

Figure 1. Northeast Norman Wells map area (NTS 95-E/NE) showing seismic lines on record with the National Energy Board that were used to augment the bedrock geology interpretation. Line names are provided in the data files.

#### Abstract

The northeast quadrant of Norman Wells map area (NTS 95-E) occupies part of the Franklin Mountains, Northwest Territories. The area varies from low-lying forested plain to high rocky ridges, with bedrock exposures concentrated along the mountainous ridges, stream banks, and lake shores. Cordilleran deformation from the southwest has uplifted Cambrian to Devonian strata along faults and anticlinal folds. Structures in the area display a variation in trend from northwest to north and northeast, reflecting the influence of pre-existing normal faults on Cordilleran structural development. An unconformity at the base of Upper Cretaceous strata cuts more deeply into underlying Devonian and older strata through the central portion of the map area, a reflection of uplift along the Keele Arch before deposition of the Slater River Formation. A potential reservoir in buried Cambrian sandstone has been the focus of petroleum exploration activity in this map area.

#### Résumé

Le quadrant nord-est de la région cartographique de Norman Wells (GNRC 95-E) couvre une partie des monts Franklin (Territoires du Nord-Ouest). La région passe d'une basse plaine boisée à de hautes crêtes rocheuses, où les affleurements du socle rocheux sont concentrés le long des chaînons montagneux, les berges de ruisseaux et les rives de lacs. La déformation cordillerienne en provenance du sud-ouest a soulevé les strates du Cambrien au Dévonien le long de failles et de plis anticlinaux. Les structures de la région affichent une variété de directions allant du nord-ouest au nord et au nord-est, ce qui rend compte de l'influence d'anciennes failles normales lors de l'évolution structurale cordillerienne. Une discordance à la base de la succession du Crétacé supérieur s'enfonce plus profondément dans les strates sous-jacentes du Dévonien dans la partie centrale de la région cartographique, ce qui témoigne d'un soulèvement le long de l'arche de Keele avant le dépôt de la Formation de Slater River. Dans cette région cartographique, l'exploration par les compagnies pétrolières a ciblé un possible réservoir dans des grès enfouis du Cambrien.

SE/NE	DL/RE	SE/NE
CGM 98	CGM 99	CGM 88
SE/NE	DL/RE	SE/NE
CGM 101	CGM 100	CGM 91

National Topographic System reference and index to adjoining published Geological Survey of Canada maps

#### Cover illustration

View looking southwest across west-dipping strata on the Jacques Range, to Franklin Mountain Formation dolomite uplifted on the Kelly Lake Fault west of Lennie Lake, Franklin Mountains, Northwest Territories. Photograph by K.M. Fallas, 2013-031

