

Hydrocarbon in Glacial Sediment, Bedrock Topography, Drift Thickness and Characteristics: Peerless Lake Area (NTS 84B)

John G. Pawlowicz* and Mark M. Fenton
Alberta Geological Survey, Alberta Energy and Utilities Board
4th Floor, 4999 – 98 Avenue, Edmonton, Alberta, Canada, T6B 2X3
John.Pawlowicz@gov.ab.ca

Quaternary investigations provide information on the bedrock topography, thickness and nature of drift cover. Glacial sediments currently mask a bedrock landscape that was modified by major Tertiary fluvial systems, and glacial erosion and deposition during the Quaternary period.

1:250,000 scale bedrock topography and drift thickness maps have been produced for the Peerless Lake area from available preexisting data as well as from Alberta Geological Survey core samples analyzed for geochemistry, palynology and hydrocarbons. Two major buried channels were identified: the north-south trending Red Earth Channel through the Loon River Lowland and a south-east to west trending channel that may be an extension of the Wiau Channel identified to the east from earlier work in the Winefred Lake area. The channels meet near the centre of the map area and contain thick accumulations of till, glaciofluvial and glaciolacustrine sediments totaling more than 200 m in places.

Palynological analysis yielded a younger than expected Late Campanian age (~75my) for the bedrock on top of the Buffalo Head Hills, indicating mid Wapiti Formation, and an older than expected Late Albian age (~100 my) for the uppermost bedrock in the Loon River Lowland, placing it at the contact of the Joli Fou and Pelican Formations.

Analysis of hydrocarbon occurrence in drift cores indicates the presence of severely biodegraded petrogenic hydrocarbons similar to Lower Cretaceous oil sands in northeastern Alberta. A 10 metre deep till sample contains a mixture of petrogenic and biogenic hydrocarbons, the latter indicating sources derived from recent land plant material.