Appendix H
PROPERTY AND CASUALTY LOSS ESTIMATION – TORNADO

This appendix describes the steps followed in making probabilistic tornado hazard estimates and related impacts for individual sites considering tornado hazards.

Step 1. Pick a one-degree latitude by one-degree longitude grid that covers the site in question.

Step 2. Estimate the area covered by this macro-grid (e.g., 10,242 km^2).

Step 3. Use NOAA data having tornado vectors and their Fujita ratings to count the number of tornadoes (by their starting-point) in the macro-grid.

Step 4. Divide each count by the number of years surveyed in the NOAA data.

Step 5. Use a linear multiplier for undercount. J. McDonald (oral communication, 2004) suggested a much lower multiplier than Sigal et al. (2000) used; the multiplier of 1.3, or a 30 percent increase, is not adjusted by Fujita rating.

Step 6. Use data by Brooks (2003) from NOAA studies to determine a "mean-based" rectangle that represents each Fujita level tornado. Each rectangle is assumed to occur wholly within the macro-grid, and contains all Fujita level winds associated with each tornado.

Step 7. For each rectangle, determine length degradation (from Sigal et al., 2000) and width degradation (McDonald, oral communication, 2004) matrices, and combine them to determine a total degradation matrix (e.g., how much of the total area of a Fujita 5 tornado has Fujita 5 level winds, Fujita 4 level winds, and so on).

Step 8. Use the foregoing steps to derive the total annualized area in the macro-grid that is exposed to Fujita level 5 winds, Fujita 4 winds, and so on.

Step 9. Divide these total annualized areas by the total macro-grid area in order to estimate the annualized probability of Fujita level 5 winds, Fujita level 4 winds, and so on at each site in the macro-grid.

Step 10. Use HAZUS damage functions to estimate damages and casualties for one- and two-story wood-frame dwellings, with and without safe rooms. Safe rooms are assumed to withstand 250 mph winds as tested by Texas Tech. They are assumed conservatively to be no safer than normal dwellings in higher level winds.

Step 11. Make estimates of casualties as based on HAZUS.