continental propagation of the shorter period R_g Rayleigh waves. We are hesitant to extrapolate the North American R_g results to other continental masses because equivalent success remains unproven (see section 9.2). The m5.0 threshold can be reached using 20-second Rayleigh waves only by degrading the number of observations (and hence the probability of application) and relying on the matched filtered data from one or two very high-gain long period facilities. This more restricted m5.0 capability, which is not yet proven to be generally applicable, can be regarded as explosion identification in the 10 to 20 kiloton hardrock range.

The identification threshold can be reduced below m5.0 only by employing criteria whose thresholds of application are below the explosion Rayleigh wave detection thresholds with equipment currently deployed. The criterion with greatest appeal is the P wave spectral ratio, which can in theory be applied close to the P wave detection threshold. The spectral ratio method for one station-region combination is a positive identifier at the m4.9 level; others show potential application at lower levels but result in overlapping populations.

Thus, we conclude that to consistently achieve an identification threshold below m5.0 all available identification criteria must be brought to bear as a multivariate analysis. The problem of assembling the necessary regionalized data to achieve identification below m5.0 for any conceivable test site in the northern hemisphere is a formidable one. This results, in our opinion, in a tendency to neglect the intrinsic power of the different methods, and leads naturally to the alternative concept of increasing the detection capability for explosion Rayleigh waves by a major investment in widely distributed arrays designed to achieve, for example, the capability of detecting Rayleigh waves for any m4.5 explosion.

We believe that an appropriate intermediate step, between acceptance of the existing rather limited capability as defined earlier in this chapter and commitment of extensive international resources to a widely deployed, highly sophisticated, integrated system of modern array stations, would be further definitive national assessments of existing capabilities and, where necessary, minor adjustments in facilities and techniques designed to improve modestly these capabilities. Some recommendations and suggestions for implementation of this intermediate step are given in the following section.

9.2 Recommendations for Improving Capabilities Using Existing Facilities

The conclusions of this assessment that result from the formal detection calculations are closely tied to the initial assumptions required to define individual station capabilities in terms of quoted operating magnifications. The assumptions we have made, in the absence of supporting definitive empirical data, are of necessity conservative: witness the conservative assumed general P wave detection capabilities of stations MBC and COL compared with their empirically defined capability for a particular site, described in section 6.2. If, on the average, our assumptions for both SPZ and LPZ station capabilities are conservative, then additional empirical