

An Example of A Risk-informed Methodology

A risk-informed methodology for determining a design basis tornado wind speed for a specific site might be based on a tornado hazard curve such as the one shown below. Tornado hazard curves are usually expressed in terms of the frequency per year of exceedance of various wind speeds. A risk-informed methodology could permit a design basis tornado of higher mean frequency than 10^{-7} per year if a risk-informed analysis satisfactorily demonstrates that the risk from tornado strikes with frequencies between the selected design basis frequency and 10^{-7} per year is sufficiently small. Using the tornado hazard curve shown below as an example, the selection of an initiating tornado frequency of 10^{-6} per year instead of 10^{-7} per year as the criterion for the design basis tornado wind speed would result in reducing the design basis tornado wind speed from 268 mph to 222 mph. The reduction in the design basis wind speed will mean that structures, systems, and components may begin to fail when exposed to wind speeds in excess of 222 mph that would otherwise not have failed until wind speeds exceeded 268 mph. The likelihood of these failures can be combined with the frequency of wind speeds between 222 mph and 268 mph to estimate the increase in risk associated with reducing the design basis wind speed from 268 mph to 222 mph. This increase in risk could be compared to some acceptance criteria such as the guidelines in Regulatory Guide 1.174 to determine if the increase is sufficiently small.

This approach and acceptance criteria are consistent with current risk informed practices and decision criteria as described in Regulatory Guide 1.174. The approach is also similar to the approach used to demonstrate an acceptable seismic design that is being used in the early site permit applications. This approach may need to be further developed and modified in accordance with other risk informed guidelines developed by the Commission and the analytic methods available to evaluate the risk of high winds.

A Typical Tornado Hazard Curve

