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SAA-IAFPA Fire-fighting Foam Seminar

Fluorine-Free Fire-fighting Foam – The Path to Where We are Today

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The Solberg Company

Leading manufacturer of fire fighting foams

- Bergen, Norway
- Greenbay, WI, USA
- Sydney, NSW, Australia

Foam production:

+ AFFF (C6 technology only)
+ Fluorine Free Foams: Re-Healing™ RF™ series
+ Class A Fire Brake
+ High Expansion, Training Foam
- No protein based products

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Where are we today

- Past the impossible
  - Environmental impact: Organofluorine foam
    - Products, with ingredients, NOT leaving any environmental footprint in seawater
    - — Biodegradable in fresh water
    - — NO PERSISTENT ingredients
    - — Low toxicity
  - Fire Performance: Organofluorine foam
    - LASTFIRE
    - ICAO B&C
    - EN 1568-3 & 4
    - UL 162
    - FM 5130

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Where are we today: Regulations

PFOS: Phased-out:

- Europe, USA, Australia …

PFOA: Phase-Out (Including PFOA precursors)

- Pending REACH, estimated 2020
- Pending Australia, adoption of Queensland Gov. Policy
  - You cannot release any Fluorinated Organic compounds direct to ENV.

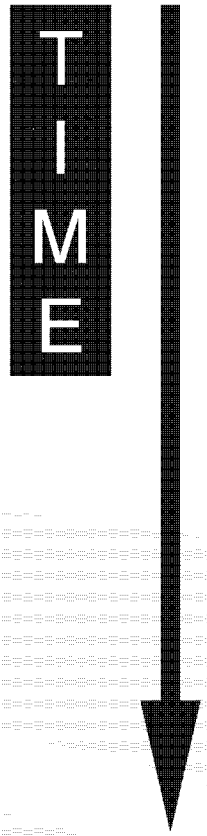
PFHxA and precursors Phase-Out

- Under investigation: Germany (REACH)

PF(any)Acid and precursors

- Matter of time

  personal note: the sooner the better



Any product biodegradable to Perfluoro carbonic acid or collect and burn

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NEW Standards

- The new FFF or better "OrganoFluorine Free" foams have to pass the same standards as the AFFF's and fluoroproteins
  - THEY DO !
  - Most of them are already better in performance than Fluoroproteins
  - FilmFormingFluoroProteins

- US Mil Spec F24385F
  - Strategic Environmental Research and Development program (SERDP) (US Military, Navy)
  - STATEMENT OF NEED
  - to develop a fluorine free for use as an alternative to AFFF
  - to meet requirements defined in MIL-F-24385F

Drinking Water US EPA : 70 part per trillion PPT PFOS and PFOA (70PPT)
Blood (German Env. Agency) 5 ng/l PFOS 2 ng/l PFOA (7 PPT)
Recent Victorian (AUS) parliament inquiry: < 2600 µg in fire water …

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MYTHS and FACTS

- AFFF vs FFF
  - Solberg ARCTIC FOAM: New C6F13*- technology “US Mil SPEC” performance
    - LASTFIRE
    - EN1568
    - UL 162
    - FM 5130
    - ICAO
    - US MIL SPEC F24385F
  - Solberg Re-HEALING FOAM: Organofluorine Free “patented” technology
    - LASTFIRE
    - EN1568
    - UL 162
    - FM 5130
    - ICAO
  - SOLBERG AFFF is not just an AFFF !
  - SOLBERG RF™ is not just a Fluorine Free Foam

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RF-History

- ☆ Solberg Fire Brake (3M OrganoFluorineFree intellectual property)
- ☆ First RF products
  - ★ RF3, RF6 Australian Standards
  - ★ RF 3X6 ATC EN 1568 & LASTFIRE
  - ★ Second Generation RF3 (& RF6)
    - EN 1568-3 RF3 IA (Fresh water)
    - ICAO LEVEL B
  - ★ Second Generation RF3X6 ATC
    - EN1568-3& 4
    - LASTFIRE
    - ICAO LEVEL B & LEVEL C
- ☆ RF products TODAY …
    - **RF1-S Newtonian, Silicone Free: Passing EN 1568-3 IB** (Fresh-Water)
    - RF3X3 FP ATC: improved performance on Polar liquids

