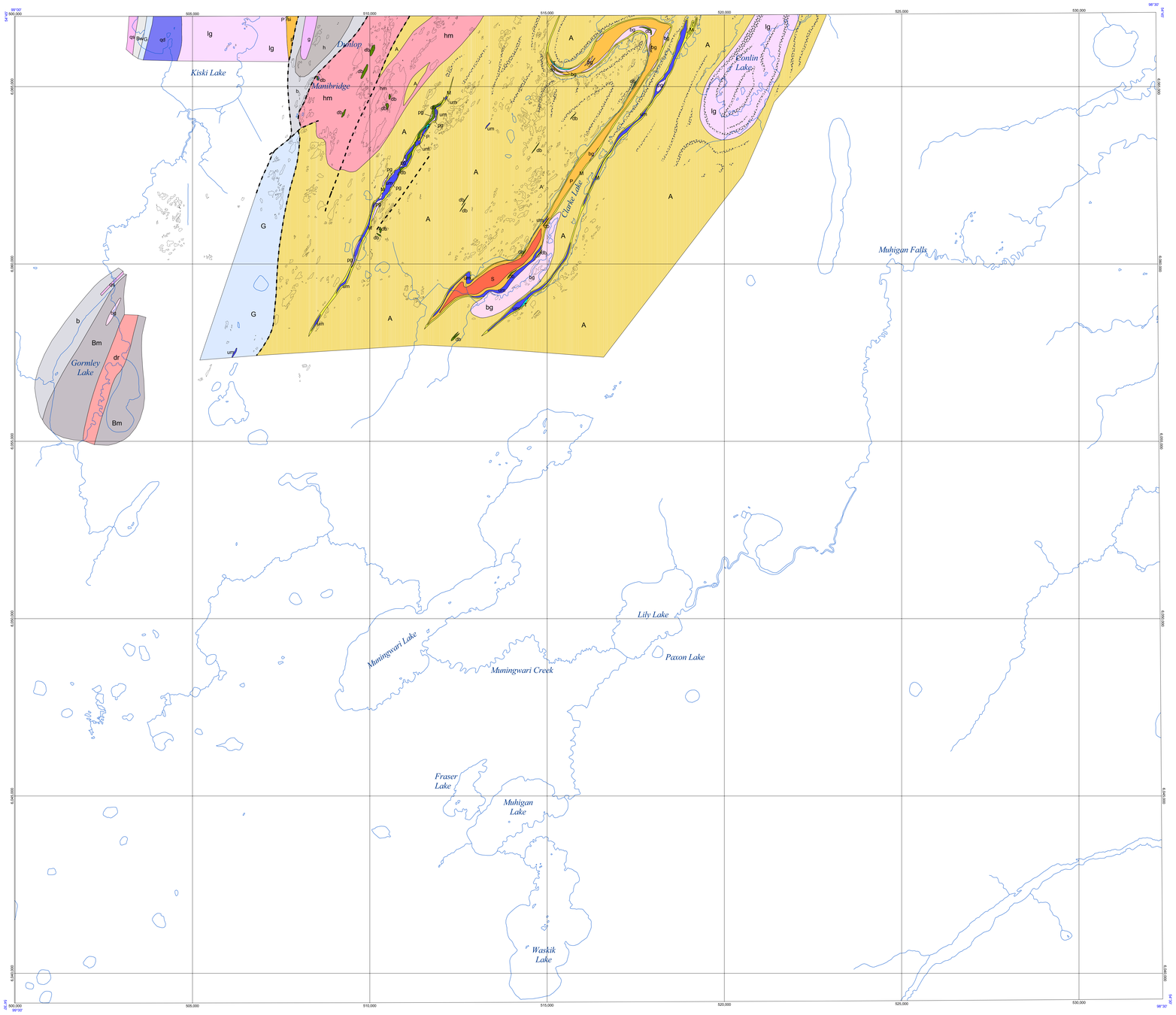
Manitoba Industry, Trade and Mines

Preliminary Map: 2001FN-1

Geology of the Muhigan Lake area (63J/10)



LEGEND

INTRUSIVE ROCKS, ORTHOGNEISS

- mk — Gabbro of MacKenzie dyke swarm
- db — Metadiabase or metagabbro dykes. In O or A, usually belong to Molson dyke swarm
- pg — Pegmatite
- g — Granite, granitoid rocks
- lg — Leucogranite
- bg — Biotite granite
- hm — Hornblende granite
- hg — Hornblende - biotite granite
- dr — Granodiorite
- qm — Quartz monzonite
- qs — Quartz syenite
- bm — Biotite - hornblende quartz monzonite
- qd — Quartz diorite
- gb — Metagabbro, usually associated with um or occuring as subvolcanic sills
- um — Dunite (serpentinized), metaperidotite, metapyroxenite, serpentinite, derived ultramafic schist; usually as sills in Ospwagan Group sequence

