

AFFF Fire System Conversion



Pre-conversion



Post-conversion

AFFF Fire System Conversion

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3. Regulatory Overview for AFFF Conversion
4. Ramboll's Approach to AFFF Conversion
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Introductions

Rick Parkman



- Principal, Site Solutions, Environment & Health
- PFAS Lead, Europe
- 30+ yrs in environmental research & consultancy
- Focus on contaminants of emerging concern and PFAS
- Active participant in [NICOLE](#):
 - ✓ Former Steering Group Member
 - ✓ PFAS Working Group: co-led the sub-group on policy/regulatory developments
- External Advisory Board (EAB) member of the Dept. of Earth & Env. Sciences, University of Manchester, UK

Frederic Leveau



- Principal, Site Solutions, Environment & Health
- PFAS Lead, France
- 25+ yrs in environmental research & consultancy
- Provides regulatory, technical and project management support for PFAS related site investigation, risk assessment and remedial efforts typically associated with AFFF releases (such as post-fire)
- Evaluation of fire suppression systems containing AFFF

Michael Jannitto



- Senior Managing Consultant, Site Solutions, Environment & Health
- AFFF Conversion Team Lead and PFAS Growth Team Lead, Northeast (USA)
- 20 yrs in environmental research & consultancy
- Provides technical and project management support for PFAS related site investigation and remedial efforts typically associated with AFFF releases and discharges
- Evaluation of fire suppression systems containing AFFF and the development of fire system conversion and risk evaluation programs
- School of Engineering, Science, & Technology (SEST) Advisory Board member, Central Connecticut State University, USA

Ramboll in brief

Private architecture, engineering, and consultancy company

Creating sustainable solutions across energy, real estate, transport, water, waste, industry, finance, technology, healthcare and public sectors

Founded 1945 in Denmark

Owned by Rambøll Fonden – The Ramboll Foundation providing long term stability

SBTi approved reduction targets and committed to reaching net-zero GHG emissions across scopes 1, 2, and 3 by 2040