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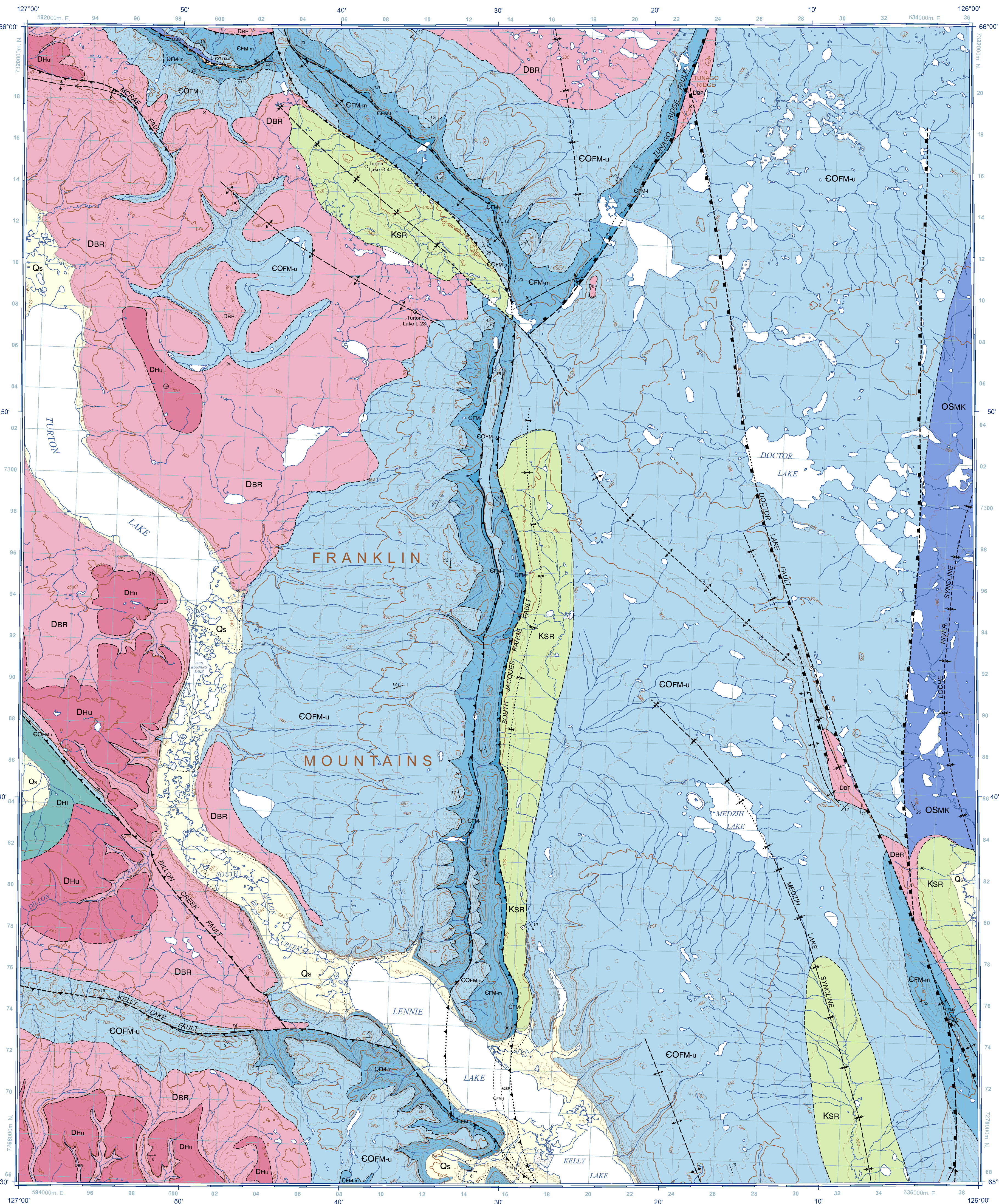
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Natural Resources Canada / Ressources naturelles du Canada

## CANADIAN GEOSCIENCE MAP 99

### GEOLOGY NORMAN WELLS (NORTHEAST)

Northwest Territories  
1:100 000



- QUATERNARY**
- Qs** Quaternary sediment: mud, sand, and gravel: unconsolidated.
- LATE CRETACEOUS**
- KSR** Slater River Formation: shale and mudstone: dark brown to dark grey, black, or rusty-brown; soft, crumbly, and fissile; adremitic concretions common; rare fish scales; minor bentonite and ash tuff: white to yellow, pale green, or orange-brown; and minor sandstone: light to dark grey, brown, grey or rusty, very thin- to thin-bedded, cross-laminated, and tabulated.
- DEVONIAN**
- DHu** Hume Formation: limestone: wackestone to grainstone, floatstone, medium to dark grey or brownish-grey, typically weathers light grey, thin- to very thick-bedded, parallel to irregular or nodular bedded, fossiliferous with abundant and diverse assemblage. Unit is thicker bedded and cliff-forming in upper part.
- DBR** Bear Rock Formation: limestone breccia: variably dolomitic and petroclastic, angular clasts range from granule- to boulder-sized, greyish-brown to grey, weathers light grey, massive and rubby with minor bedded intervals, vuggy, and oolitic; gypsum or anhydrite, white, weathers light grey, laminated or massive.
- ORDOVICIAN TO SILURIAN**
- OSMK** Mount Kindle Formation: dolomite: dolowackestone to dolopackstone and dolostone, siliceous and cherty, light to dark grey or brownish-grey fresh and weathered surfaces, thin- to very thick-bedded, vuggy, recrystallized, tabulated, and fossiliferous (mainly silicified corals, crinoids, orthocone cephalopods, and stromatopores).
- CAMBRIAN TO ORDOVICIAN**
- COFM-u** Franklin Mountain Formation, upper member: dolomite: crystalline dolomite, commonly cherty and siliceous, cream to beige or grey, weathers white to light grey, very thin- to thick-bedded, vuggy and nodular, locally stromatolitic, tabulated, intracast-bearing, or oolitic.
- CAMBRIAN**
- COFM-m** Franklin Mountain Formation, middle member: dolomite: dolomudstone to dolopackstone, rarely calcareous or cherty, light grey to cream or beige, weathers light yellowish-grey to orange-brown, thin- to thick-bedded, typically recrystallized obliterating primary textures, locally vuggy, stromatolitic or thrombolitic, tabulated, oolitic, cross-bedded, or intracast-bearing; rare shale partings. Alternation, at 1-2 m intervals, of oolitic dolopackstone with dolomudstone produces a locally prominent striped appearance.
- COFM-l** Franklin Mountain Formation, lower member: dolomite: dolomudstone, locally calcareous or silty, rare detrital chert grains, grey to greenish-grey or brown, weathers pale yellow to grey or orange-brown, very thin- to medium-bedded, parallel-laminated, locally includes intracast rudstone, locally stromatolitic or tabulated, interbedded with shale: dolomitic and silty, varicoloured, laminated, and fissile.
- CSR** Saline River Formation: shale: silty, grey, red, or green, fissile, minor salt casts, desiccation cracks, and horizontal burrows; evaporite: gypsum, anhydrite, or halite, white and grey to pink or red, very thin- to thin-bedded, bedding typically disturbed and chaotic; dominates middle part of unit, minor dolomite: dolomudstone to dolopackstone, grey to yellow, green, or orange, locally intracast-bearing, oolitic, stromatolitic, and sandstone: light to dark grey, quartz arenite, calcareous or dolomitic, can be conglomeratic, varicoloured, parallel- and cross-laminated, ripple marks, rip-up clasts, and possible trace fossils.

