Buncefield Incident – Some Lessons Learnt

mosen

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?

mosen

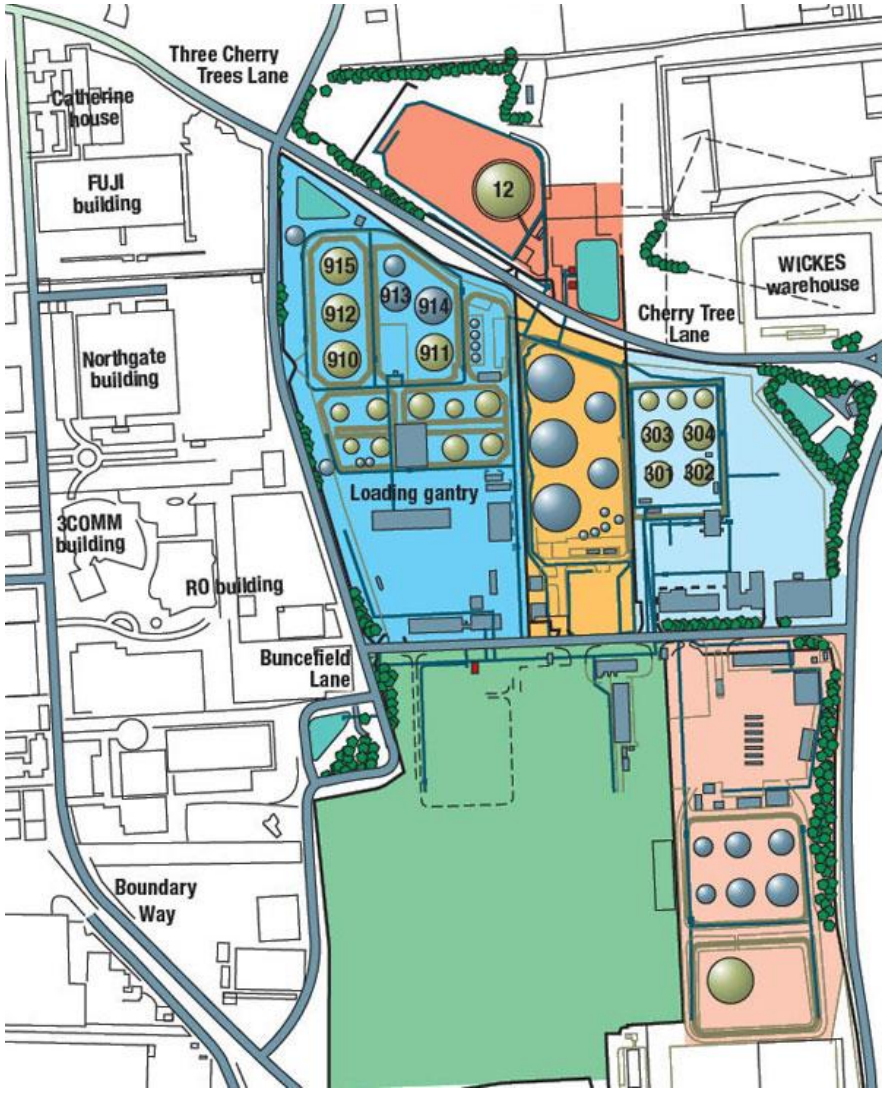
Dr Fathi Tarada

- 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

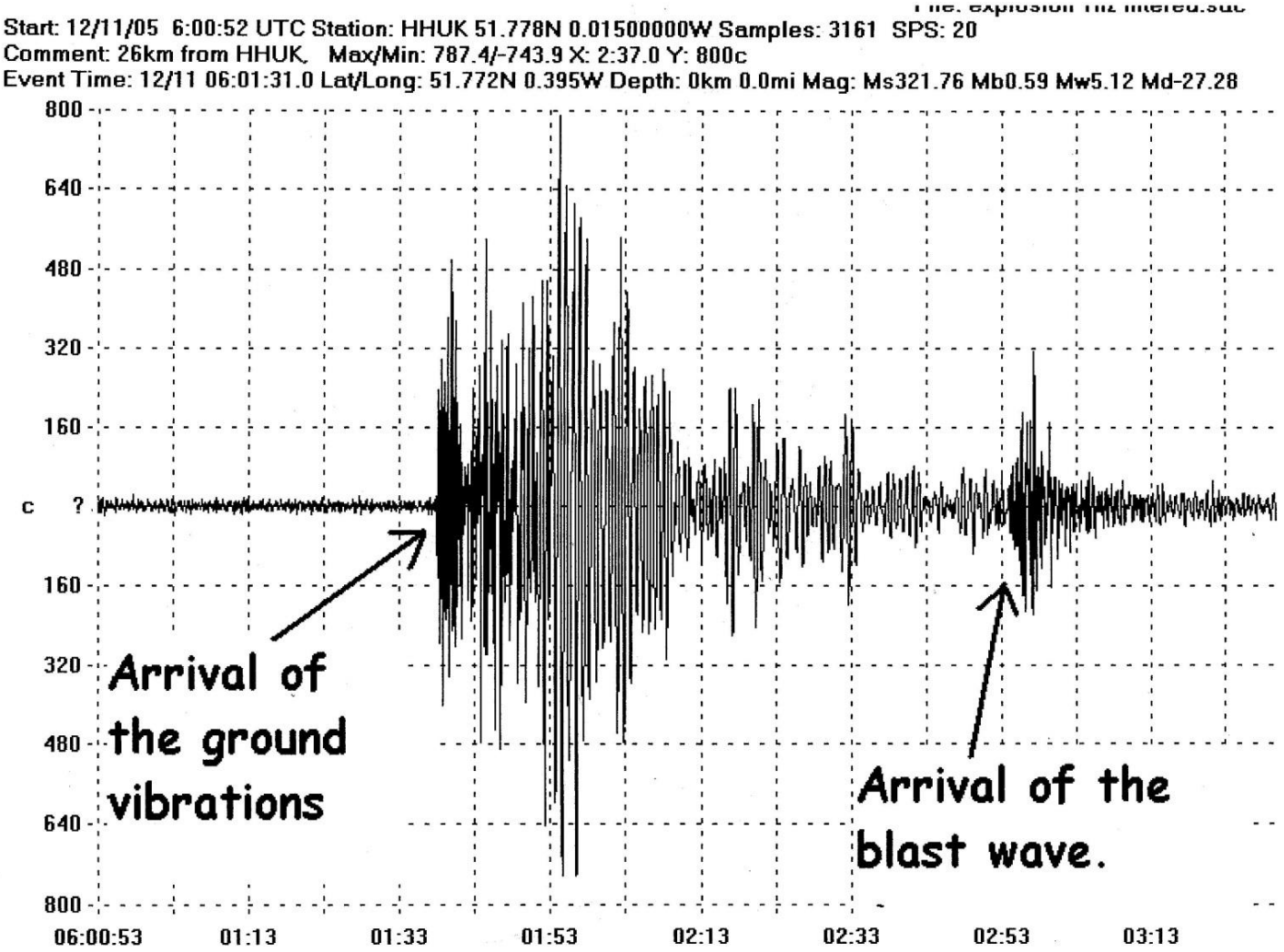
- Large initial explosion from HOSL's tank T912, and consequent fire
- Fire spread over 22 fuel storage tanks and 7 bunds
- Six tanks on adjoining British Pipeline Agency Limited (BPA) site also involved in fire

Casualties

- Fire burned for 3 days
- 43 people injured (two hospitalised)
- Extensive property damage

Initial Fireball

Seismic Activity (Richter Scale 2.4)



