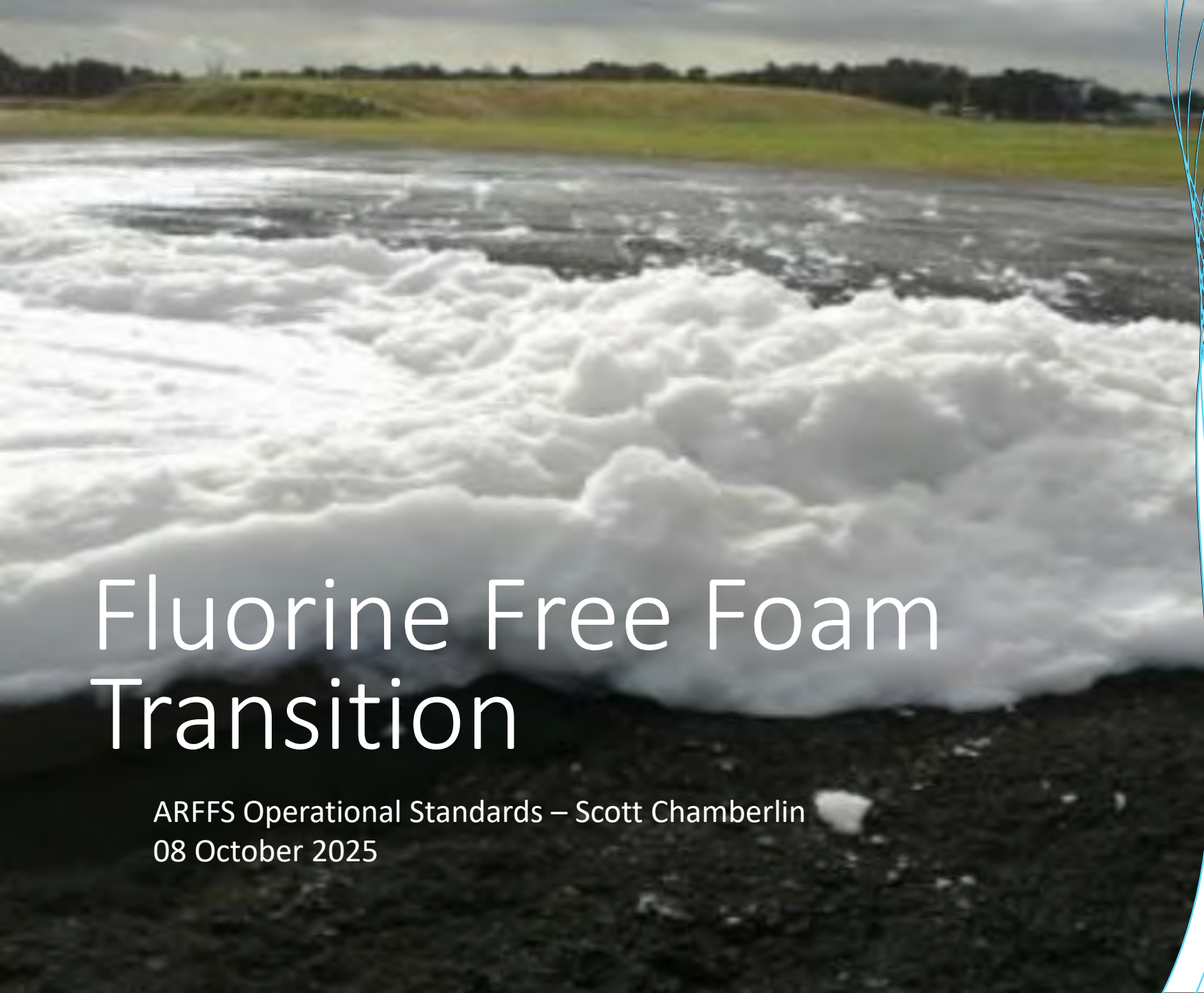

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Fluorine Free Foam Transition

