Saskatchewan
Energy and Mines
Saskatchewan
Geological Survey

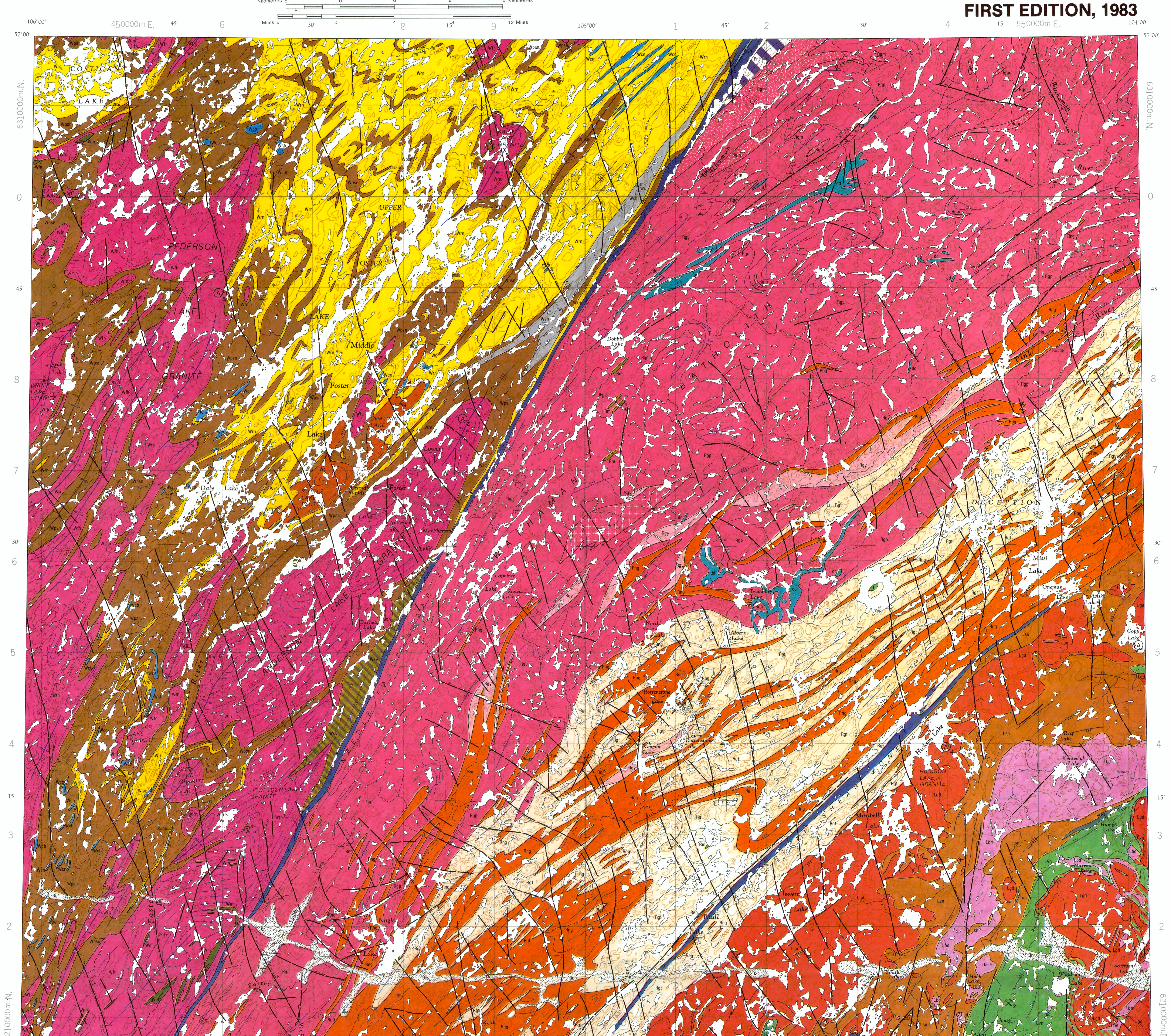
Map 228A. COMPILATION BEDROCK GEOLOGY SERIES

