THE CATALYST

Q1 2021

JOIFF THE INTERNATIONAL ORGANISATION FOR INDUSTRIAL EMERGENCY SERVICES MANAGEMENT

1. JOIFF & GESIP Agree Partnership
2. JOIFF Industrial Fire & Hazard Management Virtual Conference 2021
3. Can Aspirated Type High Expansion Generator Improve System Dependability?

ALSO:

Foam Feature

High Hazard Industry Transition To Fluorine Free Foam

PFAS Regulation

Navigating PFAS Remediation

WWW.JOIFF.COM

JOIFF

ABOUT JOIFF

JOIFF, the International Organisation for Industrial Emergency Services Management is a not-for-profit organisation dedicated to developing the knowledge, skills and understanding of personnel who work in and/or who are required to provide emergency response to incidents in Industry, primarily High Hazard Industry, with the aim of ensuring that risks in Industry are mitigated and managed safely.

The 4 pillars of JOIFF aiming to support its Membership in preventing and/or mitigating hazardous incidents in Industry are: Shared Learning – improving risk awareness amongst JOIFF Members; Accredited Training – enhancing operational preparedness in emergency response and crisis management; Technical Advisory Group – raising the quality of safety standards in the working environment of High Hazard Industry and Professional Affiliation - networking and access to professionals who have similar challenges in their work through Conferences and other events and the prestige of being a member of a globally recognised organisation of emergency response.

Full Members of JOIFF are organisations which are high hazard industries and/or have nominated personnel as emergency responders/hazard management team members who provide cover to such organisations. Commercial Members of JOIFF are organisations that provide goods and services to organisations in the High Hazard Industry.

JOIFF welcomes enquiries for Membership - please contact the JOIFF Secretariat for more information.

JOIFF CLG is registered in Ireland. Registration number 362542.
Address as secretariat.

JOIFF is the registered Business Name of JOIFF CLG

ABOUT THE CATALYST

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MESSAGE FROM THE CHAIRMAN

Dear JOIFF Members and Catalyst readers,
At the start of the new year, I would like to take this opportunity to extend best wishes to all of you on behalf of the JOIFF Board!

May 2021 be prosperous in all aspects of your lives with all the challenges facing the world after the particularly challenging 2020 and the continuation of Corona still present all over the world.

From a JOIFF perspective, we are facing a remarkably busy agenda for 2021 starting with the first ever Virtual Conference and Exhibition in high hazard industry emergency services management in February 2021 and then the continual Shared Learnings in the form of on-line seminars planned for the rest of the year.

This brings me to a matter that has been keeping me occupied for some time now – over the years a number of individuals have worked hard on their personal development in both the JOIFF Accredited eLearning programmes and in their job roles. Many have received recognition of their efforts in the form of JOIFF awards - to put this in perspective, JOIFF has awarded the following accolades over the years: -

• JOIFF Diploma (Dip.JOIFF)	252
• JOIFF Technician (Tech.JOIFF)	21
• Leadership 1 (Team Leader)	18
• Leadership 2 (Officer)	17
• JOIFF Graduate (Grad.JOIFF)	16
• JOIFF Membership (MJOIFF)	22
• JOIFF Associate Membership (AMJOIFF)	3
• JOIFF Fellowships	16

The feedback that we have received from many of the recipients of JOIFF awards is that they found their association with JOIFF challenging and enjoyable. We would like to continue this association with these people but unfortunately, for many, there has been little or no contact with JOIFF since after receiving these awards.

I would like to invite any of these esteemed individuals who might be reading this message to contact us if there are any ways that they see that they may become actively involved in building the present and future of JOIFF.

This invitation is of course also extended to all members of JOIFF – we would really like to hear from you with feedback on what you would like to see happening in JOIFF - your organisation - and to suggest any areas in which you would like to get involved within JOIFF.

There are many possibilities for consideration. Perhaps there are some subjects in Emergency Services Management on which a JOIFF Guideline could be produced, consider volunteering to participate in the programme of JOIFF's on-line seminars; submit an article for publishing in The Catalyst; those wo may be in the position to do so, share lessons learnt in real incidents in which they were involved; technical knowledge sharing with all the members of JOIFF – there are many possibilities, please grasp them and assist us in our work to grow JOIFF in size, stature and influence to benefit Emergency Services Management Worldwide .

I really hope that you will take up this challenge for 2021 and to all holders of JOIFF awards and to JOIFF members, I look forward to hearing from you!

I trust that you will again enjoy this edition of the Catalyst and my appreciation to every contributor of articles and to our advertisers and then especially to The Catalyst team for the tremendous effort to put all of this together!

JOIFF greetings to all of you until next time.

Regards,

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JOIFF AND GESIP AGREE PARTNERSHIP

The Directors of JOIFF are pleased to announce the setting up of a partnership between JOIFF, the International Organisation for Industrial Emergency Services Management and GESIP - Groupe Etude Sécurité Industrie Petroleum (Petroleum Industry Safety Study Group) – France.

GESIP, established in 1953, offers services, training programmes and advice to industrial and logistics sites in the field of toxic risks, fire and explosion control as well as crisis management. Members of GESIP are drawn from diverse industry sectors including Airports, Chemicals, Oil and Gas, Sanitation, Waste Management, Storage and Distribution.

JOIFF and GESIP have the same mission which is to help improve safety performance and to promote a strong HSE culture in the working environment in which each organisation operates. During the coming months JOIFF and GESIP will be discussing subjects of interest to members of both organisations with the aim of information exchange, discussions, setting up joint Working Groups, possible new Guidelines and Technical publications, possible joint Shared Learning events etc.
An important subject of the joint discussions will be effective and good quality training in Emergency Services Management which forms an important part of the activities of both JOIFF and GESIP.

The Directors of JOIFF and of GESIP look forward to working together to develop this partnership.

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NEW JOIFF MEMBERS

During October, November and December 2020, the JOIFF Board of Directors were pleased to welcome the following new Members.

Emirates Steel Industries, Abu Dhabi, represented by Danny Roach, Lead Instructor and Ahmed Al Jadeedi, Assistant Health and Safety Manager.

Emirates Steel is a state-of-the-art integrated steel plant that incorporates the latest innovative technologies in manufacturing, efficiency and sustainability. Based in the industrial sector of Abu Dhabi, Emirates Steel produces home-grown high quality steel products that are shipped and used across the world and delivered into major global markets, for the construction, engineering and energy sectors. Emirates Steel, are committed to refining their manufacturing processes and creating steel sustainably and safely, whilst supporting the growth of the non-oil heavy industry sector of the United Arab Emirates.

Greater Manchester Fire and Rescue Service, Manchester, United Kingdom, represented by Ian Redfern, Operational Equipment and Technical Manager, Christopher Hanson, Operational Training Lead, Sean Booth, Learning Resource and Information Manager and the Petrochemical Officer Lead.

Greater Manchester Fire and Rescue Service is the Municipal Fire and Rescue Service serving the Greater Manchester Metropolitan area. The main areas of their work are Protection - Fire Safety advice and enforcement, Prevention - advice and education to the residents, Response - all areas of response including fires, rescues, including a number of high hazard class B liquid storage facilities.

Safety and Fire Experts Co., Ahmadi, Kuwait, represented by Maher Khalil, Business Development Manager. Safety and Fire Experts has grown to become a major player in the field of Oil and Gas as a supplier, contractor, after sales service, and provider of international standard safety training courses in Kuwait and abroad.

INDIVIDUAL MEMBERS

During Q 4 2020, the Directors were also pleased to welcome Ahmad Alkwaja Tampere, Finland. Ahmad is a Mechanical Engineer, is currently studying for his Master of Science degree and is working in technical product support for Bronto Skylift Oy.

JOIFF also welcomed Muhammad Ameen Slemang Dip.JOIFF, New Zealand. Ameen is currently Station Commander in Nghi Son Refinery in Vietnam and he has recently successfully completed the JOIFF Diploma programme and was awarded the Post Nominal, Dip. JOIFF.

We look forward to the involvement of our new and existing Members in the continuing development of JOIFF.

JOIFF

ROLL OF HONOUR

During October, November and December 2020, the following persons were awarded JOIFF qualifications:

JOIFF TECHNICIAN

Greater Manchester Fire and Rescue Service
Manchester, United Kingdom

Dave Swallow Tech.JOIFF (left)
Station Manager

Dave has been with Greater Manchester Fire and Rescue Service for 19 years and as a Station Manager for the last 5 years. Dave successfully completed the JOIFF Diploma programme in 2019 and then commenced the JOIFF Technician programme. On completion of the JOIFF Technician programme Dave said "In the last few years I have picked up a specialist function within our incident command structure as a Petrochemical Officer. The JOIFF Technician course has built on the knowledge I gained from the Diploma course and better equipped me for dealing with incidents at High Hazard Storage Sites. I will also use this knowledge and information to support the development of our foam attack capability and for the learning of our fire crews".

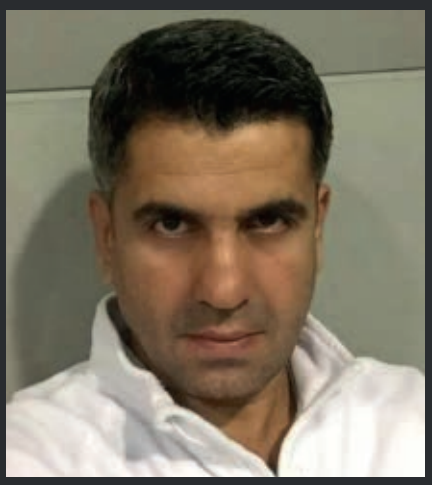
Ian Redfern Tech.JOIFF (right)
Station Manager

Like Dave, Ian successfully completed the JOIFF Diploma programme in 2019 and then commenced the JOIFF Technician programme. On completion of the JOIFF Technician programme Ian said "I have found the Technician course, especially the Unit on Process Industry, has improved my understanding of the many different processes that occur on refinery sites and now have a better appreciation of the risks involved. I Faisal Abdulla

Saeed Safdani Tech. JOIFF
ADNOC Onshore
Fujairah Terminal
Abu Dhabi, United Arab Emirates

Having been awarded Dip. JOIFF, Faisal Safdani began the JOIFF Technician programme which he successfully completed in December 2020.

