

Cradle to Grave Foam Assurance The LASTFIRE Process

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The dilemma!

Risk based Fire Hazard Management is always a balance between cost and risk reduction achieved. Especially with tank fires – not normally a life safety issue! Increasing environmental issues

Risk factors:

- Environmental issues
- Asset loss
- Business Interruption
- Public Image



Home News Business Sp About Us Advertising Contacts PUBLISHED. September 12, 2009 2:30 /	foam pollution has reached	Certainly a lot of concern!
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The LASTFIRE response

What are we doing? Developing interim best practice Position Paper Assurance procedures Reviewing alternatives Assessing new foams





Foam concentrate usage and options

Subjects

Response strategies Standards/Approvals Foam concentrate performance test





Tends to be expensive!

The LASTFIRE Test

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Commitments

Ongoing monitoring Additions to typical procurement specification Waste water treatment effect Research Control and assurance



Foam concentrate usage and options Subjects

Response strategies Standards/Approvals Foam concentrate performance test Foam Types and Properties Environmental constraints/Legislation Environmental Data Water Treatment/Separators Effects Foam Concentrate Developments Testing Systems/Equipment Training Changing Foam Concentrate Public Concerns Preplanning for Foam Usage Contaminated Firewater Treatment Reference Sources

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- Site Specific Assurance
 - Optimise use and application
 - Get the balance right
- "Cradle to Grave" approach
 - Containment
 - Control
 - System Assurance
 - Training
 - Disposal

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Foam Assurance Protocol

- Ten elements to address different areas
- Key and sub questions
- Extensive practical guidance
- Member feedback/buy in
- Red, Amber, Green ranking
- Self audit or Third Party
- Not just applicable to tanks

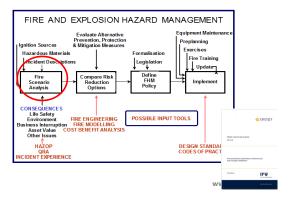


Element 1 - Assessment of Needs

Has a formal site wide evaluation of potential scenarios been carried out in order to determine the quantity of foam concentrate required to manage the incidents to the selected strategy?

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Element 1 - Assessment of Needs



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Element 1 - Assessment of Needs

Sub Questions 1 – Some Examples

- **1.1** Has a specific list of foam related tank fire scenarios and the accepted strategy to handle them been developed?
- 1.2 Did the development of the list have input from Process Operators, Maintenance, Internal Responders, relevant External Responders and Regulatory Authorities, with all team members confirming their acceptance of the outcome?
- 1.3 Is there a Scenario Worksheet quantifying the amounts of foam concentrate and associated equipment/systems required for each scenario.
- 1.4 Are all foam application rates and concentrate quantity calculations in accordance with a recognised standard and/or certified test results relevant to the specific fuels. Result?



Element 2 - Foam Concentrate Procurement Specification & Procedures

Full Surface Fire

Has there been a detailed "fit for purpose" Foam Concentrate Procurement Specification developed?

Element 1 - Assessment of Needs

The most critical section !!!

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Multi-tank Fires



Element 2 - Foam Concentrate Procurement Specification & Procedures

Fire performance

Foam

The most important tool for controlling large flammable liquid fires!



Yet often no detailed

PERFORMANCE SPECIFICATION

prepared when purchases made!





LASTFIRE Test Protocol

- Test procedure developed designed to simulate considerations for tank incidents
 - Initially developed by MRDC taken over by LASTFIRE
 - Forceful foam impact
 - Hot tank walls
 - Distorted tank shells
- Two protocols water miscible fuels and non water-miscible
- Three nozzles used to evaluate performance on the basis of foam/foammaking equipment combinations
 - Semi-aspirating
 - AspiratingSystem

Test Sequence

Extinguishmen

Vapour Seal

Burnbacl

Preburn

0

3

10

12

23

25

30 - END

- Torch Pass 1

- Torch Pass 2

- Burnback Pot (removal @ 26)

Medium expansion nozzle also added for latest tests

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Research Work

LASTFIRE Test Protocol

- · Semi-aspirating and aspirating nozzles designed such that they produce foam
 - properties typical of commercially available monitors
 - Foam thrown directly on to fuel surface
 - Semi-aspirating application rate: 3.74 lpm/m²
 Aspirating application rate: 3.63 lpm/m²
- System nozzle used overhanging tank rim
- Simulates foam from a foam pourer
- System nozzle application rate: 2.5 lpm/m²



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Element 2 - Foam Concentrate Procurement Specification & Procedures

Fire performance Environmental effects data Wastewater treatment effects Materials compatibility/Corrosion Data Shelf Life/Accelerated ageing

Physical Properties – Tolerances/Acceptable drift







Element 2 - Foam Concentrate Procurement Specification & Procedures

Fire performance **Environmental effects data** Wastewater treatment effects Materials compatibility/Corrosion Data Shelf Life/Accelerated ageing Physical Properties – Tolerances/Acceptable drift Maximum/Minimum Temperatures Compatibility with proportioners/pumps Compatibility with other agents

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Element 2 - Foam Concentrate Procurement Specification & Procedures

Legislative Regimes **Occupational Health issues** Premix issues **Chemical Footprint** Labelling/Containers **Batch Testing** Long term availability Guarantees **Retained samples Documentation**

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Element 2 - Foam Concentrate **Procurement Specification & Procedures**

Sub Questions 2 – Some Examples

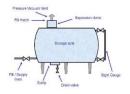
- 2.1 Is the foam concentrate type suitable for all fuels on site, including any water soluble flammable liquids?
- Is the nominal proportioning rate (percentage) appropriate for 2.2 the fuels and proportioning equipment on site?
- 2.3 Is there a requirement for all foam concentrate on site to have been batch tested to an appropriate fire performance standard (LASTFIRE fire test is the most appropriate for tank fires)?
- 2.4 Has sufficient Environmental/Toxicity data been provided to carry out a full environmental impact assessment of using the concentrate in major incidents?

