Update 2009
Large Atmospheric Storage Tank Fires
An industry consortium of international oil companies reviewing risks associated with storage tank fires
Member commitments

- Two Steering Group members
- Questionnaire completion
- Suggest issues for review
- Advise coordinator on relevant issues / experiences
- Host meetings
- Encourage membership
• New LASTFIRE Website
• Incident Survey – Questionnaire
• WM Fuels LASTFIRE Test
• Vapour Suppression Work
New LASTFIRE Website

www.lastfire.co.uk

On behalf of a consortium of 10 oil companies a project was initiated in the late 1990s to review the risks associated with large diameter (greater than 40m) open top floating roof storage tanks. The project was known as the LASTFIRE project.
LASTFIRE Incident Survey

- Atmospheric Tanks
  - OTFR
  - Internal Floating Roof
  - Fixed Roof
- Pressurised Storage
  - Bullets
  - Spheres

Fires and spills

Available to members only!
FLOATING ROOF TANK FIRE SCENARIOS

Rimseal Fire

Spill on Roof Fire

Full Surface Fire

Bund Fire

Pontoon Explosion
FIXED (CONE) ROOF TANK FIRE SCENARIOS

Vent Fire

Vapour Space Explosion

Full Surface Fire

Bund Fire
INTERNAL ( COVERED ) FLOATING ROOF TANK
FIRE SCENARIOS

Vent Fires
LASTFIRE
BOILOVER STUDY
Basic Analysis

- Time to boilover
- Effect of water/fuel quantity
- Fire spread
- Tank wall temperatures
- Effect of crude composition
- Refined products / Biofuels
- Model validation
- Foam application vs time
Basic Analysis

- Multi boilovers possible
- Hot zone >2m/hr
- Spread >10d
- Tank wall temperature or noise not definitive guides
Future study

• Cooperate with IFIF – Rotterdam
• Methods of delaying boilover
• Methods of preventing boilover
• Test to be carried out March 2010
  • Additives
  • Surface covering
  • Effect on foam application
LASTFIRE
WM Fuels LASTFIRE Foam Test Development
Objectives

- To develop the long established LASTFIRE Foam Test for Storage Tank Fires methodology to suit assessment of foams on polar solvents and water miscible (WM) fuels
- To establish test parameters / methodology
- To establish best application rates
- To trial test equipment
  - Nozzles
  - Pan / backboard
Outcome

- Testing has established:
  - Preburn time – 3 minutes
  - Foam application durations – 7 mins
  - Application rates
  - Vapour seal testing
  - Burnback methodology
  - Equipment usage
  - Nozzle performance

Full specification developed
Initial Objectives

- Measure vapours above unignited pools
- Effectiveness of low expansion foam on vapour suppression (different types e.g. FP/MP)
- Effect of foam quality
- Effect of application rate
- Effect of solution strength
- Effectiveness over time
Gasoline

LASTFIRE Tank
(2.44m diameter)
Oxygen Cells Test 5

Test 5 (Gasoline)
Cells above Foam

Exposed to air

Above fuel surface

Air (%)

Time (hour)

Ch 0 Av 4.1% Fuel
Ch 1 Av 2.8% Fuel
Ch 2 Av 1.3% Fuel
Ch 3 Av 0.8% Fuel
Ch 4 Av 0.4% Fuel
“Handheld” (personal) LEL monitor used with lance / aspirator
Foam Application
(Monitor nozzle)
Measurements made throughout foam deterioration – up to 3 hours +
Observations

- FP based and MP foams appear effective at reducing vapour concentration above pool and around tank to <20% LEL for periods in excess of normal drainage time of foam solution.
- Wind a big factor in destroying blanket and possibly vapour suppression once foam solution has drained.
- Only severe agitation of foam blanket appears to reduce suppression effectiveness.
Hot Fuel Test – October 09

- How will foams suppress vapours on hot fuels?
- What top-up period?
- Drainage time vs. vapour suppression
- Gasoline used
- 3 minute preburn
- Foam application until extinguishment only
Hot Fuel Test – Findings

• Foam rapidly cooled fuel even after a 3 minute preburn
• Fuel temperature in the order of 35ºC
• Less than 2% LEL measured for over 2 hours
• Foam still very effective at reducing vapour concentration above the pool, as in the cold fuel test

Full findings only available to Lastfire Members
Measurement of Incident Radiation
Compilation of Incident Radiation Measurements Tests 3, 4, 6, 7, 8, 9 and 10

- 85% Ethanol - 15% Gasoline and 100% Gasoline
- Ethanol
Temperatures in Small Tank Test 4

Test 4 (85% Ethanol - 15% Gasoline)
Fighting Floating Roof Tank Rimseal Fires
More Information about LASTFIRE Deliverables from:

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