- BG — BURNTWOOD AND GRASS RIVER GROUPS, undivided
- G — GRASS RIVER GROUP, undivided; mainly magnetite-bearing paragneiss
  - s — Meta-arenite, undivided, layered to laminated, locally pebbly; magnetite-enriched, in places sillimanite-bearing; locally migmatitized
    - s2 — Pebble metaconglomerate, felsic
    - s1 — Metasandstone, crossbedded, locally pebbly
  - b — Meta-arenite, undivided, layered to laminated, biotite-rich, magnetite-enriched, locally pebbly
    - r — Felsic orthogneiss, metatuff (?)
    - b2 — Metavolcanic gneiss, felsic
    - b1 — Metasandstone, layered to laminated, pebbly
  - h — Meta-arenite, undivided, usually hornblende-enriched
    - h2 — Meta-arenite, interbedded with a metaconglomerate cp
    - h1 — Meta-arenite, usually hornblende- and garnet-enriched
  - cp — Metaconglomerate, polymictic, rich in mafic fragments, interbedded with meta-arenite
- B — BURNTWOOD GROUP, undivided; greywacke-mudstone metaturbidite, garnet- and graphite-enriched, locally cordierite- and sillimanite-bearing; includes migmatitized derivatives
  - Bm — Migmatite derived from Bw or Bp
  - Bw — Metagreywacke - mudstone paragneiss, garnet- and biotite-rich
  - Bp — Metapelite, cordierite- and garnet-enriched, local magnetite
- O — OSPWAGAN GROUP SUPRACRUSTAL ROCKS, undivided
  - Ba — Bah Lake assemblage, undivided; metabasalt flows, pillowed or massive, local breccia; derived amphibolite; metagabbro - diabase subvolcanic sills; picrite sills; minor interflow chert, iron formation, volcanogenic sediment.
    - a — Amphibolite (rafts in granitoid)
    - aa — Bah Lake amphibolite
    - pp — Metapicrite or porphyroblastic metapicrite sill (not limited to the Bah Lake assemblage)
    - gb — Metagabbro, subvolcanic sill (not limited to the Bah Lake assemblage)
  - S — Setting Formation, undivided; feldspathic quartzite and metapelite interlayered in varying proportions in a metaturbidite sequence containing calc-silicate "concretions"; quartzose greywacke; rare occurrences of multiple layers of quartz-rich, oligomictic conglomerate grading upwards to sandstone - siltstone - shale
    - cc — Cummingtonite - cordierite schist, layered, a single occurrence at Setting Lake
  - P — Pipe Formation, undivided; iron formation, chert, metapelite schist; minor semipelite, dolomite marble, calc-silicate.
    - P3 — Sequence of silicate and oxide facies iron formations, sulphidic; chert; minor dolomite marble, calc-silicate; near the top sandstone - pelite metaturbidite
      - dm — Dolomite marble intercalation enclosed in silicate facies iron formation of P3
      - ox — Iron formation, oxide facies, found only in P3
      - si — Iron formation, silicate facies, stratigraphic position unknown unless determined by its host P1 or P3
      - se — Iron formations of several facies occuring close together
      - if — Iron formation, facies unspecified, stratigraphic position unknown
    - P2 — Metapelite schist with sulphide facies iron formation near its top; minor calc-silicate and chert
      - su — Iron formation, sulphide facies, stratigraphic position unknown unless determined by its host P1 or P2
    - P1 — Sequence of iron formations and associated chert layers
      - si — Iron formation, silicate facies, stratigraphic position unknown unless determined by its host P1 or P3
      - su — Iron formation, sulphide facies, stratigraphic position unknown unless determined by its host P1 or P2
  - T — Thompson Formation, undivided; marlstone or marble, layered, varied in composition and texture
    - T3 — Olivine - phlogopite - diopside marble, coarse grained
    - T2 — Semipelite, very thin layer between T1 and T3
    - T1 — Marlstone, laminated to thinly layered; dolomite marble
  - M — Manasan Formation, undivided; basal clastic rocks
    - M2 — Semipelite schist, rhythmically layered, calc-silicate layer near the top; pegmatite segregations in high grade metamorphic derivatives
    - M1 — Basal metaconglomerate, sandstone, shale; graded beds, fining upwards
- AO — ARCHEAN BASEMENT AND OSPWAGAN GROUP, undivided
- A — ARCHEAN BASEMENT MIGMATITE - GNEISS, undivided, retrogressed, leucogranite to diorite in composition, host to distinct bodies of orthogneiss (1 to 6), ages uncertain
  - 6 — Biotite granite orthogneiss
  - 5 — Leucotonalite gneiss, garnet- and magnetite-bearing
  - 4 — Migmatite, stromatic, magnetite-enriched
  - 3 — Alkali-feldspar syenite gneiss, porpyroblastic
  - 2 — Enderbite gneiss
  - 1 — Metagabbro, layered, garnetiferous

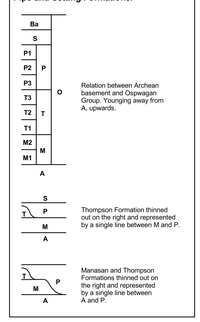
SYMBOLS

- Fault
- Structural trend derived from the vertical gradient of a magnetic anomaly
- Outcrop
- Contact

2500 0 2500 5000 7500 Meters

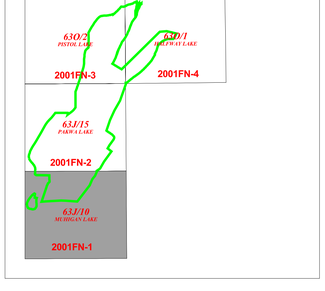
1:50000

Schematic illustrations of the relationships of Archean gneisses, Manasan, Thompson, Pipe and Setting Formations.



