3.3 WIND AND TORNADO LOADINGS

3.3.1 Wind Loadings

3.3.1.1 Design Wind Velocity and Loadings

A wind load of 30 pounds per square foot, equivalent to 108 mph, was applied to Category I structures and was found to be less critical than the operating basis earthquake load.

3.3.2 Tornado Loadings

3.3.2.1 Tornado Parameters

The Reactor Containment, Fuel Handling, and Auxiliary Buildings have been checked against a tornado loading based on a peripheral wind velocity of 300 mph and a translational velocity of 60 mph. Simultaneous with wind loading, an atmospheric pressure drop of 3 psig has been considered.

3.3.2.2 Determination of Forces on Structures

The three tornado wind distributions shown on Figure 3.3-1 were investigated in the Category I structural design. In combination with the static forces produced by the 360 mph maximum wind, a 3 psig atmospheric pressure drop was specified for the containment structure. The shape factor, C, for the dome was taken as 0.4 and for the cylinder, 0.5. No gust factor was applied.

The experimental pressure distribution curves by Hoerner and Born were considered by Conrad Associates to be representative for the size of the containment cylinder. To obtain conservative membrane shear stresses, an upper-bound pressure distribution function minimizing the windward side suction component was adopted as shown by the solid line on Figure 3.3-2.

A bursting pressure of 3 psig was also applied to the containment structure as part of the ultimate loading combination.

The tornado loading analysis indicates that the peak membrane shear (which is the only significant stress component) induced at the base is 61.5 K/ft in comparison with 152.2 K/ft and 88.7 K/ft for the design basis earthquake and operating basis earthquake, respectively.

It is further concluded from the investigation by Conrad Associates that a maximum wind velocity of 475 mph could be applied to the containment before any of the reinforcing steel reaches its yield strength.

Forces, moments, and shears in the containment structure due to tornado wind load are shown on Figures 3.3-3, 3.3-4, and 3.3-5.

3.3.2.3 Interaction of Category I and Non-Category I Structures

Non-Category I structures adjacent to Category I structures are heavily braced to withstand tornado wind forces such that they will not collapse on the Category I structures. Metal siding on the Turbine Building is designed to be blown out to relieve tornado-generated differential pressure.