35

Countries covered by
global office network



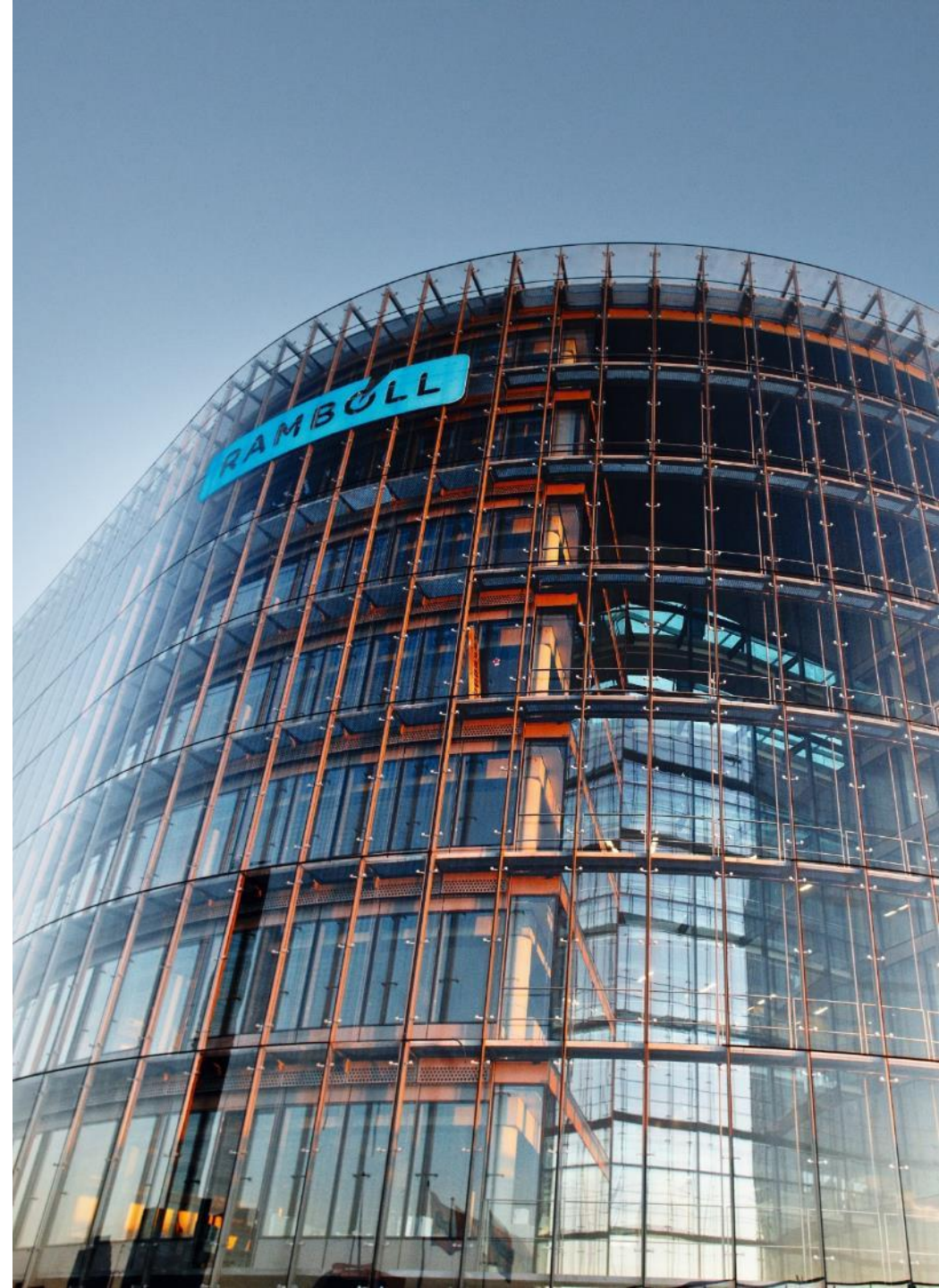
>18,000

Experts



2.3 Bn

Global revenue, in 2024
across all markets



Our Capability

For more than *two decades*, Ramboll has helped clients - *locally and globally* - resolve their *most critical PFAS issues*. Our *multi-disciplinary expertise and experience* has been instrumental in assisting clients in reducing a wide range of risks and liabilities related to *PFAS contamination, product safety and stewardship, regulatory compliance and environmental due diligence*.

Selected Site Solutions accomplishments:

- Ramboll experts developed the first global PFAS transport model



- Our experts are leading the way in establishing toxicity and clean up criteria for PFAS without regulatory standards



25+



years of providing experts solutions to complex PFAS challenges

125+



PFAS experts around the world

~650+



projects where we have supported clients with PFAS issues globally

AFFF Conversion Regulatory Overview

Focussed on Europe

EU guidance

- European Union (EU) guidance (2026) for transitioning to fluorine-free firefighting foams
- Provides clear, practical, technical support to assist operators and competent authorities in implementing the transition from firefighting foams containing PFAS to fluorine-free alternatives
- Distils complex legal requirements and technical recommendations into actionable steps to facilitate compliance with:
- EU-introduced **restrictions on PFAS in firefighting foams under REACH***, including bans, transition periods, emission minimisation requirements, and detailed obligations for the handling of PFAS-containing foams, waste, and wastewater
- **POPs (persistent organic pollutants) Regulations** which impose bans and strict limits on specific PFAS listed under the Stockholm Convention, with time-limited exemptions

* *EU Regulation on the registration, evaluation, authorisation and restriction of chemicals (REACH)*



**EU Guidance
for transitioning to
Fluorine-Free Firefighting Foams**



Find out more here
or search
www.ramboll.com
for *fluorine-free
firefighting foams*