This map is a preliminary representation of the results of a mapping and compilation program. It is not to be regarded as a final interpretation of the geology of the area. The data used in producing this map was transferred from un-rectified airphotos and thus is subject to distortion. No attempt was made to remove this distortion for this preliminary release.

Index Map



Suggested reference:

TNB Geology Working Group
2001: THOMPSON NICKEL BELT GEOLOGY;
Manitoba Geological Survey, Preliminary Map 2001FN-1, Geology of Muhigan Lake (63J/10), scale 1 : 50 000.

Map projection: Universal Transverse Mercator, Zone 14, North American Datum 1983.

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SELECTED REFERENCES:

Baragar, W.R.A. and Scoates R.F.A., 1981: The Circum-Superior Belt: A Proterozoic plate margin?; in Precambrian Plate Tectonics, (ed.) A. Kroner, Elsevier Scientific Publishing Company, Amsterdam, p. 297-330.

Bleeker, W. and Macek, J.J., 1988a: Thompson Nickel Belt Project: Pipe Pit Mine: in Report of Field Activities 1988, Manitoba Energy and Mines, p. 111-115.

Bleeker, W. and J. J. Macek, 1988b: Pipe Pit Mine (Sheets A, B, C, D, E, F, G and H): 1:400, Manitoba Energy and Mines, Geological Services, Preliminary Maps 1988T-1 to 1988T-8.

Bleeker, W., 1989: Litho-structural map of the Thompson Open Pit, Thompson Nickel Belt, Manitoba; scale 1:1200, with accompanying map description. Geological Survey of Canada, Open File 2089.

Bleeker, W., 1990a: New structural - metamorphic constraints on Early Proterozoic oblique collision along the Thompson Nickel belt, northern Manitoba, Canada: in The Early Proterozoic Trans-Hudson Orogen of North America, (ed.) J.F. Lewry and M.R. Stauffer, Geological Association of Canada Special Paper 37, p. 57-74.

Bleeker, W., 1990b: Thompson Area-General Geology and Ore Deposits: in Geology and Mineral Deposits of the Flin Flon and Thompson Belts, Manitoba, Field Trip Guidebook, 8th IAGOD Symposium, (eds.) Galley, A.G., Bales, A.H., Syme, E.C., Bleeker, W., Macek, J.J., and Gordon, T.M., Geological Survey of Canada, Open File 2165, p. 93-136.

Bleeker, W., 1990c: Evolution of the Thompson Nickel Belt and its nickel deposits, Manitoba, Canada; unpublished Ph.D. thesis, University of New Brunswick, Fredericton, New Brunswick, 400p.

Coats, C.J.A., Quirke, T.T., Bell, C.K., Cranstone, D.A., Campbell, F.H.A., 1972: Geology and mineral deposits of the Flin Flon, Lynn Lake and Thompson areas, Manitoba, and the Churchill-Superior front of the western Precambrian shield: Guidebook, field excursion A31-C31, International Geological Congress, XXIV Session, Canada.

Hubregtse, J.J.M.W., 1980: The Archean Pikwitonei granulite domain and its position at the margin of the northwestern Superior Province, central Manitoba: Manitoba Mines Branch, Geological Paper 80-3, 16 p.

Macek, J.J. and Bleeker, W., 1989: Thompson Nickel Belt project - Pipe Pit Mine, Setting and Ospwagan Lakes: in Report of Field Activities 1989, Manitoba Energy and Mines, Minerals Division, p. 73-87.

Macek, J.J. and Nagerl, P., 1992: Sub-Paleozoic Precambrian geology of the Churchill-Superior Boundary Zone between the Hargrave and Minago Rivers (63J): Manitoba Energy and Mines, Geological Services, Open File OF92-3, 55p.

Peredery, W.V. and Geological Staff, 1982: Geology and nickel sulphide deposits of the Thompson belt, Manitoba: in Precambrian sulphide deposits, H.S. Robinson memorial volume, (ed.) R.W. Hutchinson, C.D. Spence and J.M. Franklin, Geological Association of Canada, Special Paper 25, p. 165-209.

Scoates, R.F.J. and Macek, J.J., 1978: Molson Dyke Swarm: Manitoba Mines Branch, Geological Paper 78-1 53 p.

Zwanzig, H.V. 1999: Mapping in the Setting Lake area (parts of NTS 63J/15 and 63O/1, 63O/2): in Report of Activities 1999, Manitoba Industry, Trade and Mines, Geological Services, p. 18-23.