FOSTER LAKE, NTS AREA 74A

SASKATCHEWAN

Scale 1:250,000

FIRST EDITION, 1983



LEGEND

QUATERNARY

- Qr — **Recessional moraine:** unconsolidated sand and gravel of the Cree Lake moraine

PROBABLY PHANEROZOIC

- I — **Meteorite impact rocks:** impact breccia (suevite) and melt material (karnaite) at Gow Lake

PROBABLY NEOHELIKIAN/HADRYNIAN

- dd — **Diabase-gabbro:** fine to very coarse grained, massive, subophitic

LATE APHEBIAN (HUDSONIAN[1])

- X — **Cataclastic rocks:** sheared gneisses and mylonites of the Needle Falls and Paull River Shear Zones

WOLLASTON DOMAIN

LATE APHEBIAN (HUDSONIAN)

- Wg — **Monzogranite-granodiorite:** medium to very coarse grained, massive to weakly foliated, generally containing less than 10 percent biotite ± hornblende ± garnet ± hypersthene; local xenoliths of metasediment; locally intrusive into Wollaston Group; *possible Archean granitoid highly remobilized during the Hudsonian Orogeny*

EARLY TO MIDDLE APHEBIAN

Wollaston Group

- Wsh — **Quartz-muscovite schist:** pelitic to psammopelitic, fine to medium grained, ± biotite; locally intensely sheared; may, in part, be equivalent in age to unit Wsv
- Wcn — **Calc-silicate gneiss:** generally quartz-poor heterogenous calcareous metasediments with local sodium-rich rocks; highly variable texture, grain size and colour, locally anatectic with intrusive features, including massive calc-silicate rock, well-layered calc-silicate gneiss and minor marble; ± tremolite-actinolite ± diopside ± albite ± carbonate ± epidote ± sphene ± scapolite; *derived from impure limestone, dolomite, marl and minor evaporite*

  Wcb: massive, coarse variety of gabbroic appearance ('diopside pseudo-gabbro')
- Won — **Polymict metaconglomerate:** deformed pebbles and cobbles of quartzite, granite and amphibolite in psammitic matrix
- Wrn — **Psammitic gneiss:** fine to coarse grained, well foliated to massive; calcareous psammite containing less than 20 percent calc-silicate minerals (generally tremolite-actinolite ± diopside ± epidote); biotitic psammite containing up to 10 percent biotite ± magnetite

  Wrq: impure metaquartzite
- Wpsn — **Pelitic to psammopelitic gneiss and schist:** moderately to intensely foliated, containing more than 10 percent mafic minerals (commonly biotite) ± garnet ± cordierite ± sillimanite ± graphite

PROBABLY EARLY APHEBIAN (LATE ARCHEAN?)

- Wsv — **Metasedimentary and metavolcanic rock:** variable unit, fine to coarse grained, generally well foliated, locally highly sheared; *probably derived from mudstone, sandstone, arkose, conglomerate, acid to basic volcanic and volcaniclastic rocks*

~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~

ARCHEAN, DEFORMED AND METAMORPHOSED WITH APHEBIAN SUPRACRUSTAL ROCKS DURING THE HUDSONIAN OROGENY

- Wm — **Amphibolite:** amphibole gneiss, metagabbro and metadiorite; medium to coarse grained, weakly to well foliated
- Wfn — **Foliated granitoid rock:** syenogranitic to granodioritic, medium to coarse grained, generally moderately to well foliated; biotite ± hornblende bearing;

  Wfh: well foliated to massive, dark and waxy, ± clinopyroxene ± hypersthene

ROTTENSTONE DOMAIN

APHEBIAN (HUDSONIAN)

WATHAMAN BATHOLITH:

- Rgd — **Biotite-hornblende granodiorite:** medium to coarse grained, massive to foliated
- Rgp — **Biotite monzogranite-granodiorite:** medium to very coarse grained, massive to well foliated, equigranular to megacrystic, ± muscovite
- Rgm — **Monzogranite-granodiorite:** containing abundant xenoliths and rafts of amphibolite and amphibole gneiss derived from unit Pn

- Rgy — **Leucosyenogranite-leucomonzogranite:** coarse grained, massive to foliated, ± biotite ± muscovite ± garnet

ROTTENSTONE MIGMATITE COMPLEX:

- Rgt — **Tonalite-trondhjemite:** medium to coarse grained, equigranular, massive to foliated, locally containing xenoliths of migmatitic gneiss (unit Rng); *largely derived by anatexis of unit Rng*
- Rm — **Amphibolite:** medium to coarse grained, well foliated; includes coarse grained, massive to weakly foliated metagabbro-metadiorite
- Rng — **Migmatitic gneiss:** of widely varied texture, with greater than 30 percent paleosome of pelitic to psammitic gneiss with some amphibolite; medium to coarse grained, massive to well foliated, ± biotite ± garnet ± sillimanite; neosome of tonalitic to trondhjemitic to syenogranitic composition

PETER LAKE DOMAIN

APHEBIAN AND ARCHEAN ROCKS, STRONGLY REWORKED, PROBABLY LATE IN THE HUDSONIAN

- Pn — **Hornblende-biotite gneiss:** tonalitic to gabbroic composition, medium to coarse grained, with minor metagabbro and amphibolite (PARKER LAKE GNEISSES)

[1]The term 'Hudsonian' has been used by most authors in Saskatchewan to indicate the tectonometamorphic activity or orogeny which affected Aphebian rocks and older basement during the interval approximately 1900 to 1650 Ma ago. In this legend, the term 'Hudsonian s.s.' (sensu stricto) refers to the more specific peak of activity fixed by Rb-Sr isochron determinations on plutonic rocks at c. 1750 to 1740 Ma (see Douglas, 1980; Bell and Macdonald, 1982).

LA RONGE DOMAIN

PROBABLY 'HUDSONIAN s.s.'

- Lbd — **Diorite-quartz diorite-quartz monzodiorite:** medium to coarse grained, masive to well foliated, equigranular to megacrystic; ± biotite ± hornblende
- Lgd — **Granodiorite-monzogranite:** medium to coarse grained, massive to well foliated; biotite ± muscovite ± hornblende
- Lbu — **Metadiorite-metagabbro-metapyroxenite:** medium to coarse grained, massive to weakly foliated

PROBABLY APHEBIAN

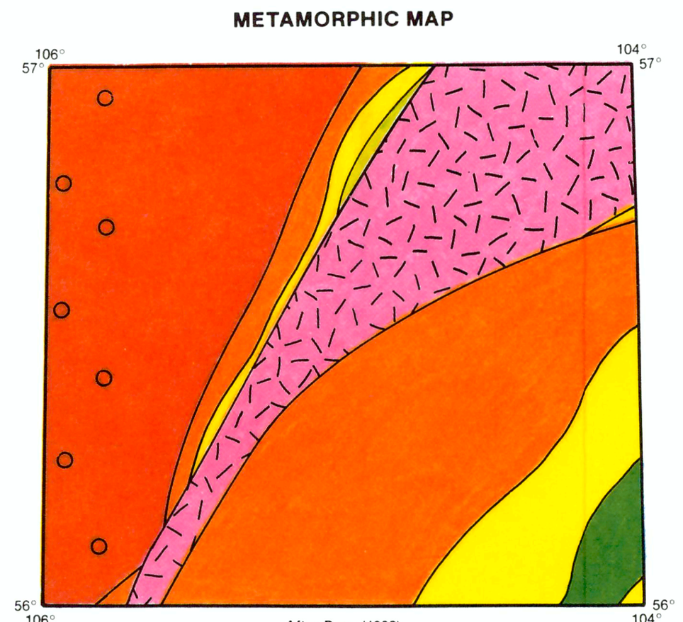
- Lvg — **Migmatitic gneiss:** containing metavolcanic paleosome (unit Lvn) and granodiorite (unit Lgd)
- Lvn — **Metavolcanic rock:** metamorphosed acid to basic volcanics with volcaniclastics and psammitic to pelitic metasediments
- Lon — **Metaconglomerate:** with minor pelitic metasediment, metavolcanic and volcaniclastic rock
- Lsn — **Metasediment:** moderately to intensely foliated; pelitic to psammitic gneiss and schist ± biotite ± muscovite ± garnet ± chlorite ± sillimanite ± graphite; minor metavolcanic and volcaniclastic rock

