
# Phasing out AFFF – lessons learned in the Arctic

From science to action, for the implementation of the BRS conventions and guidance on the environmentally sound management of industrial chemicals

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# Arctic Council (AC) project on AFFF

- AFFF (Aqueous Film Forming Foam) and other PFAS-containing foam phase out in the Arctic
- Leads/co-leads:  Finland, United States
- Participating countries: 8 Arctic States
- Consultant
- Timeline: 2021-2023
- Budget: 350 000 EUR
- https://oaarchive.arctic-council.org/handle/11374/2737

13.4.2023

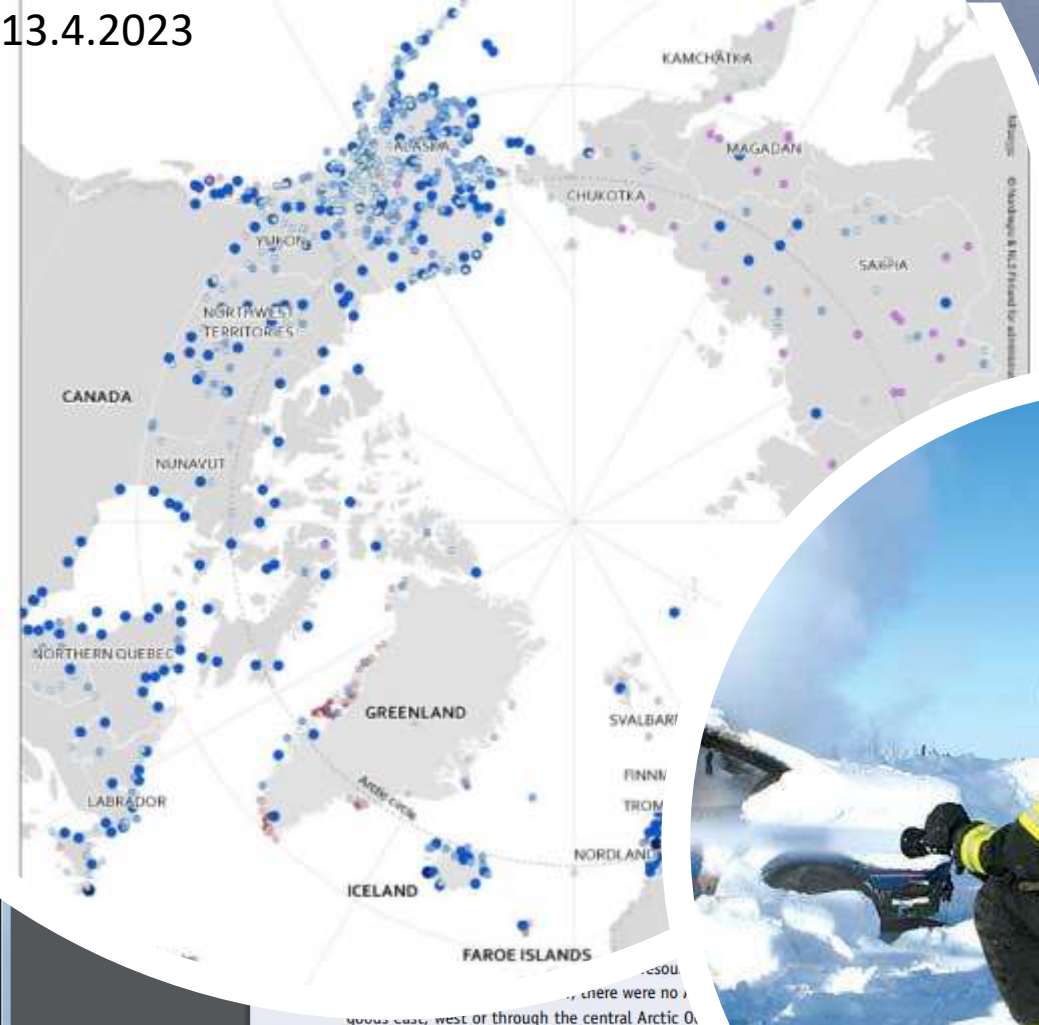





*Fig 5.8. Tank used for testing at GESIP, France, Fire before foam application*

there were no

goods east, west or through the central Arctic O

Most bulk transport takes place during the

in ice-free parts of the Arctic including the Norwe

parts of the Russian Arctic such as Murmansk. The

high-value perishable cargoes such as the concentrat

Dudinka region and the nickel from Deception Bay in

Quebec, Canada, which must be shipped year-round becaus

# Key objectives

- To develop cost effective and appropriate recommendations for the removal of PFAS-based fire fighting foams for all applications within the Arctic region, without jeopardising risk reduction.
- To arrest legacy issues at current levels before they become an unmanageable problem.

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# Other Project Objectives

- Development of tools to educate and explain the situation
- Identification of foam users in different sectors.
- Ensuring that all stakeholders recognise, understand and accept the need to change to non-PFAS based foams.
- Provision of sufficient information in the form of protocols, procedures and guidance to allow changeover to a fluorine-free foam and minimise ongoing environmental risk for the lifecycle of foam from procurement to disposal.
- Ensuring that any policies recommended are appropriate for the long term.
- Provision of sufficient information/training packages to ensure that all foam applications are managed in accordance with best practice assurance procedures.

