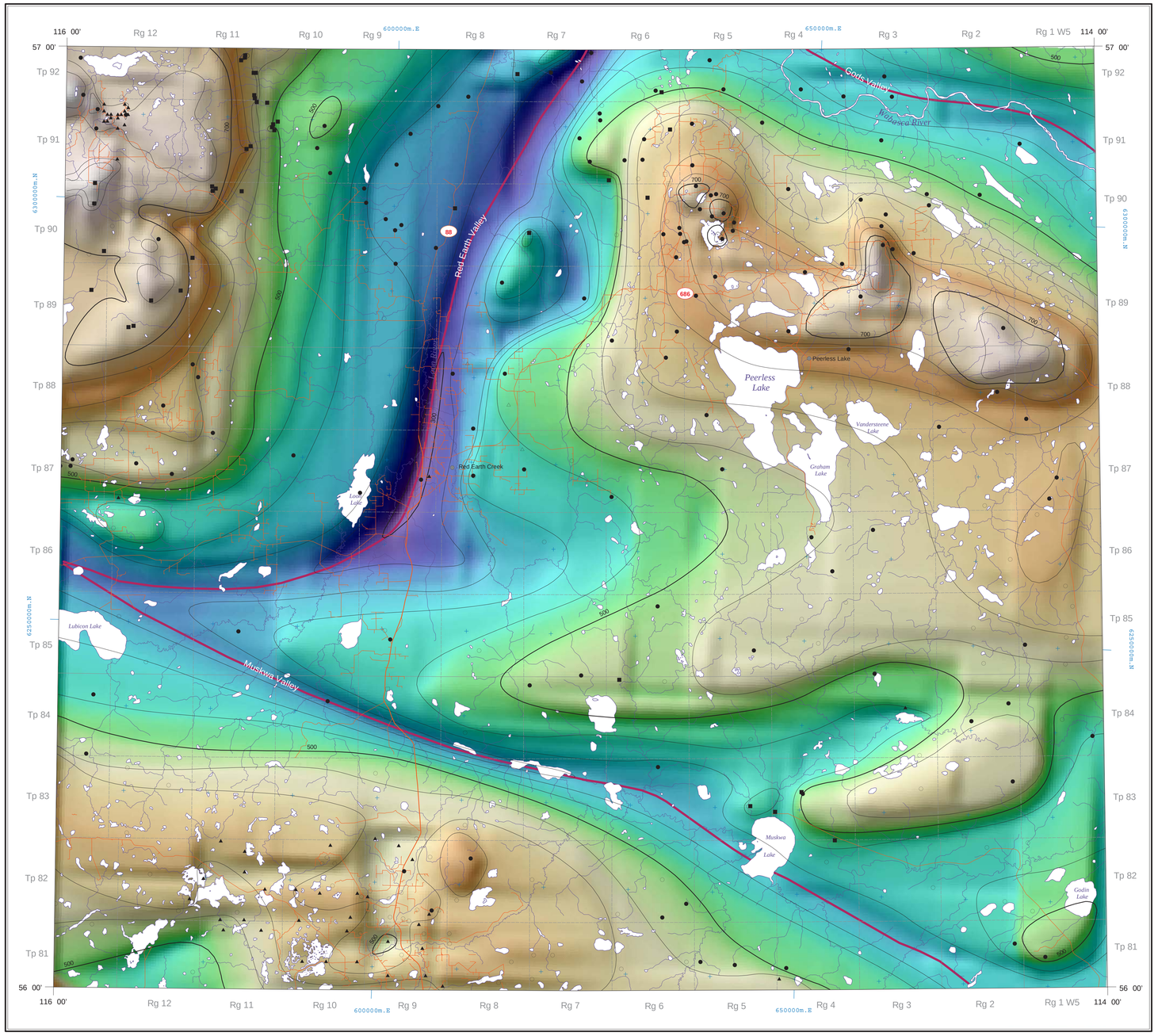
NTS 84B
Bedrock Topography

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**Map 252**

# Bedrock Topography of Peerless Lake Area, Alberta (NTS 84B)

**Geology by: J.G. Pawlowicz and M.M. Fenton**

Scale 1:250 000

5 0 5 10 15 20 25 30 kilometres
5 0 5 10 15 20 miles

Projection: Universal Transverse Mercator, Zone 11
Datum: North American Datum, 1983


## Data

Petrophysical logs were the primary source of information used for constructing the bedrock topography. A suite of the common well logs (gamma, resistivity, spontaneous potential, density, neutron, sonic and calliper) were useful in making the pick for the top of bedrock; however, the gamma and resistivity logs proved to be the most useful. The drift typically displays a lower gamma response and higher resistivity response than the underlying bedrock. Other sources of data were water well lithologs, mineral exploration drillholes and outcrop information (Paulen et al., 2003).

Mapping the bedrock surface was difficult in some areas where data were sparse. Many of the log traces were absent from the upper part of the hole because of surface casing. The depth of surface casing set in bedrock was used for an estimate of maximum drift thickness in places with few data. Conversely, many water wells did not penetrate deep enough to intersect the bedrock, so only a minimum drift thickness value could be determined.