SYMBOLS

- Approximate area of abundant bedrock exposure
- Geological contact: defined to approximate, inferred
- Structural lineament, possible to probable fault, as interpreted from geological, geophysical and/or airphoto evidence
- Major fold axial trace: antiform, synform
- Trend and approximate dip of dominant foliation surface: dip shallow (0-29°), moderate (30-59°), steep (60-84°), subvertical (85-90°)
- Structure form lines, interpreted from airphoto evidence
- Mineral prospect, former deposit:
  1. Rottenstone Mine, Cu, Ni, Pt, Pd, Au, Ag (Richards and Robinson, 1966)
  2. Jojay, Au (Beck, 1959)
  3. Burr prospect, U (Mawdsley, 1957)
- Sample location (geochronology[2]):
  1. 1705 Ma, K-Ar biotite (Lowden et al., 1962)
  2. 2500 Ma, Rb-Sr whole rock 'scatterchron' (Bell and Macdonald, 1982); location is approximate centre of collecting area
  3. 2500 Ma, Rb-Sr whole rock 'scatterchron' (Bell and Macdonald, 1982); location is approximate centre of collecting area
  4. 1730±30 Ma, Rb-Sr whole rock isochron (Bell and Macdonald, 1982); location is approximate centre of collecting area

[2]Five K-Ar age determinations from pegmatites in the Middle Foster Lake area are cited in Mawdsley (1957, p37) and range from 1150±100 to 1880±100 Ma. Exact locations are unspecified.

METAMORPHIC MAP



After Rees (1982)

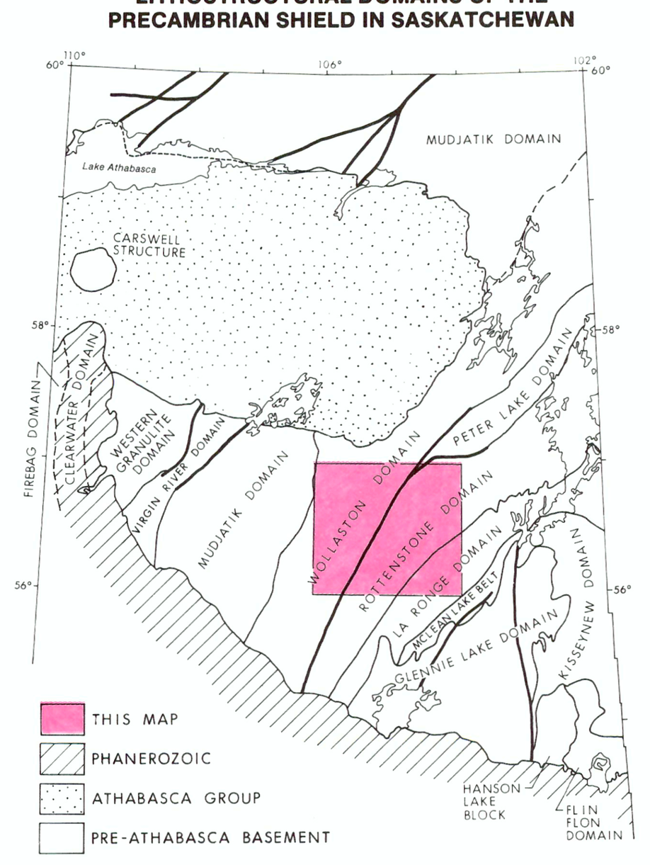
Note: All recorded metamorphic features in this area have been ascribed to one major metamorphic event of Hudsonian age

