

Table E–1. Times for major September 11, 2001, events.

Event	Time
First aircraft strike	8:46:30 a.m.
Second aircraft strike	9:02:59 a.m.
Collapse of WTC 2	9:58:59 a.m.
Collapse of WTC 1	10:28:22 a.m.
Collapse of WTC 7	5:20:52 p.m.

E.3 BUILDING INTERIORS AND COMBUSTIBLES

NIST obtained architectural plans for most of the floors in the impact and fire zones of WTC 1 and WTC 2. These included the locations of interior walls, descriptions of the floor and ceiling construction, and additional features such as the locations of staircases within the tenant spaces.

Since the ceiling system could have served as a temporary protective barrier to heating of the floor structure above, shaking table experiments were conducted to determine the magnitude of building impact that could have led to significant dislodging of ceiling tiles. Forces of the order of 5g caused significant damage to the framing. Since the aircraft impact forces were estimated to have been about 100g, NIST assumed there was not enough of the ceiling system in place to provide significant thermal protection.

The most common floor plan was a continuous open space populated by a large array of workstations or cubicles. Although there were a variety of styles of such units, the cubicles were fundamentally similar. Each cubicle typically was bounded by privacy panels, with a single entrance opening. Within the area defined by the panels was a desktop, file storage, bookshelves, carpeting, chair, etc. In addition, there were a variety of amounts and locations of paper, both on the work surfaces and within the file cabinets and bookshelves. These cubicles were grouped in clusters or rows, with up to 215 units on a given floor.

NIST conducted fire tests of single representative workstations, both to obtain flammability data and to provide input for a combustion algorithm for FDS. The tests included the effects of the presence of jet fuel and of fallen inert material representative of ceiling tiles or wall fragments. The results were:

- A workstation generated a total heat release of approximately 3.9 GJ from a mass loss of approximately 200 kg. These values were insensitive to the addition of jet fuel or inert material. Approximately 75 percent of the heat release and mass loss occurred over a period of approximately 20 min. The peak heat release rate (HRR) was approximately 7 MW.
- The inert material reduced the peak HRR approximately in proportion to its coverage of the burning surfaces.
- The jet fuel sharply shortened the time to involvement of all accessible combustible surfaces and, thus, the time to the peak HRR.

From the floor plans and the combustibility data, it was estimated that the combustible fuel load in the WTC tenant spaces was approximately 20 kg/m² (4 lb/ft²). The two aircraft introduced significant increments to this fuel loading along the paths of their entry into the buildings. United Airlines,