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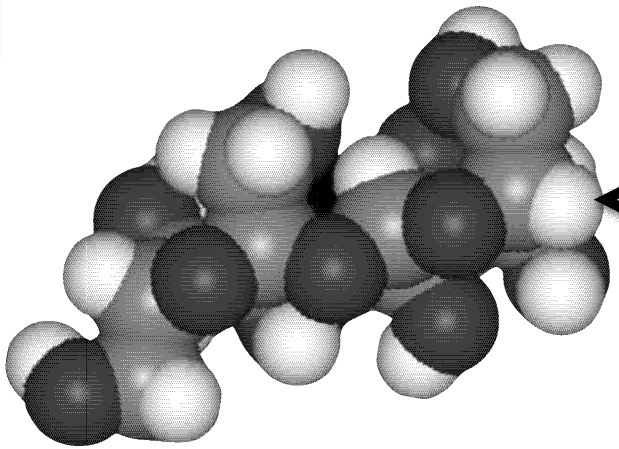
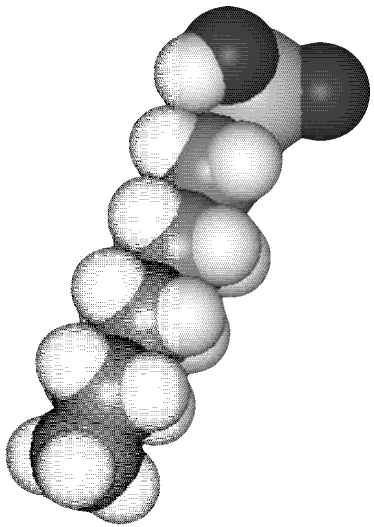
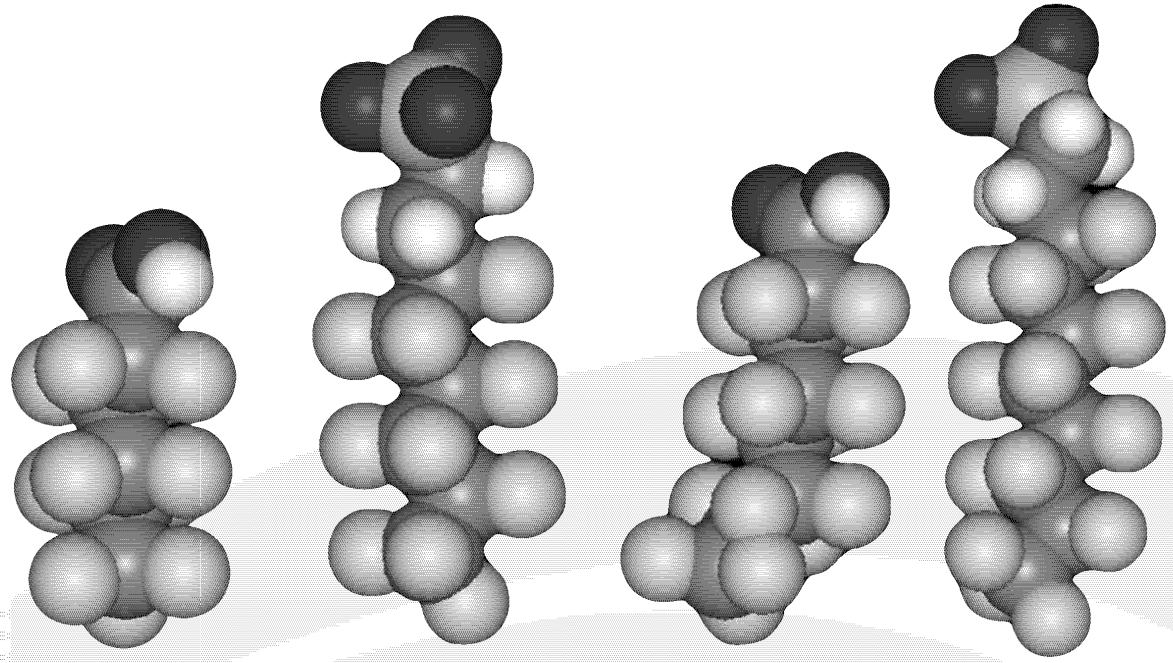
PFOS is History



