Buncefield Incident – Some Lessons Learnt
Motivation

• The Buncefield Incident in 2005 was the most severe explosion and fire in Europe after World War II
• The operators of the oil storage terminal were prosecuted and fined for their roles
• What are some of the lessons that can be learnt from that incident?
Dr Fathi Tarada

• Expert witness in criminal trial against Hertfordshire Oil Storage Ltd (HOSL) and British Pipeline Agency Limited (BPA)

• Appointed by the Competent Authority (Health & Safety Executive and Environment Agency)

• First public presentation of my findings
Contents

• Background to the incident
• Scope of expert witness role
• Secondary containment
• Tertiary containment
• Recommendations
Background to the Incident
Cause of Incident

• Overflow of Tank 912 due to faulty gauge
• High-level switch also failed
• 300 tonnes of petrol spilled through tank’s roof vents
• Vapour quickly flowed out of bunds and off the site, at 2m depth
• Unconfined vapour cloud explosion of unusually high strength
Incident Progression

• Large initial explosion from HOSL’s tank T912, and consequent fire
• Fire spread over 22 fuel storage tanks and 7 bunds
• Six tanks on adjoining British Pipeline Agency Limited (BPA) site also involved in fire
Casualties

• Fire burned for 3 days
• 43 people injured (two hospitalised)
• Extensive property damage
Initial Fireball
Seismic Activity (Richter Scale 2.4)

Arrival of the ground vibrations

Arrival of the blast wave.
Police Helicopter View
Temperature Inversion
Scope of Expert Witness Reports

For HOSL and BPA sites, review of:

- Secondary containment (bund integrity)
- Tertiary containment (site profiling and drainage)
Bund Joints
No Reinforcement Steel through Joints
Failed Rubber Gasket
Obtuse Bund Angles
Spalled Bund Joint
Shielding Effect of Steel Plate
Tie Bar Holes
Escape of Product & Firewater
Bund Joints – Key Issues

- Standards not adhered to
- Waterstops missing
- No reinforcement steel through joints
- Obtuse angles between bund sides
- Shielding of joints would have assisted in protecting them
Bund Penetrations
Destroyed Pipework
Fire-Fighting
Foam Application
Escape of Fire-Fighting Water & Foam
Aerial View
Escape of Product and Firewater
Cherry Trees Lane
Roundabout at Cherry Tree Lane
Contamination of Drainage System
Soakaway
Contamination
Tertiary Containment

• Drainage system had limited capacity, and led to soakaways.

• The fire water lagoon had an intrinsic flaw in that it flooded the fire pump house when it was full.

• The site topography was not suitable for retention of petroleum products on site, since any flow would naturally go down Cherry Tree Lane.
Specific Recommendations

• Loss of secondary containment:
  – Bund joints
  – Tie bar holes
  – Pipe penetrations

• Tertiary containment
Other Recommendations

• Loss of containment (indication switches)
• Emergency arrangements
• Safety management systems, managerial oversight and leadership
Thank You

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