

The Turtle Creek Earthquake of April 24th, 1988 and its significance to the seismicity of the Moncton region of New Brunswick

Kenneth B.S. Burke

Department of Geology, University of New Brunswick, Fredericton, New Brunswick E3B 5A3

Maurice Lamontagne, Mary Cajka, and John Adams

Geophysics Division, Geological Survey of Canada, Ottawa, Ontario K1A 0Y3

On April 24th, 1988, an earthquake of $m_N = 3.7$ occurred near Turtle Creek, about 12 km SW of Moncton, New Brunswick. An earthquake of similar magnitude, $m_N = 3.6$, had previously occurred in the same area on September 23rd, 1984. An analysis of seismograms recorded at stations of the Eastern Canada Telemetered Network (ECTN) shows that the epicentres of the two earthquakes were separated by 6.4 km along a WSW-trending line. The presence of a weak Rg phase on the seismograms recorded at station KLN suggests shallow depths for the earthquakes, probably in the depth range 3 to 5 km. Interpretation of seismic-reflection-record sections for the area show a number of SW-trending thrust faults that might be possible sources for the earthquake movement. However, focal mechanism studies of the

two events yield different solutions: the "best solution" for the 1984 event suggests strike slip/thrust motion in response to NE compression along a strike direction of 121° and the "best solution" for the 1988 event suggests thrust faulting in response to NE compression on N- or NW-trending planes.

An intensity survey was conducted for the 1988 event and showed that the earthquake was felt over an area of approximately 4900 sq. km. Magnitude - felt area relationships yield magnitude estimates of 3.6 to 3.7, which compares favorably with the instrumentally determined magnitude. This latter result increases the confidence in applying the same relationships to historical earthquakes in the Moncton region.