JOIFF LEADERSHIP 1 (TEAM LEADER)



Ibrahim Bayram Grad.JOIFF
ADNOC Onshore
Fujairah Terminal
Abu Dhabi,
United Arab Emirates

Having successfully completed the JOIFF Diploma and the JOIFF Technician programmes and being awarded Grad.JOIFF for his professional attainment in industrial Emergency Services Management activities, Ibrahim continued his personal development and in November 2020, he completed the JOIFF Accredited Leadership 1 (Team Leader) programme. On completion of the programme Ibrahim said "It's my honor that I have completed successfully Leadership 1 - Team Leader. With my previous educational programmes, JOIFF competency based learning programs have made a major contribution to my professional development".

JOIFF MEMBER

Jason Sertori MemergMgt, MIFireE
OIC, MONUSCO Fire Unit (WEST)
United Nations Integrated Security Section (UNDSS & MONUSCO)
Democratic Republic of Congo

Jason joined the Queensland Fire and Emergency Services in February 1996 and was promoted to Inspector in April 2016. He then decided to leave QFES to serve with the United Nations.

Jason has been deployed on numerous occasions throughout Australia to manage large scale incidents ranging from wildfires to floods.

Jason is currently Chief Fire Officer for the United Nations largest mission.

For six months during 2019, Jason oversaw the international Emergency Management response to the Ebola crisis within the DR Congo.

Jason has completed a Master of Emergency Management; and is also a Member of the International Institute of Fire Engineers and holds numerous academic degrees in management and emergency response related fields.

On being awarded the honour Member of JOIFF, Jason said "Being admitted as a member of JOIFF is a continuation of the continuous development that I firmly believe in. With the constant changes and developments within our profession, we need to be at the forefront of technological and strategic changes, to ensure that the service delivery we provide is optimal".

THE CATALYST AND THE DIRECTORS OF JOIFF EXTEND CONGRATULATIONS TO ALL THOSE MENTIONED ABOVE.

JOIFF GUIDELINES

THE 4 PILLARS OF JOIFF ARE :

- SHARED LEARNING

Improving risk awareness amongst the members

- TECHNICAL ADVISORY GROUP

Raising the quality of safety standards in the working environment of High Hazard Industry

- ACCREDITED TRAINING

Enhancing operational preparedness in emergency response and crisis management

- PROFESSIONAL AFFILIATION

Access to a contact list of professionals with similar work challenges; Networking; Prestige of membership of a Globally recognised Organisation of Emergency Services Response at all levels.

One of the activities undertaken by JOIFF under its Pillar "Technical Advisory Group" is that JOIFF puts together Working Groups of Subject Matter Experts to develop Guidelines to increase the JOIFF Shared Learning knowledge base in line with new developments requiring different approaches to emergency response. These Guidelines are produced to assist its members to work to current levels of Good Industry Practice within their own Response Area and to ensure that emergency responders are well informed, competent and correctly equipped to deal with potential accidents/incidents to which they may be required to respond within their Area Emergency Response Plan.

During past years JOIFF has produced the following JOIFF Guidelines:
JOIFF Guideline on Inerting Vertical Storage Tanks;
JOIFF Handbook on Personal Protective Equipment (PPE) to protect against Heat and Flame;
JOIFF Guideline on Foam Concentrate;

JOIFF Guideline for the use and maintenance of fire extinguishers containing Foam;
JOIFF Guideline on Confined Space Entry.

During the second half of 2020, a JOIFF Working Group developed and published the latest JOIFF Guideline which is "JOIFF Guideline on Emergency Response to incidents involving vehicles powered by Alternative Fuels (including hybrid vehicles)" This Guideline discusses lithium batteries, operational response for fires/incidents involving electrically powered vehicles, hydrogen powered vehicles and gaseous fuel vehicles.

All JOIFF Guidelines are available in the Members Area of the JOIFF website for free download. If any reader of The Catalyst who is not a JOIFF member would like a copy of any of the JOIFF Guidelines, please contact the JOIFF Secretariat at info@fulcrum-consultants.com

JOIFF

JOIFF INDUSTRIAL FIRE & HAZARD MANAGEMENT VIRTUAL CONFERENCE & EXHIBITION 2021

Join hundreds of fellow fire proffessionals at the joiff industrial fire & hazard management virtual conference & exhibition on the 8th & 9th february 2021

The Global Covid 19 Pandemic has resulted in all Fire Industry Events to be cancelled or postponed, this included the JOIFF International FEHM Conference 2020. Due to the risks that Covid 19 represents, organisational travel restrictions, lockdowns, reluctance to travel, In house budget restrictions, refusal to allow Senior Safety Staff to attend physical events due to volume of people & the social distancing challenges plus the probable impact of quarantine periods upon return, personal health concerns & community risk

Attending a physical event is no longer a priority or even a possibility. Despite this, your requirements for continued Shared Learning and knowledge of the latest technology & equipment innovations have not gone away and with budgets under pressure and major health logistic challenges due to Covid 19, obtaining this information to justify the latest equipment purchases and Shared Learning is more important than ever.

The JOIFF Industrial Fire & Hazard Management Virtual Conference & Exhibition 2021 is a virtual Online Conference & Exhibition platform that will allow all JOIFF Members and the Global High Hazard Fire Community the opportunity to view Key Note conference presentations, meet and chat with latest equipment and technology suppliers, collate information electronically and communicate directly with colleagues from around the world without having to leave your desk.

EXHIBITION

Meet the Exhibitors in person through live Chat and Video meetings in the interactive Exhibition Area and keep up to date with the latest technology, collate information electronically directly from the exhibition booth and watch video demonstrations and at the click of a button have all of the information sent directly to your inbox.

CONFERENCE PRESENTATIONS

In the Auditorium we will be presenting 25 + Subject Matter & Industry Experts presenting On-Demand Video Seminars on relevant & diverse subjects, all available on demand at the click of a Button.

Subject Matter Expert Presenters include Alec Feldman – JOIFF, Dr Niall Ramsden - LastFire, Jeanne van Buren - Marsh, Jetty Middlecoop - Fire Dept. Amsterdam , Lee Newman – LFB, Rina Stynberg, Dr Thomas Leonhardt – Dr Sthamer, Arjan Bruinstroop – Schiphol Airport, Tim Bird - Eddistone, Nigel Blumire - NCEC, Anne Scoggin- LFB, Dr Ian Ross – PFAS Expert, Jayson Sertori – United Nations, John Ottesen - Fomtec, Ingo Weiss - & Stuart Phythian - FireDos, David Plant - Angus, Peter de Roos – H2K, Craig McDonnell - Perimeter, Simon Barret & Paul Southwood Viking EMEA, Tony Morrisey – Knowsley & Olivier Houlbert - Bio-Ex

NETWORKING

There is a virtual Live Chat & Video meeting networking area where all of the attendees can meet up online and chat or go on a live video meeting. This is to ensure the Peer to Peer contact is maintained and you get the chance to network and catch up with old friends and new contacts direct from your computer without the risk and cost of attending an actual face to face event.

TO REGISTER TO JOIN HUNDREDS OF OTHER FIRE PROFESSIONALS AT THIS GROUND BREAKING EVENT PLEASE VISIT WWW.JOIFF.COM

If you would like further information on The JOIFF Industrial Fire & Hazard Management Virtual Conference & Exhibition 2021 please do not hesitate to contact Paul Budgen, Event Director.

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JOIFF VIRTUAL FOAM SUMMIT 2021

SAVE THE DATE - 20TH MAY 2021

LIVE Presentations from PFAS Experts, Industrial End Users, Municipal End Users, Airport Fire Services End Users, Environmental, Legislature, Risk Assessment, Remediation, Industry Foam Specialists and Representatives from Fire Fighting Foam Manufacturers & Suppliers all sharing their perspectives.

Look out for the full details of the JOIFF Virtual Foam Summit that will be provided over the coming months.

If you would like further information on Sponsorship or Speaker Opportunities please contact
Event Organiser: Paul Budgen
Tel: + 44 (0) 1 305 831 768 or Email: pbudgen@edicogroup.net

INDUSTRIAL FIRE BRIGADE INCIDENT COMMANDER

By: Steve Watkins, Gijsbert van Pinxteren

Imagine, You are sitting behind your desk and you receive a call that there has been a small explosion in one of your gas refining units. You are worried. It is your first major incident and you are responsible for the co-ordination of the emergency response. The emergency response plan is set in motion. Those plans that you have vetted and sanctioned, the skills of the response staff, your decisions and how you interact with your team are what stands between a disaster averted or losses in life, huge production losses and reputation of your organisation seen by the outside world. Are you up to it?

WHAT MAKES YOU A GOOD COMPETENT INCIDENT COMMANDER?

Someone who stays calm, can work under stress and can communicate well to motivate their subordinates are obvious traits. Be how do you come up with the correct decisions?

Gary Klein made study back in the 1990's suggested that the best commander used Recognition Primed Decision Making process to make the quickest decisions based on matching the situation to their experiences in the past. But what if the commander does not have that experience. Incidents in petrochemical plants are rare, which means new commanders may not have been exposed to those decisions. Which poses huge dilemmas.

The latest research in leadership and decision making suggests that there are two decision making modes, Type 1 (intuitive) and type 2 (analytical) decision making processes. Type 1 is the above recognition primed decision making and type 2 is a formal process in which analyse is done before the decision is made. Type 2, often termed a Conflict Management Model analyses the information received and then assesses that information in terms of risk and threats to come up with tactical options. Then a process of filtering and elimination gives the option that is most promising. The research concludes that both styles maybe adopted depending on the experience of the commander, information available, time constraints and the situation faced.

At the heart of both models is information gathering and situational awareness. Gathering information and sharing can break down within and between teams and other stakeholders, which can undermine situational awareness and coordination leading to poorer incident management. Lacking in information a commander will need to fall back on pre-conceived procedures to stabilise the situation. More information may in the course of time become available which may affect decisions already made. Can you analyse the information and adjust your plan?

Decisions need to be made in a timely fashion. i.e. we cannot wait for extra information, we need to act now or the situation is rapidly changing or we need to act now to protect of responders and the public at large. The gut instinct is to isolate and extinguish the fire, however going through a risk and threat analyse might come up with an alternative tactic. I.e. controlled burning which would eliminate a greater risk of toxic non fire threat.