- Geological contact
- Defined
- Approximate
- Inferred
- Concealed
- Drift contact
- Approximate
- Fault, motion undefined
- Inferred
- Concealed
- Reverse fault, symbol on hanging-wall side
- Approximate
- Inferred
- Concealed
- Thrust fault, symbol on hanging-wall side
- Defined
- Approximate
- Inferred
- Concealed
- Anticline, upright
- Approximate
- Inferred
- Concealed
- Syncline, upright
- Approximate
- Inferred
- Concealed
- Inclined anticline, upright, shorter arrow on steeper limb
- Approximate
- Visited outcrop, no measurements
- Outcrop observed remotely from ground or air
- Bedding, horizontal
- Bedding strike and dip, inclined, upright
- Evidence for younging direction known
- No evidence for younging direction
- Fossil locality
- Petroleum well with well name
- Unknown status

#### NOTES

The author has updated and revised map unit terminology from the Operation Norman map (Atken and Cook, 1976). In general, terminology for Cambrian units is that of Dixon and Stasiuk (1988). Silurian and Devonian usage follows that of Morrow (1991), and Cretaceous formation names are those of Dixon (1999). Cambrian to Ordovician units have recently undergone revision to their terminology, as outlined below.

Previous work by the Geological Survey of Canada in the Norman Wells map area (Atken et al., 1973) subdivided the Cambro-Ordovician Franklin Mountain Formation into three informal units. In ascending order they are: Cyclic member, Rhythmic member, and Cherty member (Norford and Macqueen, 1975). On the present maps, these older unit names correspond, in ascending order, to informal lower, middle, and upper members of the Franklin Mountain Formation. These members correspond to the units 1, 2, and 3 respectively of the Franklin Mountain Formation described by Turner (2011).

For detailed information on surficial deposits, here shown as "Quaternary sediment", see Duk-Rodkin (2002).

Coverage of public-domain seismic-reflection data used to augment the map compilation and constrain stratigraphic relationships is shown in Figure 1.

The names McRae Fault, Dillon Creek Fault, Kelly Lake Fault, South Jacques Range Fault, Doctor Lake Fault, Tunage Ridge Fault, Lochie River syncline, and Metzh Lake syncline have been introduced to facilitate discussion of these structural features. Cordilleran deformation in this map area has generated two types of faults: thrust faults which are interpreted to be detached within the Cambrian Saline River Formation, and reverse faults which are interpreted to be inverted normal faults with steep dips at depth. In Proterozoic strata, seismic-reflection data reveals an east-dipping normal fault cutting Proterozoic to Middle Cambrian strata beneath the Jacques Range. Above this structure a west-dipping thrust fault detached within Saline River Formation evaporite is seen at surface (the South Jacques Range Fault). By contrast, the Doctor Lake Fault appears to be an inverted west-dipping normal fault.

The crest of the paleogeographic Keele Arch is preserved in this map area. Repeated exhumation and erosion of Paleozoic units before the Late Cretaceous accounts for the Slater River Formation unconformably overlying Franklin Mountain Formation in the middle of the map area (see also Fig. 2).

