



**Saskatchewan  
Ministry of  
Energy and  
Resources**

**Bedrock Geology of the Eastern  
Nemebien Lake Area  
(Parts of NTS 73P03, 06, and 07)  
at 1:20 000 scale**

Preliminary Geological Map (2010)  
by R.O. Maxeiner and K. MacLachlan

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The area was mapped by Ralf Maxeiner and Kate MacLachlan, in the summer of 2010, with the assistance of Anna Torngumud, Kyle Boazek, and Cameron MacKay.

This map was printed from the geologist's digital file. Geological data were processed using Microsoft Access, and ArcView 9.3 software. Base maps were compiled from CanVec 1:50 000 scale digital cartographic maps produced by Natural Resources Canada. Grid coordinates are NAD83 CGS85 UTM zone 13. The map was processed overall using ArcView 9.3 software.

The map is issued in a package with the Summary of Investigations 2010 Volume 2, Saskatchewan Geological Survey, and is available separately from <http://www.srs.gov.ca/geos-reports>.

This map accompanies the following publication:  
Maxeiner, R.O. and MacLachlan, K. (2010). Preliminary bedrock geology of the eastern Nemebien Lake area in the vicinity of the Elizabeth Lake Cu deposit and the Dunlop Cu-Ni deposit, western Clarence Domain (Parts of NTS 73P03, 06, and 07), in Summary of Investigations 2010 Volume 2, Saskatchewan Geological Survey, Sask. Ministry of Energy and Resources, Misc. Rep. 2010-4-2.

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Maxeiner, R.O. and MacLachlan, K. (2010). Geology of the eastern Nemebien Lake area (Parts of NTS 73P03, 06, and 07), 1:20 000 scale geol. map, with Summary of Investigations 2010, Volume 2, Saskatchewan Geological Survey, Sask. Ministry of Energy and Resources, Misc. Rep. 2010-4-2.

