

- Jet fuel: Based on the estimates reported in Sections 2.6.1 and 2.7.1 and the distribution of the Jet A among the impact floors, as shown in Table 6–1 from NIST NCSTAR 1-2B, it was assumed that 40 percent of the jet fuel was available for combustion on the impact floors. The thermal properties were assumed to be similar to JP-4 and JP-5, whose values were obtained from the SFPE Handbook.
- Aircraft combustibles: The mass was 12,100 kg (25,800 lb) for WTC 1, 12,500 kg (27,600 lb) for WTC 2 (Table 3–7).
- FDS computational grid size: Each floor comprised 128 by 128 by 9 cells. Each cell was 0.5 m in width and depth and 0.4 m in height.

6.2.2 Variables

The sensitivity of the output of single floor FDS simulations to five variables had been assessed previously (NIST NCSTAR 1-5F). There were two that affected the combustible mass (volume of jet fuel and density of office combustibles) and three that affected the availability of air for the combustion (fraction of core walls broken, air velocity in the core shafts, and the oxygen concentration of the air in the shafts). The most influential was density of combustibles; second was the extent of core wall damage. The other factors were secondary. In these simulations, most of the air for the fires came from the broken windows. As noted above, the location and number of broken windows were determined from the photographic evidence and were thus not variables.

Table 6–1 summarizes the differences between the two simulations for each tower. The following add additional detail on some of the variable parameters:

- It was assumed that the sprayed fire-resistive material (SFRM) prior to the impact was consistent with the as-built condition and characterized by a uniform equivalent thickness (NIST NCSTAR 1-6). If a structural element was found to be in the path of a debris field of sufficient intensity (NIST NCSTAR 1-2), all the insulation (SFRM and gypsum board) was deemed to have been removed.
- Damage to core walls: In Cases A and C, the walls impacted by the debris field were fully removed. This enabled rapid venting of the upper layer into the core shafts and reduced the burning rate of combustibles in the tenant spaces. In cases B and D, a more severe representation of the damage was to leave intact the top 1.2 m of the core wall. This "soffit" would maintain a hot upper layer on each fire floor. This produced a fire of longer duration near the core columns and the attached floor membranes.

6.2.3 Presentation of Results

The results of the FDS simulations of the perimeter fires were compared with the fire duration and spread rate as seen in the photographs and videos. Contour plots of the room gas temperature 0.4 m below the ceiling slab (in the "upper layer" of the compartment) were superimposed on profiles of the observed fire activity (from NIST NCSTAR 1-5A) for each floor at 15 min intervals (Figures 6–1 through 6–16 for WTC 1; Figures 6–17 through 6–28 for WTC 2). The results for the two Cases for a given tower are shown on facing pages for ready comparison.