Metamorphic facies	Isograds
Upper amphibolite and granulite (undivided)	
	hypersthene
Upper amphibolite	
	cordierite+garnet (muscovite out)
Middle amphibolite	
	sillimanite
Lower amphibolite	
	staurolite,cordierite,diopside
Lower amphibolite and upper greenschist (undivided)	
Upper greenschist	
	garnet,andalusite
Mainly synorogenic plutonic rocks, regional metamorphic grade undefined	

ADDENDUM

4. Jolu — Mallard Lake — Decade Mine, Au; located 2 km south of Jojay Lake at 56° 00' 33" N, 104° 16' 30" W; minor production 1973-75 (Beck, 1959; for production information see files in Resident Geologist's Office, La Ronge)

LITHOSTRUCTURAL DOMAINS OF THE PRECAMBRIAN SHIELD IN SASKATCHEWAN



Modified from Lewry and Sibbald (1977) and Macdonald and Broughton (1980)

BASE MAP LEGEND

Base map, with acknowledgement, by Army Survey Establishment, R.C.E. Information depicted current as of 1961. Printed 1964.

GRID ZONE DESIGNATION 13V; 100,000 M. SQUARE IDENTIFICATION: DP EP / DN EN

TO GIVE A REFERENCE TO NEAREST 1000 METRES

EXAMPLE	
SQUARE Read letters of 100,000 m square	EN
EASTING Read number on grid line immediately to left of point; Estimate tenths of a square from this line eastward to point	0 8 / 08
NORTHING Read number on grid line immediately below point; Estimate tenths of a square from this line northward to point	5 2 / 52
MILITARY GRID REFERENCE (to nearest 1,000 metres)	EN0852
If reporting beyond 18° in any direction prefix Grid Zone Designation as	13VEN0852

TEN THOUSAND METRE UNIVERSAL TRANSVERSE MERCATOR GRID ZONE 13

- Horizontal control point
- Boundary monument
- Spot elevation, in feet ... 2550
- Rapids; falls
- Marsh or swamp
- Depression contours
- Surveyed line
- Road, all weather
- Wagon or winter road
- Trail or portage
- Town
- Village or settlement
- Post office
- Building

Transverse Mercator Projection
North American Datum 1927
Contour Interval 100 feet
Elevations in feet above mean sea level
Magnetic declination 19° 30' east at centre of map 1963
Annual change (decreasing) 3.0'

Geology compiled by G.E. Ray, 1980, with revisions by M.W. Thomas and R. Macdonald, 1983.

Map scribed by P. Weir, 1983. Colour reproduction by electronic scanning of hand-coloured original. Legends and text phototypeset via in-house text-processing equipment and custom typesetting by Brigdens, Regina.