**Location Map**

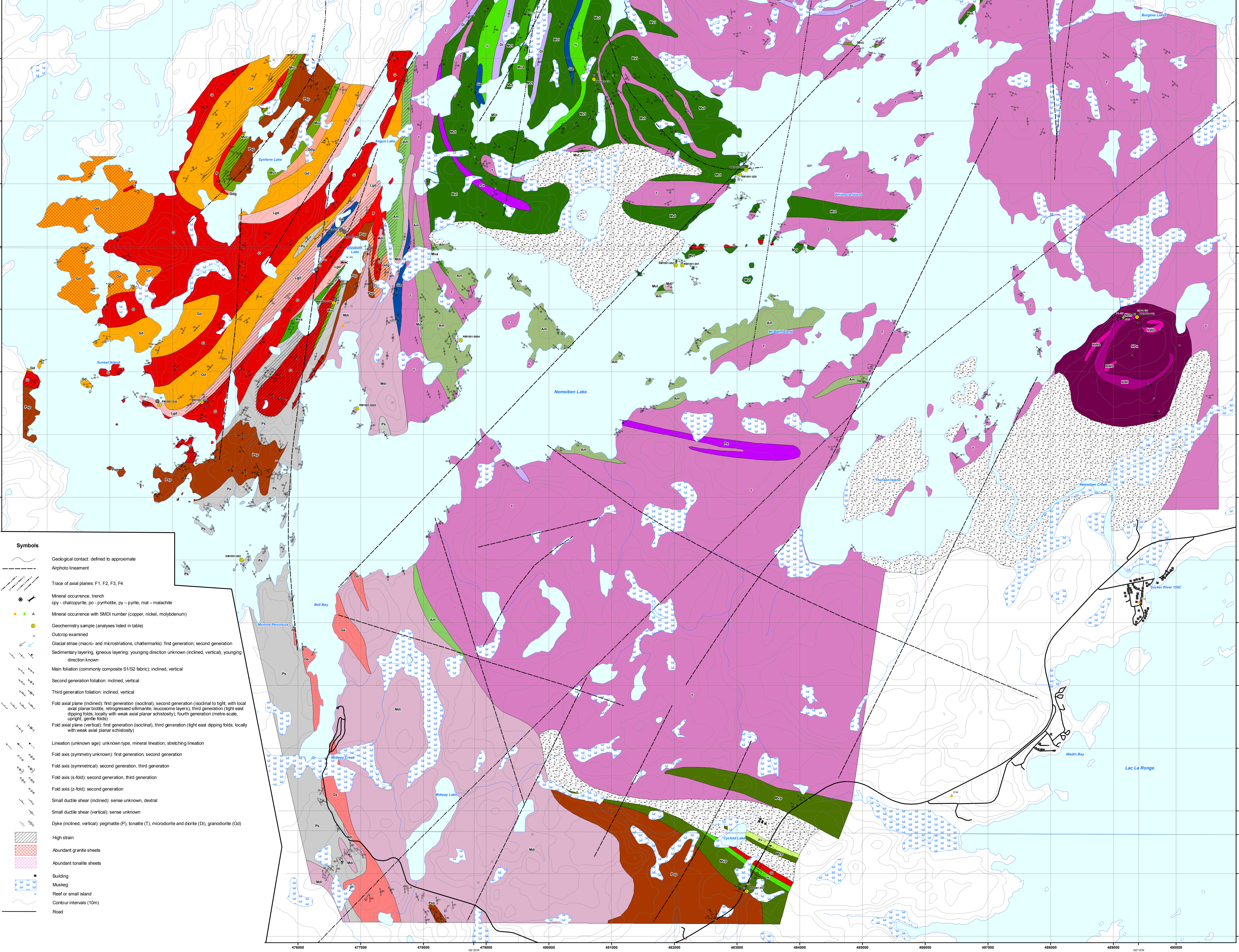
**Scale 1:20 000**

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**Table of Geochemical Analyses**

Sample	Number	Analysis Type	Fe	Al	Au	Ag	As	Ca	Co	Cr	Cu	Di	Fe	Mn	Ni	P	Pb	Se	Sr	Ta	Tb	Ti	Tl	U	V	Zn	Zr
NR01-002	NR01-002	NR01-002	1.00	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Analyses performed by Activation Laboratories, Ancaster, ONT



**Legend**

**Syn- to Post-tectonic Intrusive Rocks**

- Granite pegmatite, granite:** coarse grained to pegmatitic; homogeneous; massive to weakly foliated; biotite ± garnet; Cl=5; very low MS: 0-1.
- Syenogranite, leucogranite:** light pink to pink; fine to medium grained; locally gradational into pegmatite; homogeneous; generally massive to weakly foliated; post-dates unit M2; quartz, K-feldspar, plagioclase, biotite (5%); Cl=5; very low MS: 0.05-0.1.
- Monzodiorite (monzonite, quartz monzonite):** light grey, salt and pepper; medium to coarse grained; equigranular; homogeneous; massive to weakly foliated; commonly with abundant xenoliths of units P2 and P3; locally with dioritic to gabbroic xenoliths; cut by unit G4 and by intermediate and mafic dykes; post-dates F2; plagioclase (sub- to euhedral), hornblende (10-20%), K-feldspar (10-15%), biotite (5-10%); quartz (0-10%); Cl=15-25; low MS: 0.15-0.35.
- Nemebien Lake Ultramafic intrusion (units within intrusion were compiled from MacFarlane and Mossman (1982))**
- Nemebien Lake Pyroxenite:** pale green, dusky green to brown; medium to coarse grained; diopside (60-90%) with exsolved orthopyroxene, tremolite (5-20%), olivine (0-10%), serpentine, magnetite, pyrite, pyrrhotite, chalcopyrite; Cl=95-100; very high MS: 3-30.
- Dunite**
- Websterite**
- Wheilitite**