HOW CAN YOU GAIN THIS EXPERIENCE IF YOU ARE NO HAVING INCIDENTS THAT REGULARLY?

The answer is training, simulations that reflect the reality and challenge the commander under stress. Optimising the decision making process based on what you face through those simulations. Coaching the interpersonal soft skills needed to lead and get the most of the team.

RelyOn Nutec offers training with personalised mentoring to bridge the gap in skills, rules and knowledge needed for a commander. Our JOIFF accredited Industrial Fire Brigade incident Commander training is designed to help inexperienced commander or aspiring commanders to gain the necessary competencies in incident command. Should the delegate not have a firefighting background, then we offer a short Foundation Course (also online), which aims to bring the delegate up to speed with the basic firefighting techniques and tactics which would be employed in an industrial incident.

Experienced commander need not miss out, because we also run an advanced level for those who need to be challenged.

Whether you are professional facility firefighters or from the production side of a facility, if you are involved in the management of an incident then this course can be invaluable to you. How to gather information, analyse that information, assess the risks and threats, assess the resource needs, make timely decisions and trick and tips to lead under stress. The delegates has during the training the opportunity to test and develop their skills, in a safe but realistic way. Beside leadership role play and virtual reality exercises, the delegates will be exposed to "live fire exercises" on one of our highly realised industrial process simulators. The simulators look like a miniature refinery units, complete with pressure and flow control rooms, to stimulate the information flow to and from the process operators. Together with role play this gives a totally immersive experience. The delegates will not only be mentored on the decision making processes but also the soft interpersonal skills required for effective leadership.

Both delegates will receive verbal feedback during the exercises and a formal written performance assessment necessary to for personal development.

Image: © alhim / stock.adobe.com

CAN ASPIRATED TYPE HIGH EXPANSION GENERATORS IMPROVE SYSTEM DEPENDABILITY?

A new approach for maintenance free high expansion generators

BACKGROUND

High expansion fixed foam systems are used globally for the protection against fires in applications involving standard Class A commodities and Class B ignitable liquids. These include mine shafts, cable tunnels, LNG storage, aircraft hangars and logistics centres for example.

As with other fixed foam suppression systems, a foam concentrate is combined with water using special proportioning equipment to form a foam solution. The solution is then distributed through the deluge system's piping network to special generators that transform the foam solution into large volumes of highly expanded bubbles that submerge the fire area suppressing or extinguishing the fire by preventing oxygen from interacting with the flames and ignition source. It is these special high expansion generators that define the system type as a given amount of original foam solution will have its volume increased by 200 to 1,000 times.

The chemistry involved in the original foam concentrate is very important as it needs to be suitable for the protected commodity (Class A or Class B polar/non-polar). The foam also needs to be capable of expanding, building mass to the required submergence height and then to remain stable, within acceptable limits, against heat, smoke and other factors trying to break the foam structure down.

FOAM GENERATOR TYPES

Generators are developed and tested with specific foam concentrates. It is not the case that any foam concentrate can be used with any generator - if fire protection performance is to be assured of course. Most recognised test and design standards have requirements that the foam concentrate and generator are tested and Listed together to give defined performance criteria that is essential for fire protection and system design.

High expansion generators used in fixed systems can be of the "blower" type or "aspirated" type.
Both types are defined in NFPA 11 (Standard for Low, Medium and High-Expansion Foam), have independent third party product Listings and can be used with all the recognized design standards.

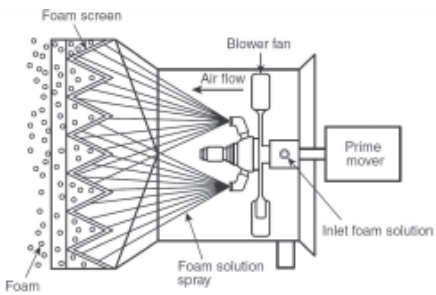

Image: © NFPA 11, Edition 2016, Annex A, 11-63, Fig. A.6.7.4(c), nfpa.org

Blower type generators produce highly expanded foam by spraying foam solution onto a metallic, perforated screen whilst simultaneously forcing an airstream through the same screen. The airstream is created by a rotating fan blade that is normally driven by a water motor using the foam solution supply, or by an electric motor.

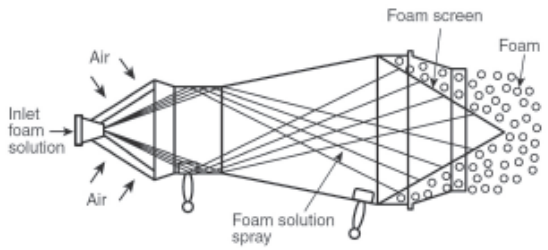

Image: © NFPA 11, Edition 2016, Annex A, 11-62, Fig. A.6.7.4(b), nfpa.org

Aspirated type generators also produce highly expanded foam from solution and air via a metallic foam screen but without the need of a rotating fan. Air movement into the generator is created by a series of specially designed nozzles that increase the discharge velocity of the foam solution, creating a venturi effect. This venturi effect (area of low pressure around the nozzles) draws air into the generator, which is then pushed onto the metallic screen by the foam solution spray.

Both generator types produce high expansion foam in much the same way with the main difference being the method of getting air directed onto the perforated screen. These two methods have distinct advantages and disadvantages when considering which type to select.

High expansion system design is fundamentality about filling a building volume, in the required time as prescribed in the design standard, with the lowest impact on water supply (flow and pressure).

Depending on the model, a blower type generator will typically have a better performance (cubic output) compared to an aspirated type. This output advantage can often mean a lower overall supply demand and perhaps a lower number of units depending on the manufacturer models involved.

This performance advantage is due to the fan because it has a more consistent performance across its operating range. An aspirated generator's output will improve as the supply pressures rises because the venturi effect increases with pressure, which will then draw more air into unit. Therefore, at higher pressures of 7 bar for example, comparable output can be observed. A blower type normally has an advantage at lower pressures around 4 bars for example.
So why would we use an aspirated type then if we might need a larger supply and more units?

Well the answer again is the fan. Whilst the fan is undoubtedly giving a better performance, it also represents a potential failure point of the device.

As with all moving assemblies, periodic maintenance and servicing is essential. When we consider the more common applications of aircraft hangars and logistics centres, this means difficult and costly maintenance regimes because the units are typically installed across difficult to access roof areas.

Business interruption is also an inevitable consequence. The end user may have to choose between costly service activities or, to neglect this requirement and hope the generators will never be used. Generators that are not working correctly could have a serious impact on system performance in a fire, not to mention the knock on effects such as subsequent invalidated insurance claims.

An aspirated type generator is normally simpler in design and construction with no specific service or maintenance requirements due to no moving parts. This can be a significant benefit for the end user as service activities are focused on the system itself in more accessible locations such as the pump room. In terms of the inevitable questions surrounding total installed system costs, it is normal to see no distinct difference because an aspirated generator's lower price point, due to simpler construction, balances scenarios when more units might be required with associated piping and supports. Then the blower type's advantage for less units needs to be balanced with the fact they are heavier and require more robust fixing and lifting plant.

CONCLUSION

As both types have the required Listings, applicability to test and design standards with comparable installed system costs, then the choice really comes down to the importance and cost of ongoing maintenance.

Auther: Simon Barratt
Foam Product Manager – Viking EMEA
barratts@viking-emea.com

Simon Barratt is the Foam Product Manager for Viking EMEA and is currently living in the United Kingdom.
Educated in Business and Finance with over 24 years of Fire Protection experience.
Simon moved to his current role of Foam Product Manager in 2013 and is responsible for the internal organization of sales, marketing, technical support, R&D and certification of Viking's expanding line of fixed fire protection Foam Products.

TRANSITION TO FLUORINE-FREE FOAM IN HIGH HAZARD PLANTS

PFAS (Per- and polyfluorinated alkyl substances) are used in firefighting foams since decades for fast knockdown. They are a large chemical family, also known as the Forever Chemicals, meaning they may stay permanently in the environment, contaminate groundwater and drinking water.

Studies have shown that PFAS chemicals, especially PFOS and PFOA (C8 fluorosurfactants), are identified as persistent, bioaccumulative and toxic pollutants. PFOS and PFOA were, respectively in 2009 and 2019, added to the list of Persistent Organic Pollutants of the Stockholm convention. New PFAS with C6 shorter-chain replaced C8 long-chain in firefighting foams. Recent studies have shown they are less bioaccumulative but still very persistent and mobile compared to C8. Regulations in many countries around the world have or are planning to ban PFAS-based products, including firefighting foams.

On the other hand, non-fluorinated foams (FFF) are available since 2002. They are PFAS-free, but are they a viable alternative to AFFF and AR-AFFF foams for high hazard industries fire protection?

FIRST OF ALL, HOW BIOEX FLUORINE-FREE FOAMS WORK?

BIOEX Fluorine-Free Foams are based on hydrocarbon surfactants, they are environmentally friendly and biodegradable. When applied, FFF creates a huge amount of bubbles, forming a resistant and covering blanket above the fuel in fire. Whereas AFFF foam forms an aqueous film above the fuel. The FFF foam blanket suppresses oxygen supply and blocks vapours. It provides a cooling effect for faster knockdown. BIOEX FFF are applied with the same application rates and the same gentle and forceful application methods as AFFF foams. Guaranteeing a long burnback resistance, the FFF drainage time is longer than fluid AFFF foams. The same storage conditions and periodical lab tests are required.

HOW ABOUT BIOEX FLUORINE-FREE FOAMS EXTINGUISHING PERFORMANCE?

BIOEX FFF foams offer comparable extinguishing performance and burnback resistance to aqueous film-forming foam (AFFF). Firefighting foam performances are certified under international standards (EN1568, UL, ICAO, LASTFIRE) in the same category as AFFF. FFF foams were successfully used during large petrochemical fires as Lubrizol in France. It is now possible to protect the environment and human health while also considering fire safety.

Fire brigades, chemical and oil & gas industries do not wait for the regulation to change for FFF. For example, a chemical factory fire in Melbourne was successfully extinguished using only FFF foams and many major international airports have already transitioned to FFF foams including Paris, Lyon and Lisbon airports.

