SEISMIC HAZARD MAPS FOR
THE EASTERN CARIBBEAN

In the following pages we present the revised probabilistic seismic hazard analyses for the eastern Caribbean using data covering the period up to Jan 1 2003. These results are given in maps showing the levels of spectral ground acceleration with 2% probability of exceedence in any 50-year period. Levels of acceleration are estimated for periods of ground oscillation of 0.2 seconds and 1.0 seconds. The 2% probability in 50 years has been established as the standard for building codes. It takes into consideration events with a 4275-year return period and therefore includes very rare large earthquakes. Each ground motion mapped corresponds to a portion of the bandwidth of energy radiated from an earthquake. Like the peak ground acceleration (pga), the 0.2 s spectral acceleration correspond to short-period energy that will have the greatest effect on short-period structures. The 1.0 s maps give the level of vibration that will have the greatest effect on longer-period structures.

The seismic hazard values we present were calculated using a probabilistic method based on a historic earthquake occurrence method (Veneziano et al., 1984) as applied by Tanner and Shepherd (1997). Definition of the way in which spectral ground acceleration at several different periods of ground vibration decays with distance for earthquakes of different magnitudes would require far more strong ground motion data than we have yet managed to acquire. However, calibrated instruments have been used in our efforts to determine the most appropriate attenuation relationships for the region. Ground motions from earthquakes between 20 and 200 km deep were calculated using attenuation relationships developed by Youngs et al. (1997). For shallow (crustal) earthquakes attenuation relationships developed by Boore et al 1993,1997 were used. These latter relationships were developed from studies of a very extensive suite of shallow earthquakes in western North America. Spectral accelerations were estimated from the spectral attenuation curves published for these relationships. The largest seismic hazard values generally occur in areas that have been, or are likely to be, the sites of the largest plate boundary earthquakes. High hazard values occur in areas where shallow-to-intermediate seismicity occurs frequently.

The site classification for these maps is a rock. Values on the maps are in gals (where 1 gal = 1 cm sec$^{-2}$). All short period maps are to be scaled by a factor of 2.5.
References