ARFFS Operational Standards – Scott Chamberlin

08 October 2025

About Me

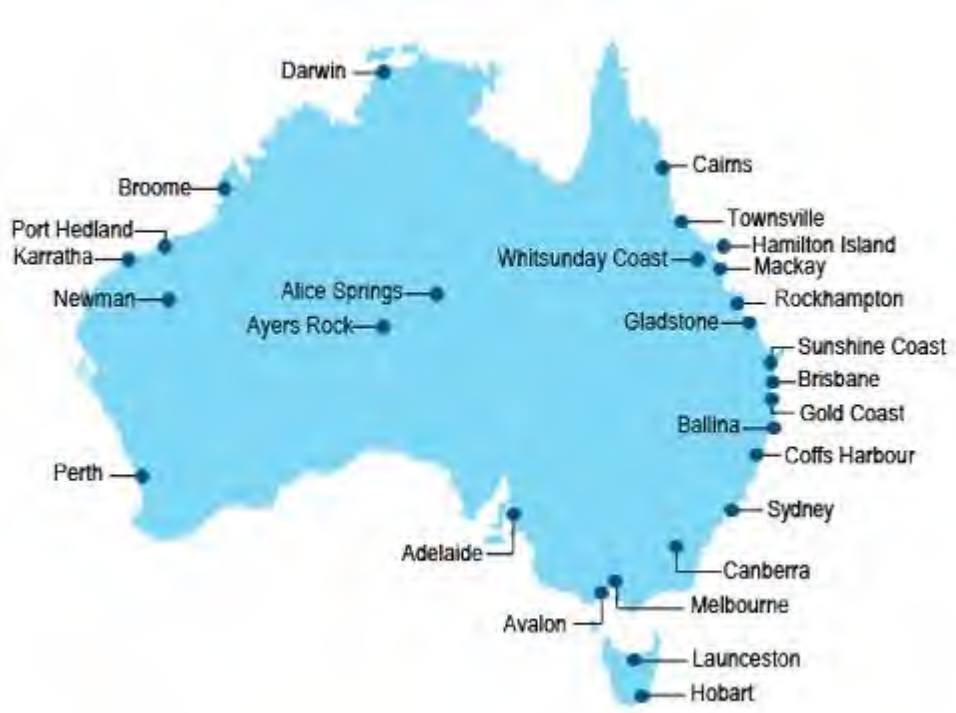
Brief History

- Scott Chamberlin – Senior Operational Standards Officer (SOSO)
- Provide support to the Chief Fire Officer
    - Standards – regulatory engagement
    - Project SME
    - Research and development
- Been with Airservices as a Fire fighter for 29 years
    - Darwin (4yrs)
    - Cairns (23 yrs – 16 on shift, 7 as SOSO)
    - Currently Sunshine Coast (18 months)
- Past 9 years working in Office of Chief Fire Officer

About Us

Airservices and ARFFS

27 Locations



Fluorine Free Foam

Early adoption of Fluorine Free Foams

- In 2003, ARFFS replaced 3M LightWater foam with Ansulite 6% ICAO-B Aqueous Film Forming Foam due to concerns around PFOS and PFOA contamination of the environment from 3M LightWater.
- Although not in the same category as 3M LightWater, it was later found that Ansulite also contained fluoro surfactants that were persistent (short-chain C6 fluorochemicals AFFF containing PFAS), potentially bio accumulative and toxic if released to the environment and difficult to treat using traditional wastewater treatment systems.
- Airservices received legal advice which indicated they may be held liable for any contamination resulting from the use of firefighting foams in any operational or training sense, with the exception of a response to an aviation emergency.
- There were new alternative foams that did not contain fluoro compounds or any other chemical compounds that had a persistent detrimental impact on the environment.
- In 2009 Airservices identified the Solberg RF6 fluorine free foam (FFF) as an appropriate alternative to Ansulite AFFFS and completed a trial at Canberra ARFFS in December 2009.
- Rest of service was transitioned throughout the first half of 2010, except for our defence force bases in Darwin and Townsville, they transitioned in 2019.

Environmental Drivers and Regulations

Airservices

- Airservices realized in the early 2000's that were potential issues with persistent chemicals, such as PFAS, in type of foam ARFFS had in-service.
- PFAS risks were formally recognized in Australia when the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) issued an alert in **2003**, restricting the use of AFFF.
- At that time there was very little by way of government regulation around the effects of PFAS in terms of human health or ground water and soil contamination.
- Linked to the organisation's environmental obligations and requirement to manage the environmental and corporate risk incurred by use of a known contaminant.
- Today, Australia's **PFAS National Environmental Management Plan (PFAS NEMP)** offers guidance on investigating, assessing, and managing per- and poly-fluoroalkyl substances (PFAS) contamination across the nation. (First published in February 2018).

