



CASE STUDY: BRISBANE AIRPORT

Beyond Performance: Brisbane Airport's Successful Conversion to Fluorine-Free Foam

Challenge:

Convert an existing AFFF (PFAS fluorinated foam) aircraft hangar sprinkler system to fluorine-free foam, including full system clean-out and PFAS decontamination, while maintaining NFPA 409 compliance.

Solution:

SOLBERG® RE-HEALING™ RF3 3% Foam Concentrate and Arcadis FluoroFighter™

The Move to Fluorine-Free Foam

Airports around the world are transitioning away from fluorinated firefighting foams in favour of synthetic fluorine-free foams (SFFF). Based on available product testing and formulation data, today's SOLBERG SFFF are non-persistent, non-bioaccumulative and do not have a long-term environmental impact. This advancement in the environmental profile is not the only benefit of SOLBERG fluorine-free foam — Independent testing has demonstrated that modern SOLBERG SFFF can achieve performance comparable to traditional aqueous film-forming foam (AFFF), driving increased interest and adoption of the technology.

Brisbane Airport in Australia was one of the early adopters of fluorine-free foam, collaborating with Arcadis Australia, Wormald Australia, and Perimeter Solutions to convert its X-Flight Aircraft Hangar fire suppression system to SFFF.

The Challenge

While certain SFFF solutions available today have been shown to be as effective as traditional AFFF — the long-standing industry standard for aircraft hangar protection — many in fire safety believed that it was impossible to completely retrofit and convert a fluorinated fire suppression system to fluorine-free.

Selecting a suitable SFFF solution with global listings and approvals is the first step. Identifying and selecting a design team capable of performing the extensive clean-out required to ensure that PFAS does not remain within a system is another critical decision that determines the success of the transition.

"The transition to fluorine-free foam is one of the biggest steps we can take to reduce the potential for PFAS discharge and therefore make a positive impact on the environment," says Peter Storch, Senior Technical Director at Arcadis.

“We were approached by X-Flight to advise on how to make the transition and we put together a comprehensive, qualified team to ensure the transition was a success.”

Arcadis Australia, an environmental engineering consulting company, led the design and implementation of the project, while Wormald Australia, a fire system design and construction company, supported Arcadis by verifying compliance of the new SFFF system with National Fire Protection Association (NFPA) requirements.

The Solution

The project team consisted of a fire engineer, fire service contractor, a foam technology supplier, and an environmental engineer. Once assembled, the team executed the project — securing airport permits and approvals, selecting a firefighting foam, designing and implementing system modifications, and removing AFFF concentrate and decontaminating PFAS from the system.

The team then recharged the system with SOLBERG® RE-HEALING™ RF3, a 3% fluorine-free foam concentrate, and conducted proportioning testing, ensuring full collection and analysis of discharged fluorine-free foam solution for waste management and reporting.

Arcadis used a proprietary, biodegradable cleaning agent to remove residual PFAS from the piping system and to reduce PFAS concentrations to levels below the newly established regulatory requirements, including the Queensland Operational Policy, Environmental Management of Fire Fighting Foam (QLD Foam Policy, 2016 & 2021). System modifications were designed and installed by Wormald and included foam proportioners and foam sprinkler heads tested with SOLBERG® RE-HEALING™ RF3.