Regulatory overview

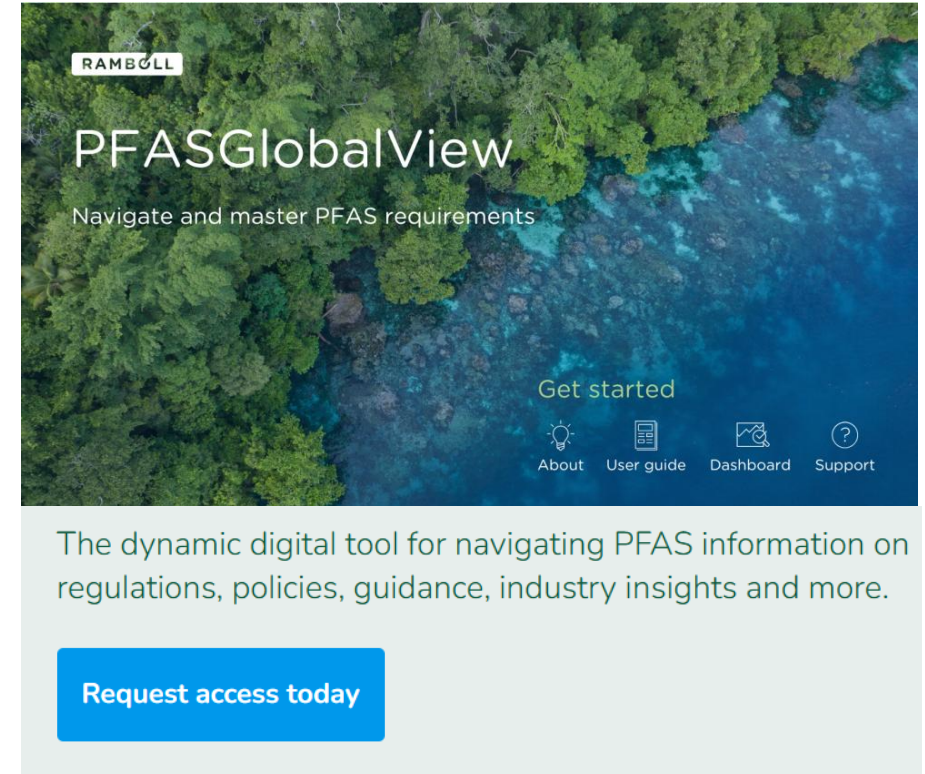
Key frameworks in EU/Europe

- POPs: PFOS, PFOA and PFHxS (plus proposal for ΣC_9-C_{21} PFCAs)
- REACH: PFHxA, ΣC_9-C_{14} PFCAs and Σ All PFAS in FF foam

Controlling potential releases (e.g. firewater effluent, flush and wastewaters) also need to consider other EU and national regulator requirements:

- Waste management thresholds
- Stormwater discharge limits (WFD/ EQS)
- Permitted discharge limits

- **Regulatory situation is evolving and complex** and includes numerous thresholds, deadlines and exemptions
- Need to track closely for compliance and to future proof management decisions



RAMBOLL

PFASGlobalView

Navigate and master PFAS requirements

Get started

About User guide Dashboard Support

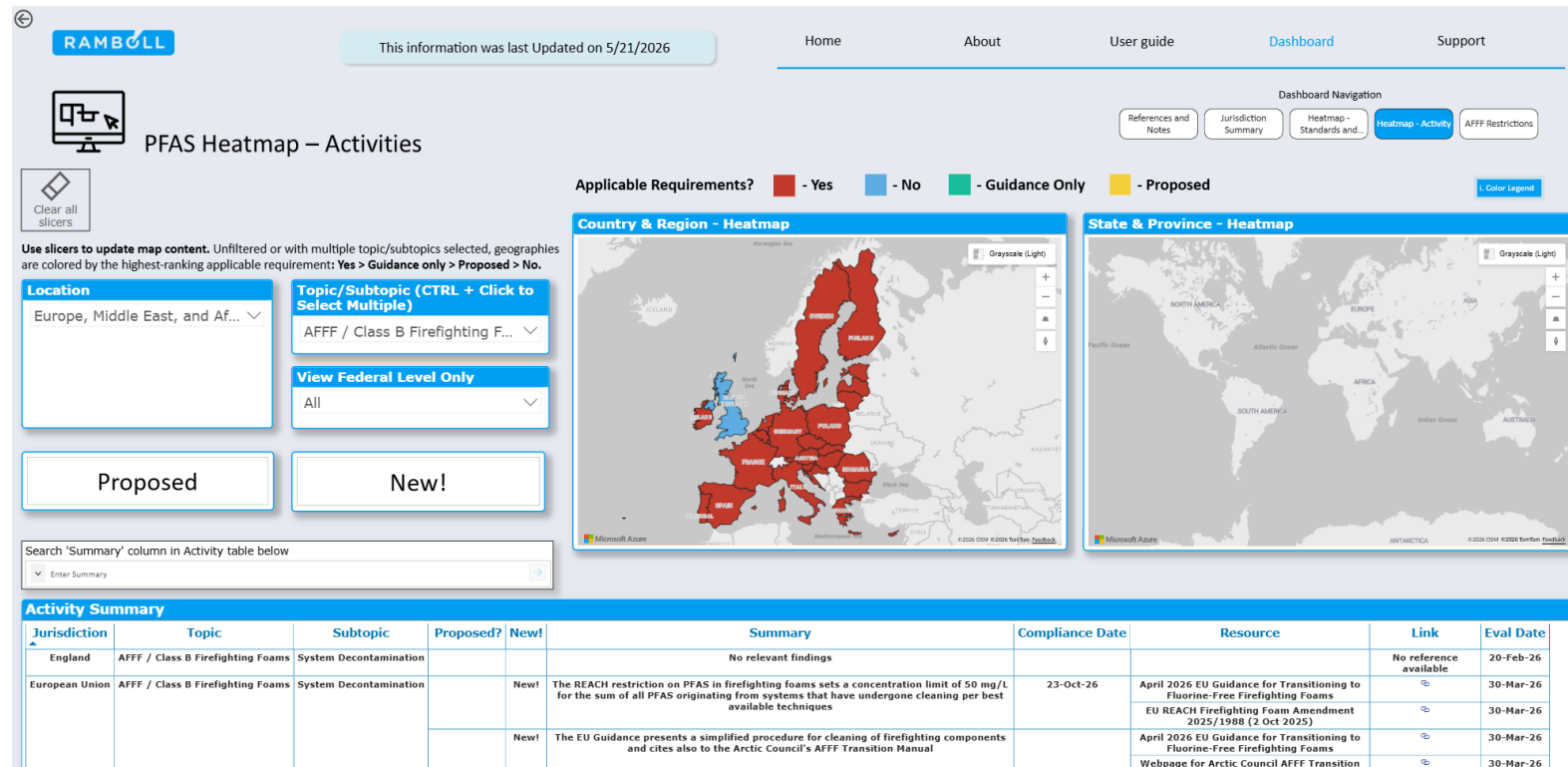
The dynamic digital tool for navigating PFAS information on regulations, policies, guidance, industry insights and more.