Transition Process

- 4 phases to the transition:
  - Phase 1: Procurement and documentation changes
  - Phase 2: Installation of required equipment
    - decontamination of vehicles, equipment and training grounds leading into phase 3
  - Phase 3: Transition to Solberg RF6 in Operational vehicles
  - Phase 4: Disposal of Ansulite AFFF
- Key Stakeholders:
  - ARFFS employees
  - ARFFS Engineering and Equipment
  - CASA
  - Suppliers of both Solberg RF6, Solberg Asia Pacific Pty Ltd, and Ansulite AFFF, Ansul Incorporated
  - Airservices Environment and Safety Group
  - Airservices Office of Legal Counsel
  - Airservices Corporate Relations
  - Airports and airline customers

Transition Process cont:

- Some of the issues and risks associated with the change include:

Issue	Assessment	Action/Resolution
Environmental contamination from the foam change process in vehicles	Possible	Portable bunding will be used to manage the transition and storage of foams until old foams are removed from site. Waste water will be managed through vehicle washing facilities and/or removed by licenced contractors, as per the usual arrangements for each site.
Equipment incompatibility	Unlikely	Usage in vehicles has been assessed by EVTs; long-term use in the same vehicles overseas
Inadequate supplies of operational foam on site	Unlikely	Removal of old foam from site does not commence until adequate supplies of new foam are in place
New foam contaminates environment	Unlikely	Monitoring of sites will continue as part of the environmental management plan for managing existing

Phase 1

Procurement and Document changes

- Procurement strategy considered:
  - Available products
  - Any changes to equipment
  - Product storage
  - Market analysis
  - Value for money (comparison to existing product)

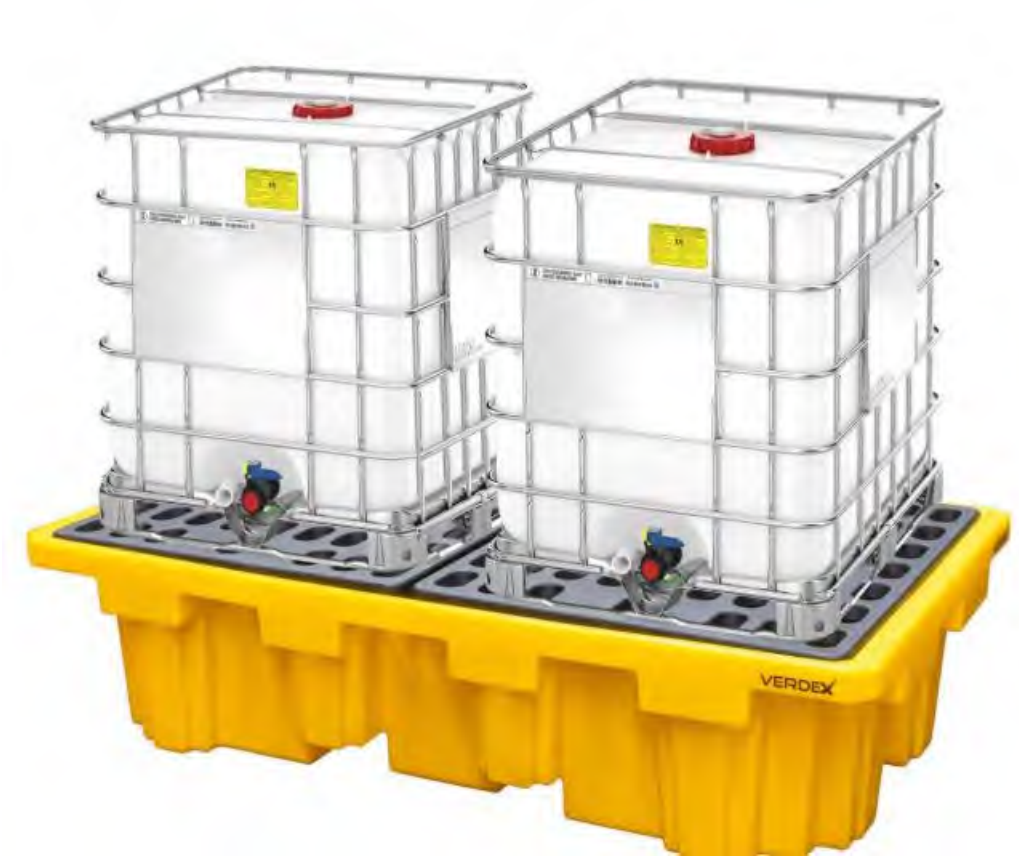
- Document changes
  - Operational practice – strategy and tactics, foam behaviour
  - Maintenance procedures
    - foam purity/percentage limits had to be updated
  - Equipment operation

