It is thus relatively easy for an expert to distinguish between earthquakes and explosions of large magnitude. Problems arise, however, in making distinctions at low magnitudes. Dr. Robert North, senior research seismologist at the Earth Physics Branch of Energy, Mines and Resources Canada, explains that two difficulties are experienced in interpreting the records of smaller events: first, there is a tendency for the seismic wave signals to get buried in background noise such as ocean movements or wind; and second, small explosions and small earthquakes tend to look alike on seismograph records.

Detection and Identification

Any verification program involves two distinct processes: (i) detection, or the recognition that a seismic event has taken place and where; and (ii) identification of the nature of the event.

In the opinion of Dr. Peter Basham, head of seismic verification research at the Earth Physics Branch, Department of Energy, Mines and Resources, the threshold at which there is confidence in the ability to detect and identify a nuclear explosion against background Earth noise is the key issue in seismic verification as far as drafting any hypothetical treaty is concerned.

Usually, a number of stations will record a specific event. The more stations that do, the better the information will be. Furthermore, if the stations are suitably placed in a geographical sense, then it should be possible to estimate where the event took place with an accuracy of between 10 and 30 kilometres. Once the location has been established, highly sophisticated analysis of the data by a seismologist may be necessary to establish the nature of the event, particularly if the signals are detected just above the level of background noise.

It may also be important to determine the energy released in an explosion, particularly if a treaty (in the absence of a complete ban on testing) establishes a threshold limit on test size. When an event has been identified as being of nuclear origin and it comes to determining the energy released, adjustments are made to the seismic readings (calibration) on the basis of seismic data previously collected for the same region. Ideally, such data would be provided by the country of origin; however, a problem exists be-