TRANSITIONING TO FLUORINE-FREE FOAMS IN HIGH HAZARD PLANTS

Firstly, verify that the FFF performance selected is compliant with latest international standards (EN1568 v2018, UL162, GESIP, LASTFIRE...). Then, ensure FFF performance on specific fuels (not yet tested by standards) by acceptance test with the firefighting foam manufacturer.

Furthermore, the compatibility of FFF with existing foam mixing and foam discharge devices needs to be verified.

To guarantee that tanks are free from all traces of fluorinated derivates, a clean-up protocol is required before refilling with FFF. This being done, the transition to FFF new foam can be successfully implemented.

BIOEX, A PIONEER IN ENVIRONMENTALLY FRIENDLY FOAMS

Twenty years ago, BIOex was the first to launch a 100% fluorine-free firefighting foam (FFF) – ECOPOL – providing an efficient class A and B fire extinguishment while preserving the environment.

A team of engineers and Ph.D doctors is in a constant process of searching for new environmentally-friendly components and testing new efficient formulations.

BIOex uses its extensive experience and comprehensive long understanding of industrial risks, especially high hazard plants protection, to provide eco-friendly foams for efficient fire extinguishment and burnback resistance. Recognised as a safer alternative to chemicals of high concern and totally free of PFAS, BIOex eco-friendly foams are Greenscreen analysed and certified.

Major fire brigades, airports, oil & chemical companies, are currently using BIOex FFF foams across their worldwide locations. They can rely on BIOex 24/7emergency service with worldwide stocks and delivery in the event of an urgent need for firefighting foam.

ECOPOL PREMIUM FLUORINE-FREE FOAM

The company's ECOPOL firefighting foam achieves the best ranking within EN1568 latest standard (1A/1A on hydrocarbon and on polar solvent fires).

To check the performance of BIOex alcohol resistant fluorine-free foam (AR-FFF), a major oil and chemical tank storage company tested both ECOPOL Premium FFF and its current AR-AFFF foam. This comparison test was conducted under a LASTFIRE fire test, both in the same conditions. An independent third party came to certify performance.

It was found that ECOPOL Premium FFF achieves better results in extinguishment and burnback resistance than their performant current AFFF-AR foam. Thus, the tank terminal company decided to use the ECOPOL Premium FFF for their fire protection on its new installations.

BIOex can support this transition to FFF by testing FFF foams on specific fuels and verifying the compatibility of the new foam with existing fire suppression systems.

BIOEX EXPANDS

To meet the increasing demands for FFF foams, BIOex, established in France, has expanded, and recently moved into new facilities. Built to the latest standards, the production (up to 80,000 litre per day) and storage capacities have been increased, means that fluorinated and fluorine-free foams production lines are separated to guarantee environmentally friendly products, free of fluorinated compounds.

Since 1998, BIOEX has been formulating and manufacturing foam concentrates to fight all types of fire.

n 2002, BIOEX, convinced of the harmfulness of fluorinated derivatives, launched the first 100% fluorine-free ecological foam concentrate. ECOPOL foam concentrate is the alternative to combine respect of the environment and high extinguishing performance on all types of fires.

Thanks to its laboratory and an expert team, BIOEX is proactive in research and development of new formulations.

With a new state-of-the-art production facility and a large storage capacity, BIOEX delivers worldwide on a short time to answer the needs of fire fighters and safety professionals.

Certificated according to international standards (EN, UL, ICAO, LASTFIRE, etc.), BIOEX firefighting foam concentrates are highly efficient on class A solid fires, on class B hydrocarbon and polar solvent fires, as well as on toxic vapours. BIOEX foams guarantee rapid extinguishing times and a long burn back resistance.

Major companies in the petrochemical industry, airports, and fire brigades trust BIOEX products: SOLVAY, OILTANKING, NESTE, DUPONT, GROUPE ADP, Fire brigades in France, Germany, United Kingdom, Spain...

High efficiency firefighting foams:
OUR COMMITMENT
Preserve the environment:
YOUR CHOICE

JUST TRYING

HIGH RISK INDUSTRIES IN EUROPE AS WELL FOAM MANUFACTURERS AT THE MOMENT ARE FACING A FAST MOVING DISCUSSION OVER PFAS REGULATION IN FIRE FIGHTING FOAMS.

Already regulated substances like PFOS and PFOA are pushing the disussion of foam concepts toward the F3* foams. Overall question is: Can F3 foams substitute the performance of AFFF?

What we have already learned from tests in the past is that a one to one replacement of AFFF or AFFF-AR is nearly impossible. Especially concepts which are working with aqueous film formation, like the Footprint™ principle for tank fire fighting (with nearly non-aspirated foam) on non-polar solvents need to be renewed. Using F3 foams for larger class B fuel fires means that foam formation is the key to success. In mobile applications the test of foam expansion ratio is quite easy. Nearly all aspirated foam nozzles and low expansion foam tubes create a good and well performing foam to achive good extinguishing results. [picture bottom right – foam test] But tests on non-aspirated nozzles show that the foam expansion ratio is in relation to the nozzle design, foaming properties of the F3 foam and the pressure at the nozzle. So, a generalisation for the application is not possible and a specific test needs to be carried out.

A good foam expansion (ratio) helps the F3 foams to perform as designed. This principle is also confirmed by the EN 1568 part 3 fire test. A foam expansion ratio at the test nozzle near 1:10 is quite good.

But how to reduce F3 foams' fuel pick up? AFFF's have a minimal fuel pick up behavior created by the fluorosurfactant. F3 foams do not have any fluorinated raw materials in their composition. Additionally the bubble structure and the application have a huge influence on the fuel pick up capability. Meaning, a more homogenous bubble structure and a less forceful application helps not to load too much fuel into the foam blanket.

Of these benefits we have heard for years now from the compressed air foam system (CAFS) manufacturers. Second benefit of CAFS is the extended throwing length of aerated foam. Conventional foam reduces the throwing length up to 30% easily. AFFF foam water solution has nearly the same throwing length as water and was preferred for long distance operations e.g. at loading racks or processing plants.

For these reasons it is good to give this technology in combination with F3 foams some more attention. At a client's site we had the possiblity to attend a training of the plant fire brigade.

The test pit has dimensions of 10 m by 20 m (200 sqm) and is filled with approx. 6000 litres of unleaded gasoline. The preburn time was approx. 60 sec. As you see the documentation is not as detailed, because it was more of a training exercise to collect some experience.

The challenge was to extinguish the fire with only one CAFS nozzle at a flow of 400 l/min. foam. Therefore we needed to check the numbers.

Regularly we recommend an application rate of 6 - 8 l/min./sqm. For 200 sqm we talk about a realistic application of approx. 1200 l/min. for a safe and fast flame control for in depth fires (more than 25mm fuel depth). The named 400 l/min is compressed air foam, means we are talking about a foam expansion ratio of 1:8. So we are facing a real application of 50 l/min.

Compared to EN 1568-3 approval test with an application rate of 2,5 l/min/sqm we should need an application of 500 l/min [ten times more] foam water solution.

Some may ask why so much less application: the explanation is superficial – that was the maximum flow of the CAFS test unit which was available.

But only 1/10th of the minimum application rate brings up some interesting results.
In the first long seconds nothing happened at all and a subjective perspective came up, that the relation between the amount of foam applied and the size of the fire was disproportionate. But after 58 seconds we saw the first formation of a foam blanket (foam foot print) at the end of the foam stream. After an additional 100 seconds the fire fighters started to extend the foam blanket by sweeping gently to the left and to the right. After approx. 50% flame control the operator of the CAF unit switched from wet CAF to dry CAF. With that change the throwing length shortens dramatically but the direct and forceful application turned into a more gentle but still direct application. The burnback resistance of the dry foam helped a lot to strengthen the foam blanket at the edge.
After 5:42 min. the fire was out.
Reignition of the fuel: On the side of foam application any reignition was not successful. On the opposite side the fuel was still visible and detected „by nose". We know this effect from other tests, where the fuel is pushed to one side of the pit. Because of additional pollution of the air the fire chiefs decided not to restart the fire.
What we have learned: The CAFS Technology built up an homogenous and stable foam with our 0.5% vaPUREx® LV (F3) foam. Especially in dry CAF operation the burnback resistance helped a lot to control the flames and extend and secure the build up of the foam blanket. The very limited amount of water extended the extinguishing time. For better planning and related data it makes sense to handle small and big tests with an equal application rate. Very impressive was that these smaller quantities were finally able to handle the incident. We are convinced that the 90% control time with the minimum application rate of 2,5 l/min./m² would be acceptable and with the recommended 6 - 8 l/min./m² very fast. The questions which arise now are: by what factor does CAFS improve the extinguishment time results?
To answer this we know we need more tests. We need to compare the CAFS technology with F3 foams to conventional foam application (like low expansion foam) with F3 foams. Then we need to change the application rate and later on test on different fuels. Looks like we are at the beginning of a new and huge project with evironmental friendly and high performing foams. But who is willing to do these tests and likes to share a lesson learned?

Just give it a try!

Author: Martin Gorski, 42
Fire fighter since 1996

Key account manager and foamconcept consultant at
Dr. Sthamer Hamburg, Germany

	Real Test	EN 1568-3	Recommandation
application rate	0,25 L/Min./m²	2,5 L/Min/m²	6-8 L/Min/m²
flow per Min.	50 L/Min.	12,0 L/Min.	xxx
flow per Min. Foam	400 L/Min.	120 L/Min.	xxx
surface in m²	200 sqm	4,5 sqm	xxx
Fuel hight	more than 25mm	more than 25mm	more than 25mm

NEW LEADER MIX 2000 FOAM PROPORTIONING SYSTEM

The fire equipment manufacturer LEADER just launched a new version of autonomous proportioning system: LEADER MIX 2000. With its patented mechanical and automatic mixing system, the new LEADER MIX 2000 fits for different firefighting scenarios, ensure reliable and optimum operation with low operational cost. A new version which completes the range of autonomous proportioner until then limited to 1000 l/min. Let's discover more!

EASY TO USE AND VERSATILE FOAM DOSING SYSTEM

Designed and patented by the R&D team of the LEADER company, its unique system based on a venturi system achieve an automatic accurate aspiration of foam concentrate required to mix with water. Several fixed mixing ratios from 0.1% to 6% are available. Simple and easy to use, the firefighter just has to turn a manual selector to immediately set up and adjust the mixing ratio.