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Element 3 - Site Foam Storage and Stock Management

Are foam stocks on site managed in such a way to ensure adequate supplies, optimise shelf life and minimise risk of degradation or loss of containment?



- Minimum stock level
- Rotation
- Storage containers
- **Basic rules**

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Sub Questions 3 – Some Examples

- 3.1 Has a minimum stock level for foam concentrate on site been set to trigger new purchases with sufficient lead time to ensure sufficient for worst case scenario remains available?
- 3.2 Is foam stock rotated so that the oldest is used for regular testing and training?
- 3.3 Is there a procedure in place to enable 100% replacement of stock used in the event of an incident within 24 hours - or is there 100% back up stock held on site?
- 3.4 Are bulk foam concentrate storage vessels filled to an expansion dome or alternatively a compatible sealer oil is used on the concentrate surface? www.lastfire.org.uk



Element 4 - Site Foam Concentrate Assurance

Is a system in place to test and assess the ongoing condition of the foam concentrate on a regular basis?





% Sediment Viscosity **Refractive Index** Specific Gravity Film formation pН





Element 5 - System specification and design

Have all foam systems and mobile applications been specified and designed in accordance with appropriate standards and are they operable during an emergency?



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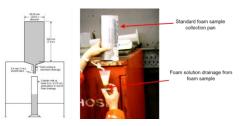
Element 6 – Testing of Foam Application Equipment and Systems

Are foam systems and other foam application equipment tested on a regular basis to provide sufficient assurance that they continue to meet their original performance criteria?









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Has a detailed environmental risk assessment has been performed related to foam storage and usage with appropriate measures being put in place to ensure environmental risk from using foam is minimised whilst maintaining effective fire response?





Source Pathway Receptor analysis

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Disposal

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Are measures in place to facilitate procurement and movement of bulk foam stocks and associated equipment required for major incidents?



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Element 8 – Site Logistics for Foam Application

Are measures in place to facilitate procurement and movement of bulk foam stocks and associated equipment required for major incidents?

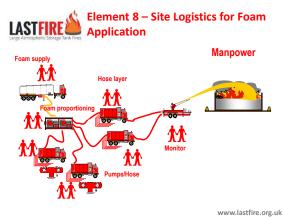














Element 9 – Training and Exercising for Foam Application

Are all personnel responsible for any aspect of foam application provided with appropriate training and have exercises been carried out to demonstrate the capability of fulfilling their role in response?







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Are all personnel responsible for any aspect of foam application provided with appropriate training and have exercises been carried out to demonstrate the capability of fulfilling their role in response?





Element 10 – Scenario Specific Emergency Response Plans

Is a comprehensive set of Scenario Specific Emergency Response Plans in place incorporating responder and operator actions for potential events?

Operator & Responder





Demonstrate responsible approach Formal assessment Cradle Grave

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Foam Assurance: The LASTFIRE Process



Risk Ranking



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<u>Pilot Studies</u> Different types of site Audit approach Review of documentation Scoring and recommendations

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Case study carried out using Assurance Guidance and Questionnaire in Q1 2017

Very successful exercise for both the assessor and site personnel

Questionnaire in very useable format – could be used with assessor or by site personnel

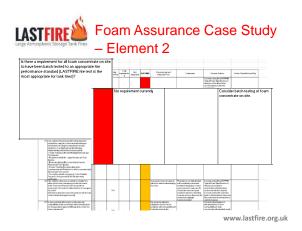
Client Comment: "Excellent process to identify areas to improve and work towards, especially on environmental aspects (e.g. containment and disposal of firewater run off)"

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multi-tank fire								uirement to extinguish largest to			rategies for all
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Critical Issues Identified:

- Auditable track availability
- Prioritising issues for longer term
- Involvement of relevant parties n.b environmental and fire fighting
- True understanding of issues and policies ٠

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A "controlled burn down" is not an acceptable option

Sometimes it is!

It can be the least environmentally damaging! It can be the safest option!

It happens! E 112 0100-Smoke? **Incident duration?** Asset loss?

Public image?



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A "controlled burn down" is not an acceptable option Sometimes it is! It can be the least environmentally damaging! It can be the safest option! It happens!







A "controlled burn down" is not an acceptable option

Sometimes it is!

It can be the least environmentally It can be the safest option! It happens!



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A "controlled burn down" is not an acceptable Could still have a "burn down" though! option Sometimes it isn't!





One test certificate proves the foam is always good! Formulation changes **Production mishaps Batch Acceptance**



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Having a UL certificate proves the foam is good for every scenario and application! Different applications – different requirements!





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Manufacturers know better than the end users what the end user needs!

Not just fire Performance Environmental data Compatibility Long term stability Effect on materials

Don't rush into change!!

All of this applies to some extent whatever the foam change – FF or C6 or other!



Manufacturers know better than the end users what the end user needs!



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Firefighting Foam Do we have a crisis? No crisis but a crossroads And an opportunity!! So look on the bright side!

