Continuing investigations in the Miramichi earthquake region of New Brunswick

*K.B.S. Burke and J.J. Chandra**
Department of Geology, University of New Brunswick, Fredericton, N.B. E3B 5A3
**Mineral Resources Division, Department of Natural Resources, Fredericton, N.B.*

During 1983, further investigations were carried out in the Miramichi Earthquake Region, where aftershock activity continues nearly two years after the main event. Ground magnetic and radiometric measurements and VLF-EM surveys have been completed and a radon gas monitoring program established for 17 drillholes in the area. Stripping of overburden in selected areas has yielded information on the nature of surficial fracturing and the identity of VLF-EM anomalies.

Modelling of gravity anomalies shows that the North Pole Stream Granite, which is the main geological body in the region, extends to a depth of 8 km and has its edges covered by a relatively thin wedge (0-1 km) of metasedimentary and older plutonic rocks. Since nearly all of the reported aftershocks have their focal depths in the 1 to 7 km range, it is concluded that the earthquake activity is confined to the pluton. Small diorite bodies with areal extents of a few square kilometres and thicknesses of 1 to 2 km occur within the granitic rocks of the pluton, but do not appear to be related spatially to the earthquakes. The heterogeneous nature of the pluton is confirmed by the magnetic and radiometric measurements.

Stripping of overburden in the area of a crack previously thought to be seismogenic revealed that mvoement was of limited extent and is more likely related to either glacial unloading or the release of tectonic stress. The stripping operation also led to the identification of a pop-up feature that is probably associated with a higher than normal horizontal stress.

A nearby VLF-EM conductor was trenched and found to be due to a highly weathered fault zone with a trend of 140 degrees. This fault zone is the only major structural feature recognized within the epicentral area. There is no conclusive evidence of post-glacial movement along this fault; however, features in the vicinity of the breccia zone can be related to glacial and possibly post-glacial phenomena.

The present earthquake activity may be taking place in a granite that has been considerably weakened by earlier stages of deformation and is now less resistant to stress than the surrounding rocks. No evidence has been found for major fault zones suggested by the fault plane solutions of the seismological records.