

Appendix D

HYPOTHETICAL BLAST SCENARIOS

D.1 BACKGROUND

As part of assessing alternative hypotheses for initiation of the collapse of WTC 7, a hypothetical blast event was considered. Scenarios of a hypothetical blast event that could have occurred in WTC 7 on September 11, 2001, were assessed, including blast location, size, and timing. Identification and analysis of hypothetical blast scenarios was conducted in three phases, with the results from each phase being used as input to the next phase. The three phases were:

- Phase I: Identify hypothetical blast scenarios to initiate structural collapse.
- Phase II: Assess the blast wave propagation inside the building and the corresponding response of the WTC 7 windows.
- Phase III: Assess the approximate distance from the building that the blast would have been audible in an urban setting.

For Phase I, a controlled demolition expert identified appropriate charge sizes and configurations. In Phase II, based on the specified charge from Phase I, the hydrocode SHAMRC was used to calculate the blast propagation through the building. The pressures at the outer walls of WTC 7 developed by SHAMRC were then used to assess window damage. In Phase III, acoustic analysis of sound propagation outside the building was carried out with a U.S. Air Force low overpressure acoustic wave propagation code called NLAWS.

The following sections describe the work performed in each of the three phases along with results.

D.2 PHASE I: EXPERT RECOMMENDED PREPARATIONS FOR EXPLOSIVELY CONTROLLED DEMOLITION

Phase I identified a single minimum plausible scenario for the explosive demolition of a selected column or truss. This included columns that supported large tributary areas and a critical truss cross-member. The analysis assumed that severance of one of these members could initiate building collapse. For successful demolition of a column, failure was defined as complete severance of the column section, or complete severance of sufficient sections of the flange, web, and cover plates, such that the remaining column section was insufficient to carry the column service loads, or that a lateral deflection of the column section would exceed its section width.

The hypothetical blast scenarios that were addressed fell into two categories:

- Those in which there was sufficient time to prepare the structures for an optimum set-up prior to demolition. The objective would have been to use the minimum possible amount of