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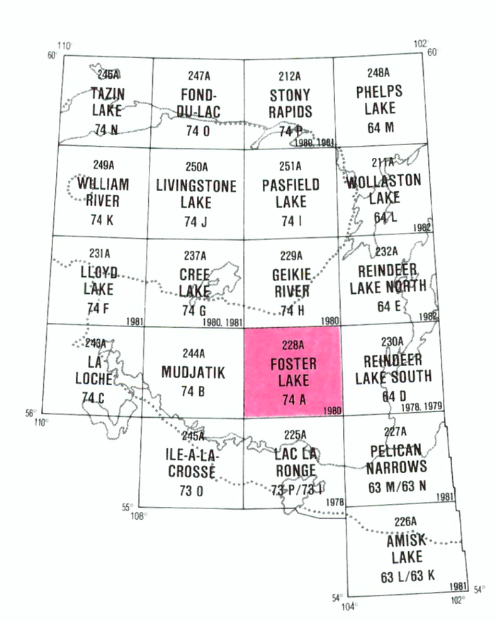
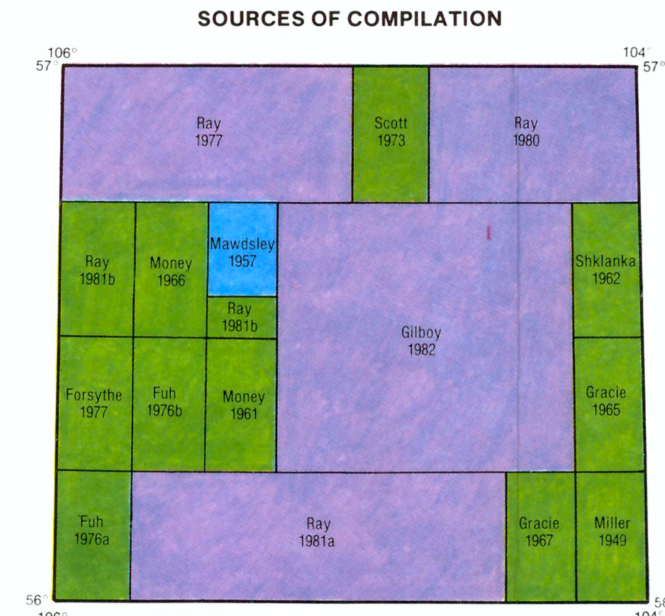
INDEX TO MAPS OF THE COMPILATION BEDROCK GEOLOGY SERIES



SOURCES OF COMPILATION



- Saskatchewan Geological Survey 1:63 360 scale mapping
- Saskatchewan Geological Survey 1:100 000 scale reconnaissance mapping
- Saskatchewan Geological Survey detailed scale mapping

GEOLOGICAL NOTES

Rock exposure is good throughout the region except in the northwest where extensive drift deposits are present. The Cree Lake moraine (unit Qr), the most prominant glacial feature, is part of a recessional moraine system that stretches from Lake Athabasca to Manitoba. The area is underlain by Precambrian rocks of the Wollaston, Rottenstone, Peter Lake and La Ronge Domains.

Wollaston Domain

The Wollaston Domain comprises an Archean basement (units Wfn and Wm) exposed as inliers within an unconformably overlying Aphebian cover sequence. A mixed succession of metamorphosed volcanic, volcaniclastic and immature clastic rocks (unit Wsv) is restricted to the eastern margin of the Wollaston Domain and forms the base of the cover sequence. These mixed rocks are overlain by paragneisses of the regionally extensive Wollaston Group.

Rottenstone Domain

The Rottenstone Domain is represented in the southeast by a migmatite complex comprising supracrustal gneisses intimately associated with elongate bodies of tonalite-trondhjemite. The gneisses include both metasediments and metavolcanics of possible Aphebian age. The plutonic rocks of the Wathaman Batholith (units Rgm, Rgp and Rgd), which is regarded as a syntectonic pluton, have yielded a U-Pb zircon date of 1865±12 Ma (Ray and Wanless, 1980). The batholith is cut by sheets and irregular bodies of diabase (unit dd). No radiometric dates are available, but similar intrusions in the Athabasca basin have been dated at between 938±33 and 1230 Ma (Hoeve and Sibbald, 1978). The region also features a presumed Phanerozoic meteorite impact structure at Gow Lake where breccias and melt material (unit I) are recorded.

Peter Lake Domain

Peter Lake Domain rocks exposed in the north comprise reworked hornblendic gneisses and amphibolites of presumed igneous parentage. These are intruded by the Wathaman Batholith. The Peter Lake and Rottenstone Domains are separated from the Wollaston Domain by cataclastic rocks of the northeasterly trending Needle Falls Shear Zone (unit X).