Request access today

[ramboll.com/
pfasglobalview](https://ramboll.com/pfasglobalview)



Heatmaps show high-level regulatory activity by topic...



Heat maps provide instant snapshots of PFAS activity

Topics/areas of inquiry include:

- AFFF/PFAS-containing firefighting foams
- Agriculture
- Air/vapor intrusion
- Biosolids/land application
- Drinking water
- Fish/fauna
- Fracking/extraction
- Funding for infrastructure and govt programs
- Governmental oversight frameworks
- Groundwater
- Hazardous substance designations and liability considerations
- Human health
- Litigation and natural resource damage assessments
- Product stewardship
- Proposed legislation and regulation
- Site investigation and remediation
- Testing and research
- Toxics reporting
- Waste management
- Wastewater and stormwater

AFFF Conversion: Our Approach

Focussed on Europe

PFAS-Containing AFFF Conversion Approach

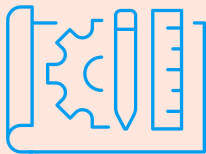
Develop an actionable, site-specific strategy to remove PFAS-containing Aqueous Film Forming Foam (AFFF) from fixed fire-fighting systems and apparatus that aims to:

1. Meet client objectives and regulatory requirements
2. Limit disruption to business operations
3. Be efficient and cost effective
4. Reduce future environmental impacts and liabilities

Three Fundamental Pillars of AFFF Conversion

Assessment & Planning

- Evaluate risk and codes
- Assess system layout, functionality, viability, containment
- Understand usage
- Engage stakeholders
- Identify replacement
- Understand future risk
- Disposal / Treatment Coordination



Implementation

- Decontamination design removal and disposal
- Oversight
- Installation / upgrade / replacements / retrofit
- Monitoring systems
- Containment upgrades