**Intrusive Rocks Predating Main Deformation Event**

- Leucocratic orthogneiss:** white, light grey to rusty brown; fine to medium grained; homogeneous; sheared and altered partly silicified sericitized granodiorite; strongly foliated to mylonitic; quartz, plagioclase, K-feldspar, biotite (0-5%), muscovite (0-5%); a magnetite ± garnet ± pyrite; Cl=4-5; variable MS: 0.05-0.50.
- Granite (to granodiorite):** light pink to pinkish grey; medium to coarse grained; generally homogeneous with local granitic pegmatite; massive to moderately foliated, becoming progressively mylonitic towards the southeast; post-dates units P2 and P3; quartz (20-30%), K-feldspar (20%), plagioclase (25%), biotite (5-10%); a magnetite; Cl=5-10; variable MS: 0.05-17.
- Biotite granodiorite:** light pinkish grey to grey; variable from medium grained, well foliated and locally gneissic to coarse grained, homogeneous and massive; locally cut by granitic pegmatite sheets and dykes; plagioclase, quartz, K-feldspar, biotite (5-15%), magnetite (0-2%); a hornblende; Cl=5-15; variable MS: 0.2-50.
- Garnetiferous granodiorite gneiss:** grey to pinkish grey; medium to coarse grained; homogeneous; gneissic; moderately to strongly foliated; locally mylonitic; plagioclase, quartz (25-30%), biotite (5-10%), garnet (0-10%), magnetite (1-3%); Cl=1-20.
- Biotite tonalite (granodiorite):** white, light grey to light pinkish grey; medium to coarse grained; homogeneous; massive to moderately foliated; locally gneissic; cut by late granitic pegmatite dykes; contains xenoliths of units M2 and M3; plagioclase, quartz (25-30%), biotite (5-10%); a hornblende; Cl=5-10; very low MS: 0.05-0.5; erratic high values; <math>K\_2O</math> potassium based on spectrometer.
- Diorite, microdiorite:** salt and pepper; fine to medium grained; homogeneous; equigranular; moderately to strongly foliated; local amphibolite inclusions and transposed tonalitic sheets; plagioclase (50-70%), hornblende (15-20%), biotite (5-10%), quartz (0-5%) ± titanite ± garnet; Cl=25-35; low MS: 0.4-0.6.
- Gabbro:** mottled black and white; greenish black; generally medium to coarse grained; moderately to strongly foliated; heterogeneous with abundant cross-cutting tonalitic sheets; plagioclase, hornblende (35-60%) ± clinopyroxene; Cl=25-70; generally low to moderate MS: 0.4-0.7; erratic high values.
- Pyroxenite, melagabbro:** black to pale green; medium to coarse grained; cut by tonalitic sheets (unit T) and granitic pegmatite (unit P); Cl=75-95; generally low to moderate MS: 0.4-0.7; erratic high values.