Ideal equipment for various fire interventions, the LEADER MIX 2000 is suitable for a wide flow range from 300 to 2000 l/min. It realises real-time adjustment, without human intervention, of current water flow and in case of flow variations. On large scale fire requiring high flow, it is possible to combine several LEADER MIX 2000 to go up to even larger flows. By coupling two LEADER MIX 2000, you achieve flow ranges of 600 to 4000l/min.

The LEADER MIX 2000 handle all foam concentrate types, including AR-types (wetting-foaming agents, fluorine-free foam concentrate, AFFF, AFFF-AR, proteinic foam, etc.), whether their viscosity: liquids foams (Newtonian fluids) or highly viscous foams (pseudoplastic). The equipment has been tested and calibrated for an accurate dosing, particularly for highly viscous pseudoplastic foam concentrates proportioned at 1% and 3%. The quality and performance of the produced foam are greatly related to the equipment used. With the LEADER MIX 2000, get an accurate foam and water mix for successful firefighting and avoiding to waste water and precious stock of foam concentrate.

The control panel allows to select the intervention position: water, foam or flush. The "water" position (by-pass) reduces pressure loss in the water supply when foam injection is not necessary. The "flush" position allows the dosing system to be rinsed and clean up for the next operation. The simple interface is easily understandable for fast and flawless action.

RELIABLE FOAM PROPORTIONER FOR LONG-LASTING OPERATION

As key part of the foam fire extinguishing system, the LEADER MIX 2000 foam proportioner is a 100% mechanical system, reliable and autonomous. It stand-alone and is ready to produce foam immediately. It operates without electronics and without external power supply, unlike electronic foam proportioning technologies. No periodic maintenance is required. The absence of a metering pump increases the reliability of the system and allows dry operation if the end of the tank is reached. This equipment has very low operational cost. All parts and components are corrosion resistant.

MAXIMUM FLEXIBILITY

This foam proportioning system is suitable for municipal fire departments, as well as for petrochemicals plants, industrial plants, logistics warehouses, waste treatment plants applications. Matching project specific requirements, the LEADER MIX 2000 mixing system can be easily installed in a centralized foam extinguishing system (foam pourer, deluge system, high expansion foam generator...) or on a fire fighting vehicle in its "fixed" version. In its "portable" version, it can be placed on the ground close to the foam concentrate storage or on remote locations. Its "plug & play" robust construction as well as its extremely compact and light format (less than 35kg) give him maximum flexibility.

To learn more about the LEADER MIX 2000, visit www.leader-group.company.

A major company for several decades, LEADER designs, manufactures and promotes high performing equipment used in firefighting and search and rescue applications. LEADER offers innovative products such as PPV fans for firefighting, Search equipment for tech rescue operations, flame simulators for training, etc.

IPEN Mis-Information

"the best F3 products on the market are able to match the performance of many MIL-Spec foams"

– **R.A. Klein, MD, PhD, Corresponding Author**
IPEN POPRC-14 Report
September 2018

US Navy Information

"We need to come up with fluorine-free foam. But what's available now can't meet (MIL-) specification."

– **John Farley, Director of Fire Test Operations**
US Naval Research Laboratory (NRL)
C&EN "The price of fire safety" January 14, 2019

As a result of the US EPA's voluntary 2010/2015 PFOA Stewardship Program, a total of fourteen (14) C6 AFFFs are currently on the US MIL-F-24385 Qualified Product List (QPL).

Current F3 Foams have not only failed US MIL-spec fire performance and key properties such as compatibility, but also failed ICAO level B fire tests at 32° C and higher ambient temperatures.

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dynaxC6

NAVIGATING PFAS REMEDIATION

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INTRODUCTION

Per- and polyfluoroalkyl substances (PFAS) are a group of emerging contaminants with unique and peculiar chemical features. Understanding their behaviour and properties is key to delivering successful environmental management and remediation of PFAS impacted sites, such as fire training areas.

The focus on PFAS as emerging contaminants continues to have commercial impacts on many industries, with regulatory agencies around the world setting exceptionally low limits for select PFAS in drinking water and surface waters. The initial focus has often been to just consider 'long chain' or 'C8' perfluoroalkyl PFAS including perfluorooctane sulphonate (PFOS) perfluorohexane sulphonate (PFHxS) and perfluorooctanoic acid (PFOA). However, regulations are advancing to address many more PFAS, including the shorter chain replacements such as perfluorohexanoic acid (PFHxA) perfluoropentoic acid (PFPeA) and perflurobutanoic acid (PFBA) and their "C6' precursors. The 'C6' firefighting foams tend to contain PFAS undetectable by conventional commercial analysis termed precursors or 'dark matter' [1] which are converted by microbial action in soil and groundwater to the increasingly regulated PFASs, such as PFHxA, PFPeA and PFBA (in addition to ultra-short chain PFAS)[2]. There is evidence to show that these bioactive precursors are 10,000 fold more toxic than their perfluoroalkyl daughter products [3], such as PFHxA, meaning that it's likely the precursors in AFFF will drive assessment of how harmful these fluorosurfactants are.

California recently tightened restrictions on the use of PFAS in firefighting foams with Senate Bill 1044 which regulates the sale, manufacture and use of firefighting foams containing intentionally added PFAS from January 1st 2022, with certain exemptions [4, 5].

The rapidly evolving regulations and innovation around measuring and treating PFAS make it difficult to chart the optimal management strategy for this class of chemicals. There is a question of whether more comprehensive environmental assessment of PFAS on any site in warranted, in order to attempt to mitigate long term liabilities and 'future proof' environmental works. It is possible that just managing those PFAS that are currently regulated may not extinguish future liabilities as more of this class of compounds inevitably become subject to environmental regulations. The one factor here that's certain is the very long-term nature of potential liabilities from PFAS, as this whole class of chemicals aren't biodegradable, so they and their potential liabilities persist [6-8].

As an emerging class of contaminants our understanding of PFAS is evolving rapidly and it's clear that there are many unknowns [9]. So rushing into using a remediation strategy for site clean-up may not be wise, until chemical analytical methods are developed to assess the concentration of PFAS, especially with uncertainties remaining regarding measurement of PFAS in soils [10]. Understanding where most of the mass of PFAS are present on a site and how they remain present as a source to groundwater is critical when formulating a management strategy for PFAS.

Fluorosurfactants self-assemble at interfaces to coat surfaces in the form of supramolecular assemblies which act as a waterproofing layer (i.e. Scotchgard). Every time soil or concrete is exposed to a Class B firefighting foam containing PFAS (such as aqueous film forming foam (AFFF)) the surface potentially becomes waterproofed. So over time, as a result of repeat use of AFFF, significant mass of PFAS can remain as a waterproof surface coating, which very slowly leaches back to groundwater or surface waters as a result of rainfall [11]. There are reports of fire training areas where concrete surfaces or soils remain an ongoing source of PFAS for multiple decades, following cessation of fire training activities as a result of ongoing leaching [12-15].

When considering the nature of PFAS in source zones and the chemistry of fluorosurfactants, leading to their behaviour as surface coatings, this brings additional complexity to implementing remediation. Remediation processes often involve multiple stages, where PFAS is first separated from an impacted matrix, concentrated and then destroyed.

This article aims to describe the potential pitfalls when considering multiple approaches to remediate PFAS, to provide an overview and assist with guidance through the properties of PFAS which make them challenge when considering remediation. Consorting the number of technologies evolving for commercial use to remediate PFAS, some generalisations are made.

BIOLOGICALY BASED TECHNOLOGIES

Remediation of PFAS using biological approaches appears to be very unlikely, as a result of the perfluoroalkyl group being a true xenobiotic, not having been present of the planet prior to synthesis by man and being extremely stable. There are a very limited number of biogenic monofluorinated organics produced by plants [16] and PFAS have not been reported to be evolved by volcanoes [16], with it being known that they are extremely persistent in the environment since the 1960's [17-20].

Attempts to bioremediate AFFF impacted soil or groundwater, may produce seemingly positive results as shorter chain PFASs such as PFHxS may appear, which give the impression that PFOS is being degraded via PFHxS, but shorter chain PFASs can appear as a result of biological transformation of polyfluorinated precursors, present along with PFOS in firefighting foams. PFOS may also appear to dimmish in concentration but this can be as a result of the ionic strength of amendments added to stimulate biological growth. There is potential that PFOS partitions to surfaces as the ionic strength rises and any precipitates or insoluble metal salts in growth media can provide surface area for adsorption of PFOS, making it appear that PFOS has been biodegraded. The design of experiments to show PFAS have been degraded should always include data showing the stoichiometric formation of fluoride. The recent preliminary report describing that an extremely slow growing micro-organism may be degrading PFASs [21] has not been verified, with independent chemical re-analysis not showing the same results, as those published. There may be an organism in an extreme environment that possesses an enzyme that attacks and degrades the perfluoroalkyl group, but application of a technologies based on bioremediation are not currently feasible.

THERMAL TECHNOLOGIES

Thermal technologies to address impacted soil and waters will meet with regulatory questions regarding emissions of organofluorine compounds to atmosphere and there may residual PFASs in any ashes formed, in a similar manner to the attention being paid to incineration [22, 23]. So proving that PFAS are destroyed without creating emissions may be critical to regulatory approval and project success when considering thermal remediation approaches.

Chemical Oxidation

The use of oxidants for destruction of PFAS has not generally been demonstrated in academic studies. Very harsh conditions (very low pH) were reported to be effective for PFOA and no treatment possible for PFOS [24]. Recent reports of the use of silver activated persulfate to degrade PFOA, look promising [25]. Although there are reports describing difficulties oxidising

PFOS [26] the ScisoR® process is described as a patented chemical oxidation method [27] effective on PFOS, with ScisoR® field tests described to be progressing. However, when using oxidants for remediation of PFAS at AFFF impacted sites there needs to be careful consideration of the mass of relatively immobile precursors at the source areas. The oxidants are more likely to mobilise precursor PFAS that are concentrated at the source by converting them to the more mobile PFHxS, PFHxA, PFPeA, PFBA and ultrashort PFAS, rather than oxidise them. So application of oxidants can increase the mass flux of PFAS from a source area. If an injection of oxidant increases the ionic strength it may look as though the PFOS has diminished in concentration in groundwater, when the PFOS has partitioned to adsorb to the aquifer. As a result of these complications, attempting chemical oxidation at a contaminated site will require significant thought and a series of laboratory trials using site soils should be considered in advance of on-site remediation.

