Chapter One

Introduction

Planet Earth, no matter how solid it may sometimes seem, is really a gigantic sounding board. By applying appropriate "ears" to the ground, one can sense vibrations caused by significant events that may have occurred 10 000 kilometres away.

The noises most commonly heard are natural in origin — the results of earthquakes, the pounding of waves on distant shores and weather noise — but humans make their own contributions through daily activities such as mining, construction and the operation of trains and motor vehicles.

The most dramatic of all noises of human origin, however, derives from underground nuclear explosions, which may cause shocks in the Earth's crust comparable to those of sizeable earthquakes.

The instruments that are used to detect such events are called seismographs. These sensitive devices record both vertical and horizontal movements of the Earth's surface that may not be sensed by human beings. The seismograph may be the most important means of verification for a treaty prohibiting all underground testing of nuclear weapons.

When a sufficiently large number of suitably located seismographs sense the same event, it is often possible to compare their findings and determine with a fair degree of certainty the nature of the event causing the shock waves, its location, its depth below the surface and the approximate amount of energy involved.

Canada has a long tradition in geophysics and in the monitoring of earthquakes. Canadian experts who have spent their careers studying such matters believe that Canada has a unique role to play in the development of reliable verification systems that would be an essential prerequisite to the conclusion of any comprehensive test ban treaty. Canada's size, geographical position (see Figure 3), and geological similarity with the great continental rock mass that underlies much of Europe and Asia, as well as our own technical expertise, make this possible.