Commissioning

- Approvals
- Testing
- Training
- Monitoring
- Inspections
- Maintenance

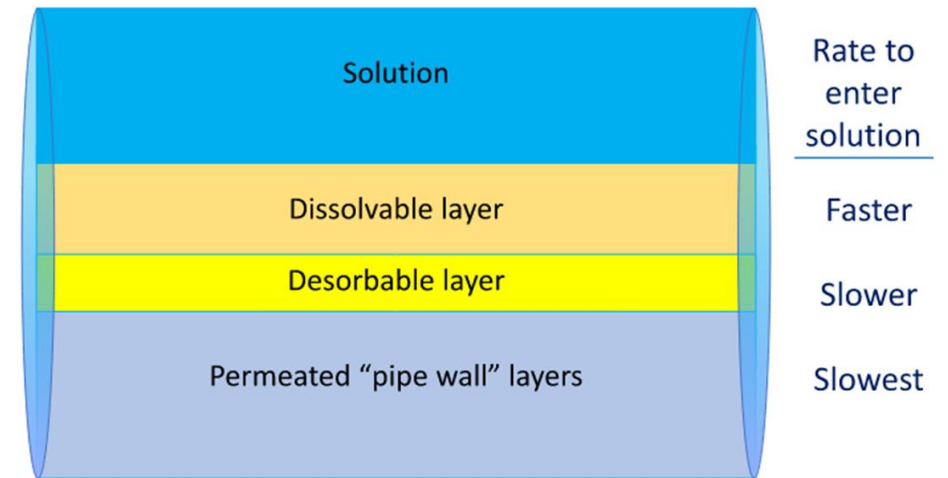


Fire Suppression System Cleaning

- Various guides or BMPs but no approved cleaning methods.
 - Triple-rinse with water (hot water) and/or mild detergent
 - Use of cleaning solvents (selected to fit site conditions)
 - Physical/mechanical methods: jet washing, agitation, sonication (used to assist removal of desorbed and permeated layers)
- Check your local or federal requirements/guidelines, as they may differ from location to location.
- Temporary system modifications are likely to be needed
- Anticipated operational down-time considerations for cleaning and conversions including JHA approvals
- Scope consideration for how to collect, manage, and dispose of wastes. Review applicable regulations for onsite waste management
- Management of rebound effects following initial cleaning as PFAS is likely to remain in the system at measurable concentrations
 - Future discharges managed as PFAS containing
 - Annual test/cleaning waters



PFAS persistence and rebound



- PFAS rebound originates in slowly desorbing layer(s), causing measured concentrations to increase with time.
- Rebounded PFAS concentrations can never be less than the PFAS levels in the water used for flushing.

Reference: USEPA, Office of Research and Development, Center for Emergency Environmental Solutions and Emergency Response Webinar, Clean or Replace? Decontaminating PFAS from firefighting equipment and hangars, Matthew Magnuson, October 12, 2022

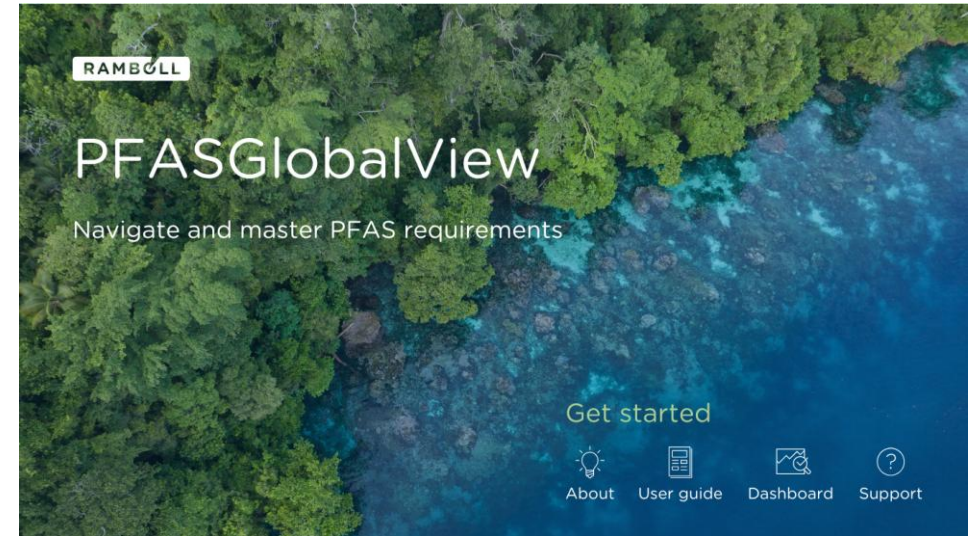
Disposal Options and Challenges

- Offsite disposal of solids and liquids
 - Geography (site and disposal facility)
 - Environmental Justice Concerns
 - Hazardous waste disposal considerations (current and potential) and regulatory concerns
 - Thermal Destruction (Incineration)
 - Landfilling
 - Deep Well Injection
 - Liquids shipped for offsite treatment and disposal/discharge (hub and spoke treatment facility)
- Onsite treatment (concentrate and rinse water)
 - Space
 - Time
 - Ability
 - Weather
 - Onsite or offsite discharge (storm/sanitary)
 - State or local jurisdiction permits / approvals
 - Offsite disposal of treatment media (solids)



Wrap-up / Closure

- Successful transitions require:
 - ✓ detailed evaluations and planning
 - ✓ engineering
 - ✓ stakeholder engagement
 - ✓ clear and defined goals/outcomes
 - ✓ maintenance of safety and compliance
 - ✓ follow-up training, and
 - ✓ ongoing management and commitment to compliance.
- Tracking regulatory changes and requirements is also a key success factor



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Bright
ideas.
Sustainable
change.

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Thank You!

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