PHYSICAL WASHING

Soil washing processes tend to separate soils by particle size and works better on soils with relatively low amounts of clays and silts (below 20% fines). As PFAS can be adsorbed to create waterproof layers similar to Scotchgard, washing with water can struggle to remove these layers, however many of these layers may be coating the higher surface area fine grain deposits, so by separating the sands and gravels from the fines it's potentially possible to separate out the most PFAS impacted deposits. With commercial analytical methods to measure PFAS in soils failing to assess many PFAS [10, 28], specialist analysis would be required to determine the effectives of this technology.

FOAM FRACTIONATION

Foam fractionation is an innovative approach to selectively remove PFAS from aqueous wastes as a concentrated foam. Fluorosurfactants adhere to gas bubbles, which rise to the water surface in a column, form a foam which can be separated off [29]. The separated foam comprises a liquid concentrate, which comprises a PFAS concentrate, with treated water passing through multiple columns to effectively remove PFAS [30]. Th concentrated waste can then be treated by further technologies such as sonolysis, electrochemical oxidation, plasma or supercritical water oxidation. As opposed to use compressed air for foam fractionation an alternative approach requires an ozone generator to add the chemical oxidant, ozone in a process termed ozofractionation [31]. Although ozone bubbles can be smaller than those created using air providing a potentially larger surface area for adsorption and removal of fluorosurfactants [32], the major drawback of using ozone is that it is a chemical oxidant. Ozone as an oxidant converts precursors to short and ultrashort chain PFASs which are not surfactants so are difficult to remove from water. So using ozone will create a secondary mechanism by which PFAS are not removed. This can be especially important when attempting to treat waste from AFFF use [33] and landfill leachate [34] which are commonly dominated by precursors.

INJECTING PARTICULATE ACTIVATED CARBON

The use of proprietary products containing activated carbon for injection to aquifers has been proposed to address PFAS. [35, 36]. This form of "trapping" technology relies on distributing an adsorbent particulate material throughout the aquifer, which facilitates adsorption of the contaminant onto the injected adsorbent. There are concerns that the micron sized particles of carbon will strain out in the aquifer formation. As activated carbon is ineffective for short chain PFAS, these will not be trapped effectively. PFAS remain in the aquifer using this approach and potentially concentrate in a zone where the carbon rests, so a further source area is produced. This will start to desorb PFAS over time, so there are questions over the long-term effectiveness of this approach. Liabilities associated with PFAS impacts may not be addressed as they remain in the aquifer.

SUMMARY

As remediation technologies are researched and scaled for commercial application there will be many opportunities for innovative approaches to develop and be proven in laboratory and field environments. Critical thinking combined with a detailed understanding of PFAS behaviour appear to be critical to delivering successful remedies.

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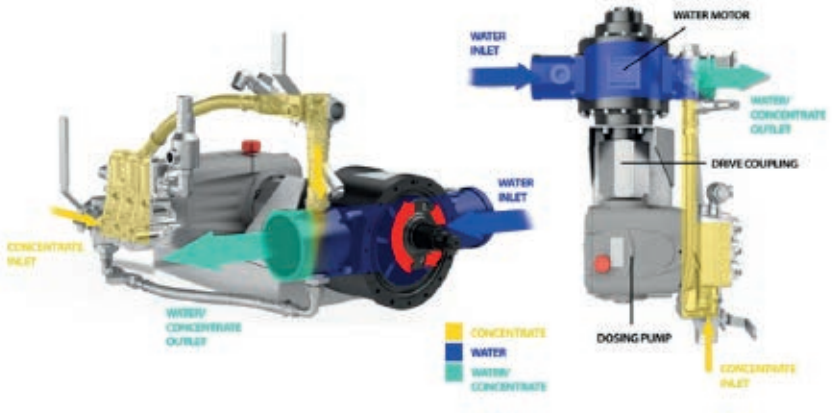
WATER DRIVEN PUMP PROPORTIONER

A VERSATILE DOSING SYSTEM FOR MANY DIFFERENT APPLICATIONS AND CONCENTRATE VISCOSITIES



FUNCTION PRINCIPLE

A water driven pump system is a mechanical way of dosing firefighting additives into the water, without the need of external power, as electricity or diesel driven engines. Furthermore, the water driven pump system does not need any pressure balancing or calibration.

FIREMIKS is such a system and it consists of two volumetric parts, one water motor and one concentrate pump, connected to each other through a direct drive coupling (some models equipped with a belt drive). Extinguishing water drives the volumetric water motor, which in its turn drives the positive displacement concentrate pump that doses the correct amount of foam concentrate in the extinguishing water exiting the water motor.. With this solution the water motor acts like a combined flow meter/drive for the foam pump, so automatically achieving the correct ratio between water motor and foam pump (= dosing rate within approved tolerances) without use of any external flow meters, valve regulating systems or orifices.

A water motor may either be a positive displacement (volumetric) type motor or an open turbine. The difference between these two options is that, with a turbine as drive, the flow and pressure range will be limited as a turbine motor is only partly volumetric. FIREMIKS is on the other hand a fully volumetric system with a positive displacement water motor instead of a turbine. The water motor rotor has 8-10 protruding vanes. This multi-vane water motor design gives an early volumetric function without using moving elastomer sealings, making it possible to maintain the mathematical ratio (=correct dosing rate) between water motor and concentrate pump in a wide pressure and flow range.

THE IMPORTANCE OF KNOWING THE VISCOSITY OF CONCENTRATE TO CHOOSE THE RIGHT TYPE OF FOAM PUMP.

Today the different brand and types of foam concentrate comes in a wide range of viscosities, especially the new Fluorine free foams can be highly viscous. To be able to select an appropriate proportioner one needs to know the viscosity of the concentrate and if it is Newtonian or non-Newtonian.

Water motor driven foam pump systems equipped with Gear pump are particularly suited for use in systems with higher flow rates, such as deluge systems and large fire monitors. Gear pumps are also very suited for high viscosity concentrates. We have with excellent result tested one of our Gear pumps models with a Fluorine-free foam with 8,040 cP (Brookfield Viscometer Spindle #4 at 30 rpm). The reason Gear pumps work well with these very high viscous concentrates is that they are equipped with counter rotating gears that creates an even flow that does not agitate the concentrate, furthermore the gears seal even better with high viscosity additives.

Water motor driven foam pump systems equipped with Piston (plunger) pumps are particularly suited for use in systems with low start flows, for example sprinkler systems. Piston pumps are also very suited for low and medium viscosity concentrates. Important to know is that Piston pumps have a limit upwards to high viscosity concentrates, normally around 4,000-4,500 cP (Brookfield Viscometer Spindle #4 at 30 rpm) due to the Piston pump reciprocating principle; for each revolution, the plunger sucks concentrate and then presses it out and the concentrate goes from zero to full speed twice per revolution. If the static viscosity is too high with non-Newtonian concentrates, the concentrate will not flow smoothly and therefor the correct dosing rate might not be achieved.

FIREMIKS with Piston pump (-PP)

FIREMIKS with Gear pump (-GP)

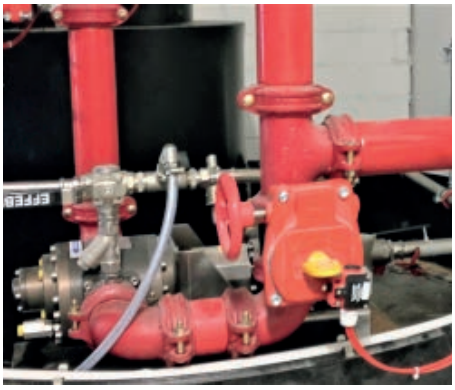
FIREMIKS proportioners are offered with both types of pumps, Gear and Piston (plunger). Among several important factors, by them flow and pressure, we always collect info of the concentrate, incl. viscosity, before we propose which type of pump we will offer our unit with. Important for all systems is that one should ensure that diameter on the foam supply piping is big enough for the concentrate delivery and to avoid longer

concentrate lines. Recommendations are specified in our Data sheet for each model. We are always available to guide you with more specific recommendations for your specific project.

SUITABLE FOR MANY DIFFERENT APPLICATIONS

FIREMIKS can be installed anywhere between a water source (hydrant or main water pump) and one or several nozzle(s), e.g. monitors, spray pipes, foam chambers, sprinkler heads, low-ex, medium-ex or high-ex nozzles. No need of a pressure tank; only connects it to an atmospheric foam tank which can be refilled, or replaced also under operation if necessary, using a simple valve switch. Because of this and without the need of an external energy source to power FIREMIKS, the resulting freedom of placement also makes it possible to design for the fastest possible reaction time – the closer to the discharge, the sooner the foam reaches the hazard.

Examples of Industrial Applications: Tank farms, Petrochemical industry, Harbour Jetties, Pump rooms, Warehouses, Waste incineration, Tunnel protection, Heli-deck protection, etc.



FM-approved FIREMIKS 1800-3-PP-F for Heli-deck protection at Hospital - Germany

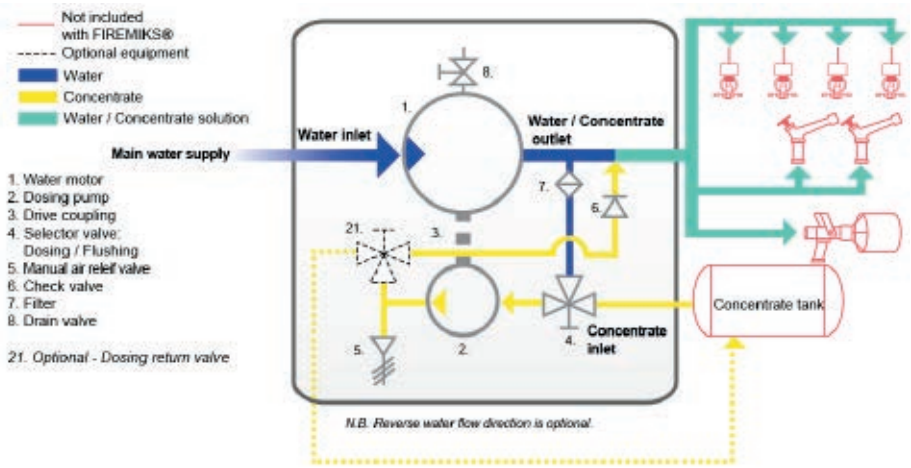
Foam trailer with FIREMIKS 2400-1-PP-F, Dow Chemical - Netherlands

Others example of applications are Fire trucks, Foam trailers and Marine-Offshore.
Both pump types can be supplied in Mobile versions. With a Mobile unit (or installed

in a Fire truck) a fire brigade can lay out a system consisting of one FIREMIKS proportioner and e.g. three, four or five nozzles working independently of each other, at different heights and lengths from main water pump. Firefighters are free to open or close their nozzle, even in rapid succession, "pulsing" as there is no delay in reaching the correct dosing FIREMIKS is available in different flow sizes, from max capacity of 180 lpm up to 10,000 lpm, (Installed in parallel on a skid we offer up to 20,000 lpm) and with fixed dosing alternatives of 0,5%, 1%, 2%, 3%, and selectable 0,3-0,6-1%, 1-2-3% or 0,5%-1%-3%. Other dosing options are available on request.