Phase 2

Installation of Equipment

Installation of equipment related to:

- Change over/replacement of bulk storage facilities
- Change over to new foam transfer pumps
  - Avoid cross contamination
  - New product was significantly thicker than previous foam
- Storage of 1000l totes where no bulk storage available



Phase 3

Transition to Solberg RF6 in Operational Vehicles

- Contracted environmental service provider to perform PFAS testing of the flushed foam tank water. The results from flushing were tested against the recreational water quality guideline as defined in the National Environmental Management Plan (NEMP)
- Process undertaken over a 5/6-day period
- Initial baseline test was conducted on the vehicle outlets and the filling hydrant
- Cycle of Fill – Soak (2hrs/overnight) – Drain (repeated until results meant NEMP requirements)
    - Ambient temperature water was used due to lack of access to hot water, which was the preferred option.
- After every soak the water sample from foam tank was sent off for chemical analysis for PFAS prior to next fill and soak
- Finally, fill water and foam tanks and bring into service
- Disposal/Clean-up
    - All equipment, hoses, and transfer pump used for Ansulite during testing were decommissioned and disposed of following use.
    - Due to the site's limited wastewater treatment capabilities, a third-party contractor was engaged to treat the water on-site using a mobile setup housed in two shipping containers, followed by appropriate disposal
- Testing procedure development/refinement:
    - Conducting tests after each flush enabled us to optimize the process by identifying the point at which PFAS levels met NEMP requirements. This refinement reduced the number of flushes per vehicle and minimized overall wastewater generation.
    - Results showed that the 2-hour soak procedure did not significantly reduce PFAS levels. The method was subsequently refined to include an initial gross clean followed by a 24-hour soak (water sampling taken every 2 hours). This revised process was repeated daily over the course of a week and then one weekend soak.

Phase 4

Disposal of Ansulite AFFF

Approximately 200,000 litres of existing Ansulite had to be disposed of on transition to the Solberg RF6 foam. Two alternatives were explored:

- Ansul, the supplier of Ansulite AFFF, may buy back or take back the existing foam
- Disposal of the foam through environmentally sound destruction process

ARFFS would not on-sell the Ansulite product to other parties given the environmental impact associated with this product.

The Environmentally sound disposal strategy Airservices ultimately settled on was very high temperature incineration of the Ansulite foam.

Lessons Learned

- Impact of increased viscosity
- Rehydration process – 6-month foam purity test of bulk storage and on vehicle foam, remediate under direction of manufacturer and retest, if still not within limits replace
- Storage of foam – out of weather, under cover, tarpaulins, air condition rooms
- ‘Sticky’ valves in vehicles – EVT’s check operation of valves every 6 weeks
- Annual test of Fire Station potable water!

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Next Foam Iteration

- Airservices are now looking to transition to a Performance Level C FFF, which is expected to provide additional operational benefits:
  - 3% rather than 6% foam (reduction in reserve stock requirement, storage)
  - More efficient foam requiring less agent and discharge rate to achieve Q1 and Q2 (ICAO ASM)
  - 1 tank of foam will support 4 water tank refills
- Airservices have leveraged information available through the FAA technical team
- FAA technical team have a testing capability we can leverage off in the form of a qualified product database.
- CASA (Australian regulator) do not have a technical capability, regulatory assurance only.

Category	Vehicles	ARRFS Actual Agent	ICAO Required B	ICAO Required C	Actual reduction in quantity between B and C requirements	Excess Water Capacity 'B' (L)	Excess Water Capacity 'C' (L)
5	1	8900	5400	3900	1500	3500	5000
6	2	17800	7900	5800	2100	9900	12000
7	2	17800	12100	8800	3300	5700	9000
8	3	26700	18200	12800	5400	8500	12900
9	3	26700	24300	17100	7200	2400	9600
10	4	35600	32300	22800	9500	3300	12800

Thank You

Question's