## Interpretation

The physiography of the Peerless Lake map area has been defined by Pettapiece (1986) and a modified version of these subdivisions is shown on the accompanying digital elevation model (Figure 1). The Buffalo Head Hills Upland in the northwest, Peerless Lake Upland in the east, and Utikuma Uplands in the south are separated by the north-trending Loon River Lowland and the east-trending Wabasca Lowland. Throughout the map area drift covers the bedrock, with the exception of a few small isolated outcrops, and varies in thickness from less than 2 metres in parts of the Buffalo Head Hills to over 200 metres in the Loon River Lowland. Figure 2 shows the drift thickness of the Peerless Lake map area, from Alberta Geological Survey Map 253 (Pawlowicz and Fenton, 2005). The sub-cropping bedrock consists mainly of Shaftesbury Formation and Smoky Group marine shales, with smaller areas of Dunvegan Formation sandstone (Hamilton et al., 1999).

The bedrock topography contours were initially generated from bedrock surface picks using a computer-contouring program with some subsequent modifications by hand. Preliminary versions of this map were released as Alberta Geological Survey publications by Andriashek et al. (2001) and Pawlowicz and Fenton (2002).

The bedrock topography map shows the elevation of the bedrock surface. In general, the topography of the land surface reflects the bedrock topography. Thus, bedrock highs underlie the Buffalo Head Hills Upland, Peerless Lake Upland and Utikuma Uplands. Major buried valleys lie within the Loon River Lowland in the west-central part and within the Wabasca Lowlands in the south and northeast parts of the map area. The elevation of the bedrock surface ranges from 780 metres above sea level (masl) in the Buffalo Head Hills to 300 masl in the Loon River Lowland. Segments of three major buried valleys are present: the Muskwa Valley in the south, the Red Earth Valley in the Loon River Lowland and Gods Valley in the northeast. The exact shape of these bedrock valleys and their relationships in the areas where they appear to merge is uncertain as a consequence of the scarcity of relevant drillholes. The Muskwa Valley trends westward towards Lubicon Lake and approximately corresponds with the southern part of the Misaw Channel of Ceroici (1979) and part of the L'Hirondelle Channel of Ceroici (1979) and Borneuf (1981). The eastern extent of the Muskwa Valley also corresponds with a bedrock low in the northeast corner of the Lesser Slave Lake map area (NTS 83O; Vogwill, 1979). The Red Earth Valley partly corresponds to the northerly trending segment of the Misaw Channel of Ceroici (1979), although in the northern part of Loon River Lowland the Red Earth Valley trends north-northeasterly. In the northern part of the Loon River Lowland, abrupt changes in the elevation of stratigraphic markers appear to define a northeasterly trending graben-like structure (Pawlowicz and Fenton, 2002), which suggests the trend of the Red Earth Valley is partly controlled by bedrock structure. The lowest elevation along the Red Earth Valley is near the town of Red Earth Creek.

This map shows general variations in bedrock topography within the study area and complements the regional Bedrock Topography of Alberta map (Pawlowicz and Fenton, 1995). Experience from more detailed investigations to the east (Andriashek and Fenton, 1989; Andriashek et al., 2001; Andriashek, 2003) suggests that, in addition to the valleys shown, narrow deep buried valleys are to be expected.

### FEATURES LEGEND

**Data sources**

- Petroleum well, bedrock surface picked
- Petroleum well, bedrock surface above logged interval
- Water well, bedock surface picked
- Water well, bedrock surface below bottom of well
- Mineral exploration borehole, bedrock surface picked
- Mineral exploration borehole, bedrock surface below bottom of hole
- Buried valley thalweg
- Bedrock topography contour elevation in metres above sea level contour interval = 40 metres

**Bedrock elevation**
(metres above sea level)

820 metres
720
600
480
280 metres

### BASEMAP LEGEND

- City/Town
- Road - gravel
- Road - paved
- Township/range - surveyed
- Township/range - unsurveyed
- UTM, Zone 11 Grid (450000m.E)
- Rivers
- Lakes

Figure 1. Present day surface topography and physiography

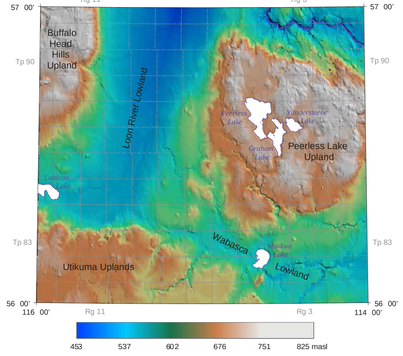
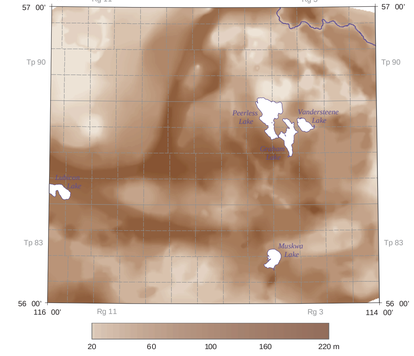



Figure 2. Drift thickness

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EUB Alberta Energy and Utilities Board | AGS Alberta Geological Survey