# Phasing out AFFF is a complicated process

- Although fluorine-free alternatives are available, they are not drop-in substitutes!
  - Transition needs to be planned to avoid compromising safety
- Changing the foam usually requires changes in the equipment (e.g. nozzles, pumps)
  - Alternatives are not as efficient in forming bubbles
- Old equipment needs to be cleaned up – but to what level?
  - What will happen to the cleaning water? Waste or waste water?
- Waste management
  - Waste AFFF is not hazardous waste, although it could well be POPs waste

# *Phase 1 – Data Collection & Assessment of Current Situation*

- Review of current legislative fire and environmental requirements in Arctic region countries
- Identification of foam users by sector and facility
- [Work alongside Russian consultant to assist in data collection within Russia and also carry out analytical studies on the components of foams found to confirm foam types]
- Development and circulation of questionnaire to collect data on current situation, local legislative requirements and current foam application practices.
- Identification, classification and collation of all sectors data

# Collection and review of worldwide data on the following

- Regulations relevant to fluorinated foams in the Arctic region
- Transition methodologies
- Equipment developments
- Foam concentrates
- Equipment clean out techniques
- Transition case histories

# *Phase 2 – Pilot Studies*

- Selection of typical facilities for site visit within each end-user/industry
- Development of analysis tool for current practice at site and identification of enhancements required
- Site visits for pilot studies and use of analysis tool
- Summary report on findings of pilot studies outlining requirements of those protocols, options and policies for implementation of transition.
- Feasibility and cost estimates for selected transition proposals.

# *Phase 3 – Development of Initial Protocols, Policies & Options*

- Usually protocols and transition plans are corporate-specific and confidential
- In many respects, the Arctic conditions represent specific challenges, such as low temperatures, variety of activities with foams
- Discussions on practices and requirements take place between international group of experts in the steering panel
  - There is no current legislation e.g. on ”how clean is clean”
- Transition manual will become available for the public and likely translated into several languages to assist countries also outside the Arctic region in transition

# Issues for consideration (1)

- Justification of system or alternative fire hazard management measures
- Foam performance specifications and environmental effects data for future foam concentrates
- What clean up measures are required
  - E.g. fire-engine systems, sprinklers, monitors
- What engineered system changes are required
  - Nozzles, pumps, pipes, capacities
- What health and environmental issues are associated with the new foam?

# Issues for consideration (2)

- Ongoing assurance systems for the new foam
- Additional training and emergency planning measures that need to be considered for the new foam
- Arrangements for the period during foam transition when there may be limited foam coverage for some scenarios on a facility
- Contamination from PFAS from training, testing of systems or use during an incident
- Recovery and disposal of existing stocks

# Findings

- AFFF foams are widely used, also for applications in which they could easily be replaced
- Airports, chemical plants, municipal fire brigades – high proportion of PFAS foams
- On many sites more than one foam type, although usually from the same manufacturer
- Bulk containers, mobile equipment or in the original containers
- “Municipal fire brigades should not have AFFF foams” – but they do
- Reputation as a multi-purpose foam

# Where is foam used?




Wherever a flammable liquid
“loss of containment”
can occur

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# Ask the question: why AFFF?

- Salesmen sell ”multi-purpose” foam to fire brigades
- Hand-held extinguishers in hotels, conference centers etc
  - There could be a regulatory reason for it, but is there ”flammable liquid” or risk of class B fire?
- Airplane hangars
  - If tanks are emptied for service, why do you need AFFF?
  - Protocols…
- Military specification (MilSpec) may explain some airport use
  - Change in the US in 2023
- Training and testing equipment is a low hanging fruit to reduce releases

# A specific challenge will be portable extinguishers

- Service varies from country to country
- 0,7 l of foam concentrate inside
- Could be in hundreds at e.g. ships
- How to phase out? How to get the information through to the owners?
- First fluorine-free hand-held extinguishers coming to the Nordic market in 2022 – PFOA restriction kicking in 1.1.2023 in the EU!
- A lot depends on the foam replacement schedule, but still: how will the waste be disposed of?

# Finnish surveys 2017 & 2019

- Municipal (17/22 and 9/22) and industrial fire brigades (26 and 11)
  - You should not ask the same questions too often
- Questions asked:
  - Trade name
  - Amount
  - Year of purchase
  - Fluorine or not

- 2023: Article 6 notifications of stockpiles

# Municipal fire brigades

- 36 different foam products, 17 non-fluorinated
  - From 10L to 7000 L per product
- Oldest concentrates were from 2014, although many unknown (likely older)

# Industrial fire brigades

- 31 different products
- 20 fluorinated, 11 fluorine-free
- Quantities varied from 10 L to > 100 000 L per fire brigade
- 95% fluorine foams

# Conclusions

- Level of knowledge is poor
  - Articles about AFFF and restrictions in fire-fighter magazines
- Same tradenames with different compositions
  - time of manufacture important
- Lab analyses may be necessary to identify the restricted foams from those that can continue to be used
- Pre-2016 AFFF likely to contain PFOA as an impurity
- Extinguishers likely replaced
- All foams on site should be considered ”in use” – it is not possible to change the foam during a fire

# Thank you!

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