

to occur, to what levels could the event be identified as either an earthquake or an explosion, and to what accuracy could it be located?

In our assessment, country A and country B described above are entirely general. This approach could, of course, be extended in a variety of ways working from the world-wide ensemble of stations. If country A is concerned about the possibility of clandestine testing in countries B, C and D only, for example, the problem of the minimum additional information required to meet certain levels of guarantee is, in our opinion, solvable by similar analyses. The general problem we have studied is, in many ways, the most difficult. Another example of the application of such a dialectic approach would arise in considering the application of this analysis to "verification by challenge": the approach used allows calculation of the limits of the effectiveness of a refutation of a challenge by the provision of seismological information. Extension to stations not reported in the UN returns is, in principle, straightforward for country A with a country B, C, D problem, or for the general case.

It may be of value to explain here briefly how this final assessment differs in contents and format from the preliminary analysis distributed and discussed in the CCD in August, 1970. The principal reason for preparing a second edition is to include in the analysis all seismograph station data received by the Secretary-General after completion of the earlier preliminary analysis. We have, in addition, made other changes, the most important of which are as follows.

- (1) On the basis of new information received the effective sensitivities of two long period arrays have been increased.
- (2) A more elegant method of defining detection probabilities of events on the basis of station sensitivities is employed.
- (3) All global detection and identification capabilities are defined at the 90 per cent probability level.
- (4) All formal calculations are made using conceptual global networks of fixed numbers of stations.
- (5) Explosion thresholds are stated in both equivalent earthquake magnitudes and explosive yields.
- (6) Additional published and unpublished research results are discussed.

This paper is long because we felt it important to describe unequivocally at each stage in the developing theme exactly what assumptions are made, giving our rationale for them. We have, perforce, needed to make a number of scientific judgements at different points in the development, and these we have attempted to explain fully so that any of our colleagues who read this paper can more easily form their own professional judgement about them. In addition, in a serious attempt to make the scientific significance of this document understandable to readers outside the seismological community, we have judged it useful to labour some points that would be simply appreciated by seismologists. However, of necessity, the entire document is couched in seismological terminology. So that the results of the analysis may be more comprehensible to a