TESTING WITHOUT CONSUMING THE CONCENTRATE

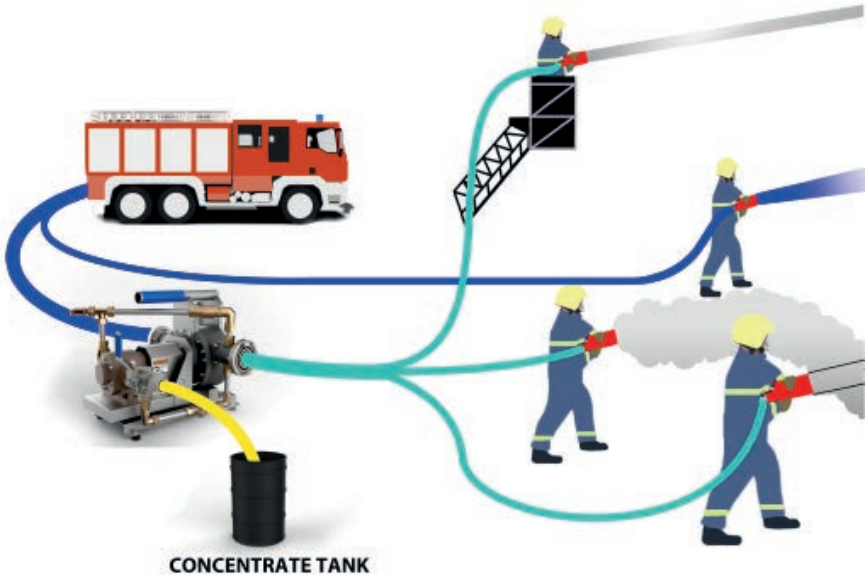
With the option Dosing return valve (DRV) – see point 21. below on Flow chart - one can test the function of the unit without consuming the concentrate This allows for an easy, quick and regular testing of the unit's functional capacity and for a possible checking of the admixture rate with an added flow meter and pressure valve, without generating the concentrate solution.
This may give a substantial saving of costs during many years. Apart from no need of concentrate there is no cost for cleaning up and destruction of the solution after the test, which is an important environmental benefit if choosing this option.



Above a flow chart showing Option with Dosing return valve.
One example: an 8,000 lpm unit with 3% dosing rate. 4 tests/year at max speed for one minute. 8,000 lpm x 3% = 240 litre of foam concentrate x 4 times = 960 litre at an average cost of 3 euro/lit = 2,880 Euro.- in saved cost/year.

SELECTED LINE OF FIREMIKS FM-APPROVED

A selected line of six sizes with 3% dosing rate is FM-approved, incl. different water motor material: Hard anodized and PTFE-coated ALU, Ni-Al Bronze or Stainless steel 316 L.



Flow chart showing Option with Dosing return valve.

FIREMIKS meets applicable parts of NFPA 11 and NFPA 1901 and production is made according to European directive 2006/42/EC = CE marked. We offer also Third-party inspection certificates from for ex. DNV-GL, towards NFPA 11 and/or EN 13565 for the whole range.
For more information, go to www.firemiks.com

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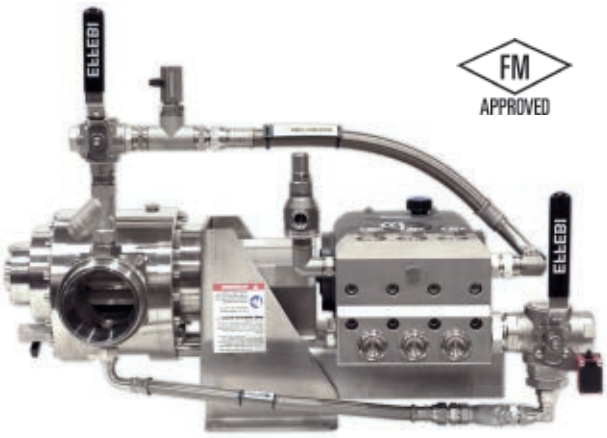
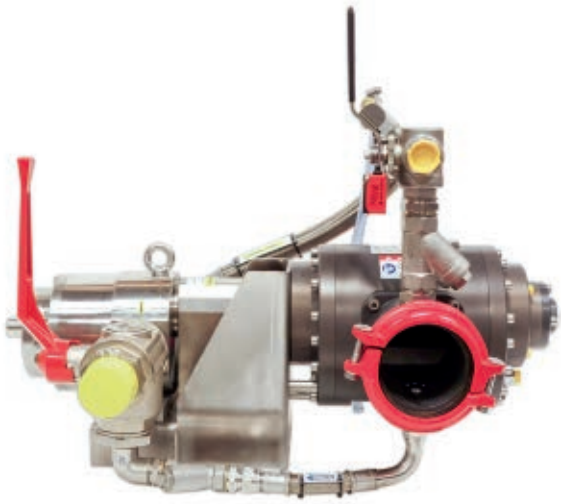


FIREMIKS equipped with Piston pump, suitable for low and medium viscocity concentrates and large flow range. Selected range with FM-approval Class 5130 inkl. water motors in Ni-Al Bronze and SS 316L.



FIREMIKS equipped with SS 316L Gear pump, suitable for high to very high viscocity concentrates and deluge systems.

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EASY TO USE

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TRAINING SIMULATOR PRESSURE BURST ACCIDENT

On 17 September this year, we experienced a small explosion during an exercise on one of the training simulators at a training centre in the Netherlands.

It was a sunny Thursday morning and various training groups were preparing to start the activities for that day. One of the groups was about to do undertake an exercise in an industrial process unit.

The unit involved comprises of a steel structure within which a modified sea container is inserted to create the interior space.

The instructor briefed the group and the safety officers designated to support this exercise prepared the unit. This involves igniting one of the gas burners in the unit to simulate an industrial gas release and then increase the gas flow to the desired intensity for the scenario. Sprinklers are activated to protect the steel structures.

After a few minutes of pre-burn the fire team was allowed to perform the scenario. However before the team could make any direct intervention as part of the scenario, the explosion took place. The sea container had opened up in the force of the blast (see photo below). Prior to the explosion there were no indicators of a pressure build-up such as a venting sound, the sound of steel deforming or "white" steam vapour visible on the outside.

The exercise was immediately stopped. No one was injured. Subsequent investigations to the incident revealed a surprising effect.

Sea container are widely used throughout the world for training structures. Sea containers gain their rigidity and strength by forming box sections from gauge sheet steel, the design of which is an important factor in this incident. It was evident that within the box section and similar sections that moisture has accumulated and with the addition of extreme heat from the gas fire then this moisture will produce steam and create overpressure within the box sections.

This accumulation of steam pressure could not vent easily and the overpressure increased to the point where the steel sections failed.

In our 35 years' experience of running these types of simulators this has never been witnessed before.

Safety is a high priority in our centres. We immediately modified all sea containers so that pressure in the box sections or other enclosed spaces cannot build up. A simple remedy by boring holes in all the sections. This allows the moisture that evaporates in the sections to escape easily.

This information we shall willingly with JOIFF in the hope to increase awareness and safety with our industry worldwide. We can learn from each other.

Shared Learning Provided by RelyOn Nutec Netherlands

GESIP, JOIFF'S NEW PARTNER

Risk management is based upon the knowledge of events and the sharing of experience. Since 1953, Gesip has been reinforcing human safety and facility integrity by sharing its knowledge through offering expertise and specialized training programmes. Gesip is a community of over 60 companies working together to improve industrial safety. Having developed an internationally recognized expertise, Gesip has become a reference for industrial safety matters

We work in the field of toxic risk, fire, explosion and crisis management. Gesip's vocation is to help improve safety performance and promote a strong HSE culture. To carry out our mission, we rely on a team of specialists from industry and public emergency professionals.

The unique alliance of capitalized knowledge, industrial members, human skills and full-scale infrastructure, allows us to offer high added value services. Gesip owns two technical platforms for testing and training that are unique in Europe. They are equipped with full-size training units within industrial amenities. We have also published more than 100 guides and technical supports. Gesip has been supporting beyond 100 clients for over 20 years.

Industrials are well aware of the regulations and have the means to control industrial risks. However, zero risk does not exist. That is why the operational and managerial teams must be prepared to act and be effective in crisis situation. Disaster management must have been the subject of training in advance, both from a managerial and operational point of view. To effectively manage a crisis, it is essential to prepare, to know how to organize interventions and to be able to anticipate. This is what Gesip provides to

its members and customers.
Gesip works with industrial players in several ways.
To start, we bring together experts around major issues to develop technical guidelines. They constitute a reliable foundation, on which the plant operators can rely for the management of the risks associated with their activities.
We then support manufacturers in consulting and auditing in reviews of procedures and installations. The services covered include the implementation or the updating of an emergency response plan, safety management procedures, the adaptation of the fire control system.
Finally, knowledge sharing being an invaluable wealth, we offer training courses combining theory and practice. This can be in English, in French or any languages on your premises or our technical platforms.
Furthermore, Gesip owns technical platforms in Vernon and Roussillon (France), equipped with full-size training units within industrial amenities. These technical platforms are former industrial facilities, the perfect place to train with real tank fires and other industrial equipment such as loading station, flanges and flares, manufacturing units. The trainees are immersed in real conditions with a large range of fuels fire like petrol, kerosene, gas, alcohol. This is the unique place in Europe to be trained on large scale hydrocarbon fire.
Returns on the incidents stress the importance of these real-life scenarios. Our technical platforms provide all the necessary facilities to:

- Set and extinguish large static and dynamic fires together with a large range of fuels.
- Intervention in confined environments.
- Drills in toxic or corrosive environments,
- Laboratory demonstrations of hazardous phenomena,
- Crisis management training with equipment and rooms that replicate industrial environments including 4D dynamic simulators.