Solberg patented technology

Some molecules





C8S **SOS**

Sodium OctylSulphate

PFHxA

C6:2 FTS

PFOA

C8:2 FTS

PerFluoroHexanoic Acid

Octanoic

PerFluoroHexanoic Fluorotelomer Sulphonate

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AFFF History

PFOS based technology: Potassium Salt, Filmer + Foamer based PFOS

- 1980's: 3M Light Water™ (98% pure PFOS)
- 1990's: 3M Light Water™ (65% pure PFOS)
  - C4 - C16 prefluoroalkyl Sulfonates
- 2000'nd: PFOS phase out

PFOS FOAMER
- Technology 1
- Technology 2
- Technology 3

PERFORMANCE

Fluorotelomer based technology

- FROM - UNTIL ? **C8:2FTS** surfactants, Polymeric Fluorosurfactants **UNTIL 2020?**
  - 15 - 25% C8:2 FTS; 55 - 65% C6:2 FTS, 5 - 15% C10:2FTS
- From 2004(?) **C6:2FTS** surfactants, Polymeric Fluorosurfactants **UNTIL 2030?**
  - **98% ?** C6:2 FTS
  - Today available **99.5% C6:2 FTS**

PFOA impurities
- PAST
- NOW
- Near FUTURE

FilmFormingFluoroproteins
- C8 technology
- What about C6?

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MYTHS and FACTS

- AFFF is still AFFF
  - PFOS Technology
    - 98% C8 and TECH 1 Foamer = BEST
    - 65% C8 and TECH 3 Foamer = WORST
      (more needed) (TECH 3 needed pure C8)
  - Fluorotelomer Technology
    - 20% + C8:2 FTS based surfactants = BEST
    - 99,5% C6:2 FTS => Need 4X more as direct C8:2 FTS replacement
      => Optimised background mixture reduces C6:2FTS amount!
- AFFF is not the same anymore !
- FUTURE C4 or C10 and higher technology
  - NO chance: WHAT's the purpose ...

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MYTHS and FACTS

- FFF is not performing as well as AFFF?
  - FFF can be different technologies
    - NOT ALL FFF are good products: BE CAREFUL !
  - Re-Healing Foam patented Technology
    - 2004: AFFF beter in certain applications
    - 2007:
      - RF outperforming AFFF in specific applications
        - PASSING LASTFIRE
        - Passing EN 1568-3 Direct application
      - AFFF outperforming RF in specific applications
    - 2011
      - RF UL 162
      - RF FM 5130
    - 2012
      - RF1, 1% Re-Healing Foam: Special designed for off-shore sprinklers systems
    - 2016
      - RF1-S, 1% Re-Healing Foam: Newtonian, passing EN 1568-3 Direct application
        - **test results: direct extinguishing time < 1min30sec (spec=3min)**
        - **test results: Burn-Back > 18 minutes (30°c)**
- FUTURE = PROMESSING
  - New RF1, RF3 Newtonian, RF1X3 ATC™ …

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More Myths And Facts

Recent testing in Schiphol, NL
50 m2: 200 LPM:
Extinguished in 34 seconds

- TESTING - TEST protocols
  - The "Debunk" theory (negative approach?)
  - To Proof it works
    - in critical situations
    - Below standard fire fighting practices
  - test protocols are "difficult".
    - Many trials of the same product may give:
      - Many results

- Demonstration
  - Our products are good, competition is bad ...
    - SHOW the positive side
    - SHOW the negative side

The purpose to demonstrate something

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ANY QUESTIONS

I probably can't answer anyhow ..

THANKS for LISTENING
Luc Jacobs