La Ronge Domain

The junction of the La Ronge with the Rottenstone Domain is in places gradational and occupied by granitic intrusions (units Rgt and Lgd), but farther northeast the junction is defined sharply by the Paull River Shear Zone. The domain includes gneisses of both metasedimentary (units Lsn and Lon) and metavolcanic (unit Lvn) origin. No reliable radiometric dates are available on these supracrustal rocks but they are presumed to be Aphebian in age. The supracrustal gneisses are intruded by elongate to subcircular plutons of granodiorite-monzogranite, diorite and gabbro of presumed Hudsonian age. The Hickson Lake Granite has been dated at 1730±30 Ma (Bell and Macdonald, 1982).

Metamorphism

Most of the area was subjected to low pressure, Abukuma-type amphibolite facies metamorphism during the Hudsonian orogeny. Garnet, cordierite and sillimanite are common in the supracrustals of the Wollaston Domain. The presence of hypersthene in some parts of the Archean basement suggests that granulite facies conditions were locally attained.

Lower metamorphic conditions prevailed within and adjacent to certain parts of the Needle Falls Shear Zone where muscovite, chlorite, andalusite and staurolite occur locally. Garnet and sillimanite are common in the supracrustal rocks of the Rottenstone Domain but cordierite is very rare. The passage southeastwards into the La Ronge Domain coincides with a drop in metamorphic grade which is marked by the appearance of muscovite and staurolite and the extreme rarity of sillimanite.

Economic Geology

La Ronge Domain

1) Native gold is hosted in quartz or quartz-carbonate veins filling tension fractures, faults or minor shears cutting the metavolcanics (unit Lvn). Gold is associated with either pyrite, pyrrhotite, chalcopyrite, marcasite, molybdenite, stibnite, galena or sphalerite. Higher gold values reportedly occur where the veins transect contacts between supracrustal rocks and intrusive granitic rocks.
2) The metasedimentary gneisses (unit Lsn) contain some extensive gossanous horizons which are locally associated with weak copper-nickel mineralization.
3) Granitic plutons (unit Lgd) along the northwestern margin of the La Ronge Domain are associated with numerous uranium showings in the form of gummite staining.
4) Disseminated pyrrhotite-chalcopyrite is hosted within basic intrusives (unit Lbu) 15 km southeast of Jewett Lake.

Rottenstone Domain

1) High grade copper-nickel-platinum-palladium-gold-silver mineralization hosted in a small pyroxenite mass at Rottenstone Lake was mined from 1965 to 1968. Over 28 000 metric tons of ore were removed by open pit methods, yielding approximately 5500 tons of concentrate.
2) Minor chalcopyrite-malachite occurrences are reported from small amphibolite (unit Rm) bodies.

Wollaston Domain

1) Fluorite, associated with minor amounts of copper, molybdenite and pyrite have been reported from unit Wsv. This mineralization, which may have a volcanogenic origin, is hosted in either quartz-calcite veins or small fractures cutting presumed metavolcanic rocks.
2) Quartzitic metasediments in the lower portion of the Wollaston Group at Sito Lake and elsewhere contain presumed syngenetic galena and sphalerite mineralization.
3) A widespread association of uraninite and molybdenite of presumed syngenetic origin occurs in segregation pegmatites cutting graphitic pelites in the basal members of the Wollaston Group.
4) Uraninite mineralization of presumed syngenetic origin occurs in calc-silicate metasediments of the Wollaston Group at the Burr prospect southeast of Burbidge Lake. There is reportedly 35 000 tons of ore grading 0.18 percent U_3O_8 on this property.
5) Widespread but weak uranium mineralization mostly in the form of gummite staining has been observed in segregation pegmatites cutting Wollaston Group psammites (unit Wrn).

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[3]A more complete bibliography for Foster Lake, NTS 74A is available from the Saskatchewan Geological Survey, Regina.

This publication may be referenced as:

Ray, G.E. (1983): Compilation Bedrock Geology, Foster Lake, NTS Area 74A; Saskatchewan Energy and Mines, Report 228 (1:250 000 scale map with marginal notes).

Map 228A. Compilation Bedrock Geology Series
FOSTER LAKE, NTS AREA 74A
SASKATCHEWAN
1:250 000 Scale
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