonite/gamet, locally pillowed
- Amg — Metagabbro and medium- to coarse-grained amphibolite — Foliated gabbroic to leucogabbroic rocks, commonly hornblende-augen schist, possibly subvolcanic sills or massive flows

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Magnetic declination 2001, 9°36'W, increasing 3.0' annually

Elevations in metres above mean sea level (10 m interval)

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LOCATION MAP

Geology by E. Zaleski, Continental Geoscience Division, and V.L. Peterson, Western Carolina University, Cullowhee, North Carolina, USA

Digital cartography by P. Corrigan, Earth Sciences Sector Information Division (ESS Info)

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map data at the scale of 1:20 000 from the Ontario Digital Topographic Database, Ministry of Natural Resources, with modifications by ESS Info

MAP 1917A

GEOLOGY

MANITOUWADGE GREENSTONE BELT AND THE WAWA–QUETICO SUBPROVINCE BOUNDARY

ONTARIO

Scale 1:25 000/Échelle 1/25 000

metres 500 0 500 1000 1500 2000 metres

Universal Transverse Mercator Projection, North American Datum 1927
* Her Majesty the Queen in Right of Canada, 2001

Projection transverse universelle de Mercator, Système de référence géodésique nord-américain, 1927
* Sa Majesté la Reine du chef du Canada, 2001

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE

42 E/8 | 42 F/5 | 42 F/6
42 E/1 | 42 F/4 Map 1917A | 42 F/3
42 E/16 | 42 C/13 | 42 C/14

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Figures, tables and descriptive notes accompany this map.

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Zaleski, E. and Peterson, V.L.
2001: Geology of the Manitouwadge greenstone belt and the Wawa–Quetico subprovince boundary, Ontario; Geological Survey of Canada, Map 1917A, scale 1:25 000.

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