

Glass Fragmentation

Glass Fragmentation at Khobar Towers

...windows throughout Khobar Towers are untreated and are not protected by any blast mitigation scheme. The blast from a car bomb or other device would shatter windows sending shrapnel into quarters and offices throughout the affected buildings.

January 8, 1996 Vulnerability Assessment, Khobar Towers

In the 4404th Wing (Provisional) budget, items such as Mylar, a shatter resistant window film coating, and surveillance systems for the fence line were deferred until budgets in later years, despite the fact that funds for requested items, even unfunded requirements, had never been denied by U.S. Air Forces Central Command or U.S. Air Combat Command. The decision to budget Mylar in later years was made despite Recommendation #36 in the January 1996 Vulnerability Assessment:

RECOMMENDATION 36: Install 4 mil SRWF on all perimeter glass. According to US Embassy Sources SRWF has an approximate cost of \$50.00 per square meter. If the cost of upgrading all perimeter windows is deemed too great, begin with the perimeter faces of buildings 133 and 131, then work roughly clockwise around KT through to building 117. (emphasis added)

The Effect of a 200 Pound Bomb at Khobar Towers

Even if the bomb at Khobar Towers had been much smaller -- the casualties would have been significant. A Task Force explosives expert calculated that if a 200 pound bomb had exploded 80 feet from Building 131, severe window frame failure and spalling of reinforced concrete would have resulted. Injuries from glass fragments would have been extensive. Major structural damage would probably have caused the building to be condemned. The Task Force estimated between five and 11 deaths would have occurred from the 200 pound blast. The estimate assumes that people were in approximately the same position as they were on June 25th. Deaths would have resulted from the effects of the flying glass and not from blunt trauma.

(From page 56 of the Downing Assessment)

The Significance of Blast Effects

The Department of Defense must address the significance of blast effects with formal standards. At Khobar Towers, blast effects caused concrete spalling and severe window frame failure. Glass fragmentation was a critical factor in the large number of injuries and contributed significantly to the cause of death. Two of the 19 deceased had injuries known to be caused by glass fragments that were severe enough to cause death even without other contributing forces. Of the remaining 17 deceased, 10 had glass injuries that were significant and which may have caused death even without blunt force trauma. Thus, for 12 of the 19 deaths, glass fragmentation was a significant factor.

More than 90% of the people injured suffered laceration injuries, many of which were significant. For many individuals, lacerations were the only listed injuries. The lack of emergency lighting systems in the building hallways and stairwells and, with few exceptions, outside on the compound contributed to secondary injury as people encountered shattered glass during the evacuation of buildings.

(From page 13 of the Downing Assessment)