HANDOUT 9.2: OKLAHOMA CITY BOMBING CASE STUDY

Purpose:	To examine the blast effects on the Murrah Federal Building in Oklahoma City and identify ways in which the structural damage and loss of life could have been mitigated
Duration:	15 minutes (5-activity; 10-debrief)
Group composition:	Table groups
Debrief:	Large-group discussion

Examining a real-world explosive attack on a critical infrastructure facility helps enhance understanding of the effects of explosions. You will now read a case study involving a terrorist bombing on the Alfred P. Murrah Federal Building located in Oklahoma City, Oklahoma, US. The severity of the explosion also resulted in extensive damage to the area surrounding this building. The man responsible for the attack, Timothy McVeigh, was motivated by his extreme hatred for the US government.

Directions:

1. Work with your group to read the case study involving the Oklahoma City, Oklahoma, US, bombing.
2. Be prepared to answer large group discussion questions.

Oklahoma City Bombing Case Study

Background

The Alfred P. Murrah Federal Building was a reinforced steel and concrete structure, built in 1974. The building was nine stories high, with a basement and parking garage. Located in the building were nineteen federal agencies and three private companies. A child day care center was located on the second floor.

Events

- On April 19, 1995, Wednesday morning at 0902 hours, Timothy McVeigh detonated a large vehicle bomb in a freight delivery zone next to the Murrah Building.
- McVeigh constructed the bomb device with a main charge of ammonium nitrate and fuel oil, commercial dynamite boosters with detonating cord, a nonelectric detonator, and safety fuse. The large vehicle was a rental cargo van that was capable of carrying in excess of 2,000 kg.
- McVeigh parked the vehicle bomb along the north side of the structure in a freight delivery zone adjacent to the building.
  - McVeigh initiated the 1.21 meters of safety fuse, exited and locked the vehicle, then walked away.
  - The safety fuse burned and allowed approximately 2.5 minutes to detonation.
- The north side (rear) of the structure had a glass exterior face on the third through ninth floors, supported by one main transfer beam having five structural supports beneath it.
  - The structural design of the building contributed to the progressive collapse of the third through ninth floors after the blast.

  - The main transfer beam was located just above and next to the large vehicle bomb.
- The vehicle bomb created a significant thermal effect that ignited vehicles nearby and a blast wave that structurally destroyed 10 buildings, seriously damaged 15 others, and caused damage to 312 more.
  - The shock front and reflected pressure shattered the glass face of the Murrah Federal Building and tossed persons inside through the air, causing massive injuries from the enormous pressure, as well as injuries from shards of broken glass and flying debris.
  - The blast wave impact on the building caused the failure of the main transfer beam that gave support to the third through ninth floors.
    - As this beam collapsed, all of the floors above, along the north wall, collapsed in a pancake configuration to the street below.
    - Many of the victims may have survived the blast but perished because of the building collapse.
- The blast wave traveled outward in all directions, reflecting off buildings and causing significant structural damage, deaths and injuries at the Water Resources Board building, the Athenian restaurant, the Journal Record building, and numerous others in a 1.5 kilometer radius.
- Of the six persons inside the Athenian restaurant at the time of the blast, two were killed and four were injured.
- Of the 65 employees in the Water Resources Board building, located at the end of the block approximately 50 meters from the blast seat, 2 persons died and 39 were injured because of the blast.
- The Journal Record building is a large structure having the rear area exposed to the blast seat. The shock wave and blast pressure traveled from the large vehicle bomb and reflected off the building exterior.
  - There were 303 employees inside at the time of the blast, 126 were injured.
  - The reflected pressure blew all the windows of the Journal Record building inward causing significant interior damage to the structure.
  - The blast pressure when affecting, even on glass, amplified and entered the building with greater impact.
  - The blast wave lifted the roof area, which then slid off into the parking lot below.
- Only one person on the street outside of any structures died because of the explosion; 60 others received injuries.
- After weeks of sorting through debris to find victims, the victim count was 163 people inside the Murrah Federal Building died and hundreds more injured.
  - The death toll included 19 children, who were located on the second floor, inside the America's Kids Child Development Center.
  - In addition, one nurse died during the rescue operations.

1. **Why do you think McVeigh chose this day of the week and time?**

2. **What steps could building designers, building security, or law enforcement have taken to mitigate some of the damage?**

3. **Why did it only take 68 kg to demolish the building?**

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