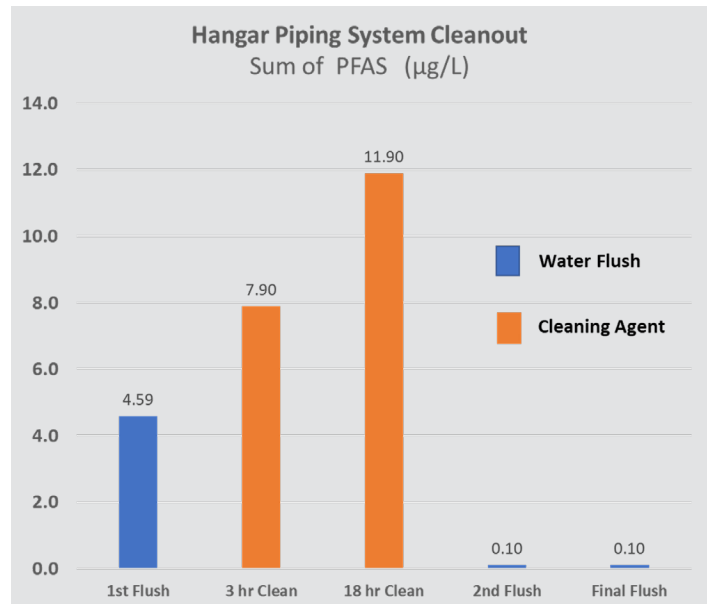
“The foam selection was critical, and the team decided on the SOLBERG® RE-HEALING product due to its compatibility with the existing system, as well as its multiple leading industry accreditations and approvals – UL162 and FM, including non-aspirated sprinkler approvals and listing, ICAO Level B & C certification, and additional global listings. SOLBERG also had established precedence in similar aviation systems, so we had great confidence in this product,” said Storch.

The SOLBERG team conducted extensive fire testing at its state-of-the-art test facility in Green Bay, Wisconsin, using the same model sprinkler heads originally installed at the X-Flight hangar. This testing verified that the required fire performance, at the same low application rates as the existing AFFF, could be achieved with SOLBERG® RE-HEALING™ RF3 utilizing the non-aspirated sprinklers already installed. The engineering team ultimately replaced the system with Non-Aspirated Sprinklers from Reliable Automatic Sprinkler Co. – Model FI56-1/2” (1.27 cm), K-Factor 5.6 (0.16 gpm/ft²), independently tested and UL-162 listed for use with the SOLBERG® RE-HEALING™ RF3.

With the necessary approvals and system hardware test data, the engineering team confirmed that the NFPA 409 design standard could be achieved. The next critical step was to ensure the change to the SOLBERG fluorine-free foam met environmental regulatory requirements. If the new system was contaminated with PFAS from residual AFFF in the foam supply

piping, the benefits of the independently verified fluorine-free SOLBERG® RE-HEALING™ RF3 would be lost. To prevent that from happening, Arcadis took steps to decontaminate the fluorinated fire suppression system, which included:

- Replacement of the foam tank bladder as well as the small-diameter, impacted piping system components, where accessible.
- A deep clean process, utilizing Arcadis’ proprietary, biodegradable cleaning agent FluoroFighter™, was applied to small, reuseable piping and valve components that were decontaminated in a fit-for-purpose treatment bath.
- An in-situ, three-step recirculation process utilizing FluoroFighter™ to clean the large- diameter in-situ piping system.



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Based on previous studies, Arcadis was able to use their clean-out process to reduce the PFAS results from the system below the PFAS contamination regulatory threshold.

Finally, the fire system components to be replaced (piping, valve, strainers, and proportioner) were also effectively decontaminated onsite before sending offsite for recycling, reducing the cost of the project.





Fire system functional testing was conducted by Wormald, post PFAS decontamination, and demonstrated that the new system met the requirements of the airport, the state of Queensland Environmental Regulations, and complied with the NFPA 409 standard. The generated foam was captured in a closed system and tested for PFAS, which showed levels below the laboratory Limit of Reporting and confirmed that the project was sufficiently decontaminated. The team then collaborated with the local utility to conduct treatability toxicity testing to obtain approval for discharge of the RF3 foam solution to the nearby sewage treatment plant, resulting in significant cost saving over offsite disposal.

This project demonstrated that a fluorinated suppression system can be successfully converted to fluorine-free foam with minimal system changes and no loss of performance.

For more information on transitioning to fluorine-free, the full SOLBERG® Fluorine-Free foam offering, and the advantages of our SFFF solutions, contact your Perimeter Solutions representative, or visit <https://www.perimeter-solutions.com/en/product/SOLBERG-re-healing-rf3-3-foam-concentrate/>.

The decontamination performance was assessed by sampling water rinsates and cleaning agents to establish the mass of PFAS removed and representative residual PFAS.



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