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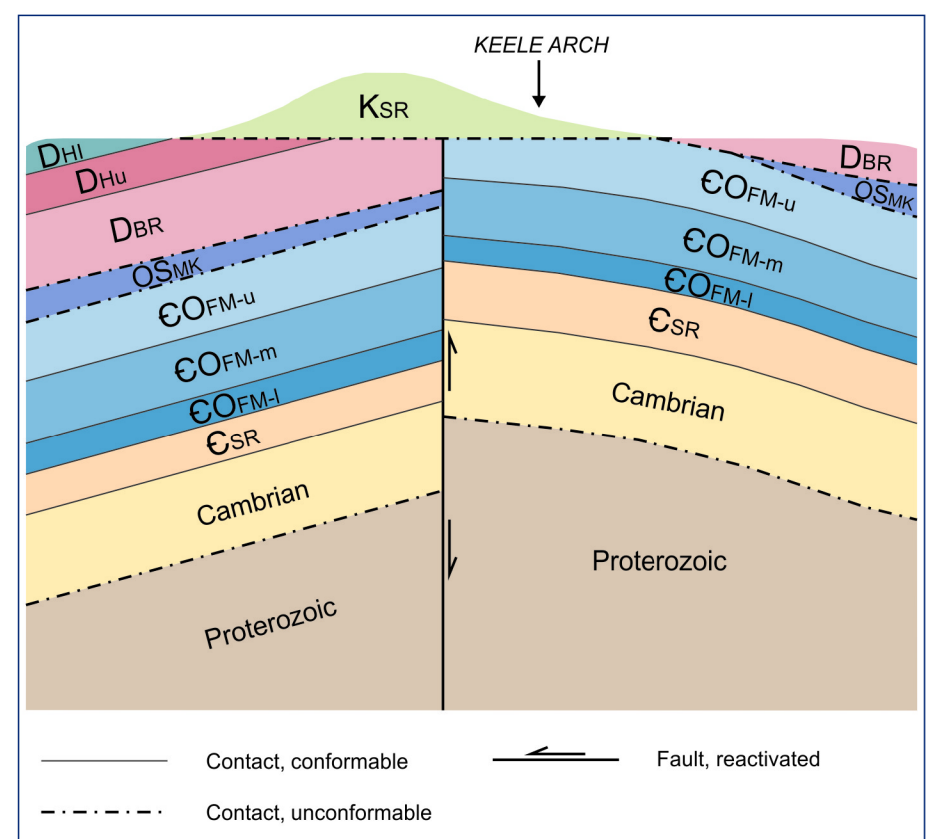


Figure 2. Schematic stratigraphic relationship diagram for northeast Norman Wells map area (NTS 95-E/NE). Subsurface relationships are constrained by well and seismic data. The variation in thickness of Paleozoic units across the reactivated fault and beneath unconformities reflects tectonic activity on the Keele Arch from the Paleozoic to the Cretaceous. The reactivated fault shown schematically lies beneath the South Jacques Range Fault.

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## CANADIAN GEOSCIENCE MAP 99

### GEOLOGY NORMAN WELLS (NORTHEAST) Northwest Territories

1:100 000

2 0 2 4 6 8 km

Author: K.M. Fallas

Geological compilation by K.M. Fallas, 2011-2012

Geological field observations by K.M. Fallas and R.B. MacNaughton, 2009-2010; D.G. Cook and J.D. Atken, 1968-1969, and M.P. Cecile, 1977

Seismic data interpretation by B.C. MacLean, 2010-2012. Stratigraphic sections measured by M.P. Cecile, 1977

Geomatics by K.M. Fallas, S.D. Orzech, and N. Raska

Cartography by S.D. Orzech

Scientific editing by E. Inglis

Initiative of the Geological Survey of Canada, conducted under the auspices of the Mackenzie Delta and Corridor Project as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) Program.

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Map projection Universal Transverse Mercator, zone 9.  
North America Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.  
Elevations are in metres above mean sea level

Mean magnetic declination 2013, 23°34'E, decreasing 32' annually. Readings vary from 23°43'E in the NW corner of the map to 23°24'E in the SE corner of the map.

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional features not portrayed on this map. See documentation accompanying the data.  
Additional references are included in the map information document.

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## CANADIAN GEOSCIENCE MAP 99

### GEOLOGY NORMAN WELLS (NORTHEAST) Northwest Territories



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