**Supracrustal Rocks**

- Feldspathic psammite (psammopelite, feldspathic quartzite):** grey to brownish grey; fine grained; equigranular; layered on cm- to dm-scale; interbedded with migmatitic psammopelite (unit P2); well foliated and locally gneissic; contains up to 20% diagenetically bound quartz veins; quartz (25-50%), plagioclase (20-30%), K-feldspar (10-30%), biotite (5-10%), muscovite (1-10%); a graphite ± garnet; Cl=5-10; low MS: 0.2-0.3; relatively high potassium content based on spectrometer.
- Migmatitic feldspathic psammopelite (psammopelite):** grey to brownish grey; fine to medium grained; well foliated; locally gneissic; compositionally layered on cm- to dm-scale; psammopelite layers predominating over minor psammite layers; generally magmatic with 10-20% transposed granitic leucosome; late cross-cutting granitic pegmatite dykes; quartz, plagioclase, K-feldspar, biotite (10-15%), muscovite (0-10%); a graphite ± sillimanite; Cl=10-25; generally low MS: 0.15-0.4; high potassium based on spectrometer.
- Felsic volcanic rock:** grey; fine to medium grained; layered; strongly foliated to mylonitic; interlayered succession (m-scale) of felsic to intermediate volcaniclastic rocks; cut by rhyolitic sills and mafic and aplite dykes; contains local cm-thick biotite-rich veins with bleached feldspathic margins; plagioclase, quartz, K-feldspar, biotite (5-10%), quartz (0-5%); Cl=10; low MS: 0.3.
- Intermediate volcanic and volcaniclastic rock:** light grey, salt and pepper; fine grained; equigranular; mostly non-descript, in part compositionally layered on cm- to dm-scale; weakly foliated to sheared; locally lineated; in part interlayered with mafic rocks; locally intruded by granitic dykes; plagioclase (50-70%), hornblende (15-35%), epidote (0-15%); Cl=15-35; low to moderate MS: 0.4-0.8.
- Trachytic-textured porphyritic mafic volcanic rock:** dark grey to greenish black; fine to medium grained; weakly foliated to sheared; characterized by mm- to cm-long, randomly to flow-oriented plagioclase phenocrysts; with calc-silicate layers and locally abundant garnet porphyroblasts with variably developed plagioclase decompression halos; intruded by locally abundant tonalitic sheets (unit T) and later granitic pegmatite (unit P); derived from volcanic flows and subvolcanic intrusions; hornblende (40-60%), plagioclase (20-40%), epidote (5-20%), quartz (5%), garnet (0-1%) ± a pyroxene ± titanite ± sillimanite ± clinopyroxene; Cl=40-60; moderate MS: 0.5-0.7.
- Altered mafic volcanic rock:** dm- to outcrop-scale zones of quartz-garnet amphibole (hornblende) alteration zones invading mafic volcanic rocks; quartz (20-40%), hornblende (5-15%), garnet (5-15%), biotite (2-15%), magnetite (0-2%), pyrite (0-2%), chlorite (2-5%); high MS: 4-15.
- Layered calc-silicate rock:** possibly representing highly strained quartz-epidote altered mafic volcanic rocks; transposed layering on dm-scale; with abundant diopside (40%), epidote or clinzoisite (30%), carbonate.
- Pillowed mafic volcanic flow:** locally cut by 20-50 cm thick tonalitic sheets.
- Amphibolite:** dark green to greenish grey; fine to medium grained; homogeneous to layered on dm-scale; massive to strongly foliated; 20-50% transposed tonalitic layers; cut by granitic pegmatite dykes that are locally foliated; derived from both mafic volcanic and gabbroic protoliths; hornblende (50-60%), plagioclase (20-40%), clinopyroxene (0-15%); a titanite ± epidote ± garnet; Cl=50-60; moderate MS: 0.5-0.7.

**Colour Index**

**Magnetic Susceptibility in 10<sup>-3</sup> SI units**

MacFarlane, N.D. and Mossman, D.J. (1982). Geology of the Nemebien Lake ultramafic complex, north-central Saskatchewan. CIM Bull., v.75, no.837, p.83-91.

**Symbols**

- Geological contact: defined to approximate
- Airphoto lineament
- Trace of axial planes: F1, F2, F3, F4
- Mineral occurrence, trench: cpy - chalcopyrite, po - pyrrhotite, py - pyrite, mal - malachite
- Mineral occurrence with SMDI number (copper, nickel, molybdenum)
- Geochemistry sample (analyses listed in table)
- Outcrop examined
- Glacial striae (macro- and microstriations, chattermarks): first generation; second generation
- Sedimentary layering, igneous layering: younging direction unknown (inclined, vertical), younging direction known
- Main foliation (commonly composite S1/S2 fabric): inclined, vertical
- Second generation foliation: inclined, vertical
- Third generation foliation: inclined, vertical
- Fold axial plane (inclined): first generation (isoclinal), second generation (occlinal to light; with local axial planar biotite, retrogressed sillimanite, leucosome layers), third generation (tight east dipping folds; locally with weak axial planar schistosity), fourth generation (metre-scale, upright), gentle (0-60°)
- Fold axial plane (vertical): first generation (isoclinal), third generation (tight east dipping folds; locally with weak axial planar schistosity)
- Lineation (unknown age): unknown type, mineral lineation, stretching lineation
- Fold axis (symmetry unknown): first generation, second generation
- Fold axis (symmetrical): second generation, third generation
- Fold axis (S-fold): second generation, third generation
- Fold axis (Z-fold): second generation
- Small ductile shear (inclined): sense unknown, dextral
- Small ductile shear (vertical): sense unknown
- Dyke (inclined, vertical): pegmatite (P), tonalite (T), microdiorite and diorite (D), granodiorite (G)
- High strain
- Abundant granite sheets
- Abundant tonalite sheets
- Building
- Muskeg
- Reef or small island
- Contour intervals (10m)
- Road