A damaging earthquake could occur in the western Lake Ontario area

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The western Lake Ontario area is the most densely populated in Canada, and the home of mass transit, skyscrapers, industrial plants, waste disposal facilities and nuclear reactors. It is also an area about which there are ongoing debates regarding earthquake potential. Some consider that, because large-magnitude earthquakes have never been recorded there and that the locations of the small ones that have occurred there are poorly known, the seismic risk is low. Others argue just the opposite.

Seismicity results from movement along faults, thus knowledge of the characteristics of major faults in the western Lake Ontario area is essential in trying to estimate earthquake risk. As a result of geological fieldwork carried out in the last few years, it is known that at least five major faults pass into Lake Ontario. One is the Niagara-Pickering fault zone, which goes under the Pickering Nuclear Generating Station, the second is the Clarendon-Linden Fault, which crosses central Lake Ontario, and the third is the St. Lawrence fault zone, which extends upstream along the St. Lawrence valley into and, apparently, along the entire length of the lake. Both the

fourth and fifth faults traverse beneath the total width of western Lake Ontario and are associated with alignments of earthquake epicenters. One, the Georgian Bay fault zone, is marked by geophysically expressed lineaments, and geologically recent faulting, whereas the other, the Hamilton-Lake Erie Fault, also shows geophysical expression and is associated with subsurface faulting.

In late November 1999 a magnitude 3.8 earthquake occurred within 25 km of the Pickering Nuclear Generating Station, and is the largest to have been documented in that area. Though not large enough to cause damage, it was felt throughout the western Lake Ontario area and may be a harbinger of things to be expected.