Police Helicopter View

Temperature Inversion

Fuji Building

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

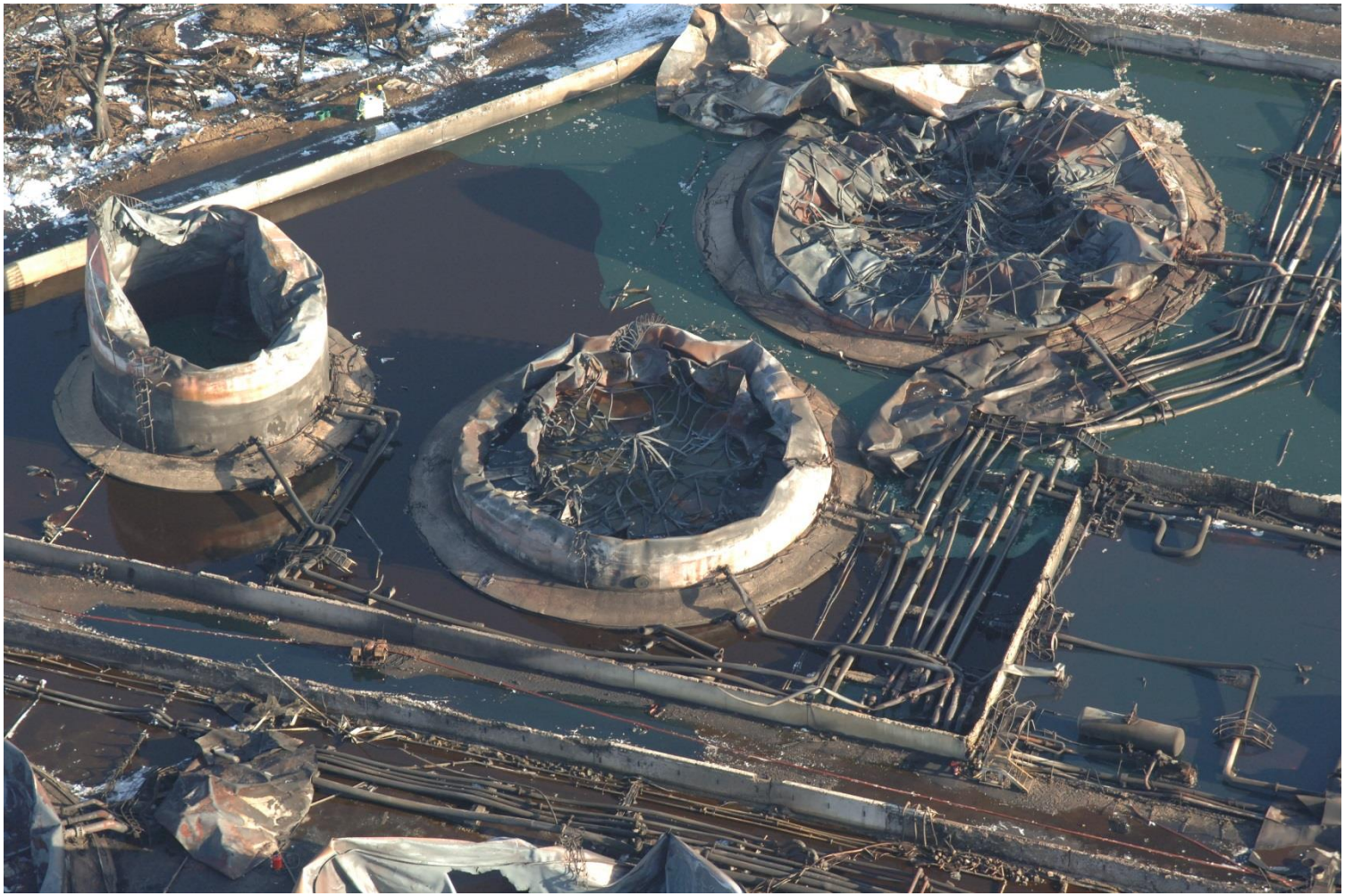
Fire-Fighting

Tank Collapse

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

Dr Fathi Tarada

Mosen Ltd