Gesip facilities are also used to perform real-life tests of equipment or devices to improve the safety of the industrial sites.

FOAM CONCENTRATES : TEST IN REAL CONDITIONS

Thanks to our technical platforms, which are unique in Europe, we carry out performance or acceptance tests of materials and equipment likely to improve the safety of industrial sites.

As an international reference, Gesip performs several programs to evaluate the new generation of foams and provides services to monitor their performance throughout their life cycle.
One of our protocol, selects particularly high-performance foam concentrates. Thus, equipping fire installations with these foam concentrates makes it possible to ensure good efficiency of the defenses and, when locally allowed, to substantially reduce the quantities of foam concentrates stored.

A LARGE SCALE PROJECT

To continue to improve industrial safety, Gesip finalized the construction of a fire pit unique in the world with extraordinary dimensions.

The fluorine-based foams are very efficient in extinguishing however, scientific research has shown that their perfluorinated components can be harmful to the environment and to human health. These products and associated substances have been included in the list of persistent organic pollutants, the use of which must be phased out.
For this reason, manufacturers of firefighting foam are investing in the development of new high performance fluorine free foam concentrates suitable for various applications. This is a big challenge, as high-risk areas such as the chemical and petrochemical industry need the best performing foam concentrates.
Before being launched on the market, these new emulsifiers must be tested on real fires under conditions as close as possible to reality. However, to date, there is no infrastructure in the world to test their effectiveness on large-scale fires. That is why, Gesip has built a 300 m2 and 50m long fire pit at its center in Vernon (Normandy).
This industrial facility, which is unique in the world, make possible to test the progression of a foam in pool fire conditions over a long distance.
It is now possible to join the international research program launched by Gesip and Lastfire, the next large tests are planned in April and November 2021. This fire pit is ideal for performing real-scale tests, it is the best way to know the effectiveness of your products.

GET IN TOUCH

For more information, please visit our website: www.gesip.com

Contact point:
gesip-technique@gesip.com
gesip-formation@gesip.com

HOW CONDENSED AEROSOL WORKS ON EXTINGUISHING THE LITHIUM POLYMER BATTERY FIRES

The condensed aerosol technology came into prominence in the firefighting industry, following the Montreal Protocol in 1987 and the Clean Air Act of 1990 on Ozone depleting substances that banned the use of Halon 1301, which was the most widely used fire extinguishing agent at the time.

The use of condensed aerosols is gradually rising with the implementation of International standards such as NFPA2010, UL2775, EN15276 and ISO15779 International standards and due to their compact nature with low maintenance, they are finding good use in both conventional and unconventional applications.

Condensed aerosols produce a relatively high surface to mass ratio of micro-sized potassium-based particles suspended in a mixture of inert gases (this is referred to as the gaseous aerosol) that rapidly floods the protected area and the chemically reacts with the fire free radicals on a molecular level.

The most used electrolyte in Li-ion cells contains lithium hexafluorophosphate salt (LiPF6) which is highly flammable and undergoes thermal decomposition when exposed to increased temperatures. The decomposition of LiPF6 is promoted by the presence of water or humidity, according to the following reactions:

The chemistry behind the extinguishing action of condensed aerosols and how they assist to reduce the amounts of toxic gases released from a Li-ion thermal runaway is based on the following:

(When heated in a dry and inert atmosphere)

$LiPF_6 \rightarrow LiF(s) + PF_5(g)$

(In the presence of moisture/water, PF5 further reacts to form POF3 and HF)

$PF_5 + H_2O \rightarrow POF_3(g) + 2HF(g)$

(When heated in normal atmosphere in presence of moisture/water)

$LiPF_6 + H_2O \rightarrow LiF(s) + POF_3(g) + 2HF(g)$

Extensive research has been carried out to eliminate the amount of HF or to further neutralize it with alkaline materials.

Fire extinguishers that contain aqueous solutions of metal salts have proven to be effective, through a mechanism where the metal ions bind to the HF gas molecules to form stable solid metal fluorides. [1]

Considering K-type aerosols, both the active agent K2CO3 and KOH intermediate product can react with HF to form stable products, according to the below reactions which as a result will cause the ambient temperature to fall below the threshold temperature 120°C, needed to sustain the thermal reactions within the Li-ion cell.

$K_2CO_3 + 4HF \rightarrow 2KHF_2(s) + CO_2 + H_2O$

$KOH + HF \rightarrow KF(s) + H_2O$

Post discharge the condensed aerosol Active Agent remains within the enclosure for at least 30 minutes preventing any re-ignition. This is due to the characteristics of the potassium salts that can chemically neutralize and provide stability to the atmosphere and a potential thermal runway event. Each aerosol brand is different in terms of chemical composition of the solid aerosol forming compound and condensed aerosol generator design so every manufacturer should conduct a series of test(s) on Li-ion cells to justify replicable performance results and test scenarios reflecting realistic fire scenarios in order to define the appropriate design density.

[1] Patent No.: US20120312562A1, Method for fighting and/or preventing fires in lithium-ion cells and lithium-ion polymer cell.

Rajesh Sabadra – Executive Director
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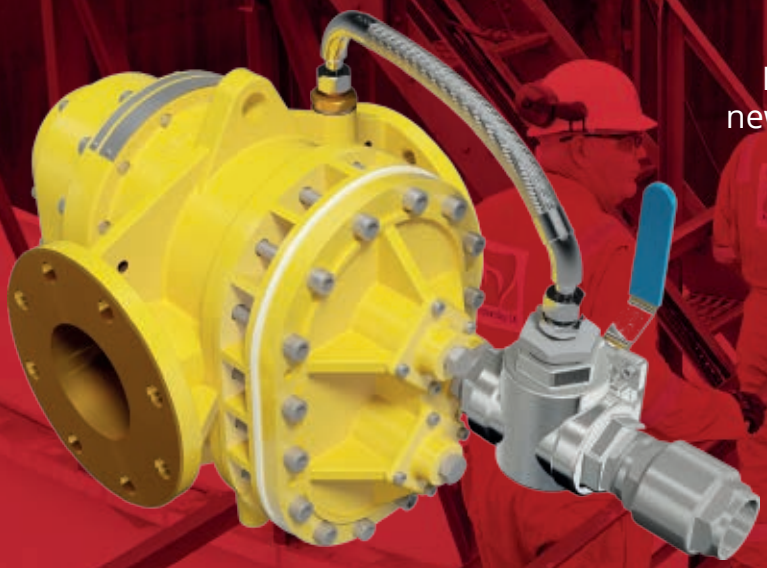
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Petrofac TRAINING SERVICES

Petrofac Training Services, Montrose Fire Training Centre has been a JOIFF Accredited Training Provider since 2004. Facilities in Montrose include:

- Three-storey training module for simulating offshore and onshore gas and hydrocarbon firefighting techniques, covering Class A, Class B, and pressurization fires.
- Three-storey training simulation module which replicates both internal process and accommodation emergency response scenarios.
- Two production and process modules simulating fires from wellheads, flanges, ruptured pipework and vessels, to provide experience of gas and hydrocarbon pressure fires and hydrocarbon spills.
- Three Confined Space modules for search and rescue exercises, including rescue from height training.
- Three helidecks – one for HLO and HDA training, as well as helicopter refueling, plus two for Emergency Response training for HERTM/ HERTL/other courses.
- Authorised Gas Testing training module for practical elements of AGT course
- Foam application exercises and firefighting techniques and an
- Accommodation block to practice search and rescue, plus essential breathing apparatus training.

Petrofac's instructor corps is comprised of highly experienced fire instructors drawn from Municipal Fire and Rescue Service, RAF Fire & Rescue Service, Offshore, Aviation and Industrial backgrounds

ADDITIONAL FACILITIES INCLUDE

- 3 OPITO accredited major emergency management simulators and 2 in Altens, Aberdeen.
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Petrofac offer a wide range of JOIFF Accredited courses.

For further information contact:
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Fire Team Member Course – 3 Days
3rd – 5th February, 2021
7th – 9th April, 2021

Fire Team Leader Course – 5 Days
8th – 12th February 2021
12th – 16th April 2021

Fire Fighting Foundation Course – 10 Days
15th – 26th February, 2021

Combined H2S, Industrial Breathing Protection and Confined Space – 5 Days
8th – 12th March, 2021

LNG Awareness and Fire Fighting - 5 Days
15th – 19th March, 2021

Road Traffic Collision Technician Course - 5 days
Planned for the 2nd quarter of the year.

The above courses and other JOIFF accredited courses on request.

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Fire Team Leader 3days
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H2S awareness 1 day

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UNITED KINGDOM
Contact: Claire Spender
Tel: + 44 1608 812 150
Email: claire.spender@capita.co.uk
Website: www.fireservicecollege.ac.uk

OSFTM- Fire Team Member Course – 5 Day
26th -30th April 2021

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JOIFF AND SHARED LEARNING

JOIFF circulates to its membership information relating to incidents that occur in High Hazard Industry. This is part of JOIFF's pillar of Shared Learning and it is aimed at raising awareness so that members can consider errors that caused the misfortunes of some, to educate against the same mistakes being repeated in their own location.

These are just a few of the incidents that JOIFF reported on during the second half of 2020.

Quite apart from the human tragedies in injuries, deaths and homelessness caused by these events, due to the experience and information available to prevent these incidents, in many cases, these are actually an unnecessary cost of loss of property, business continuity, reputational damage and environmental destruction.

Nigeria	Seven dead in blast at Oil Platform
South Africa	Oil Refinery Explosion kills 2, injuries 6
USA	Large explosion & fire on ship at U.S. Naval Base injures 2
Taiwan	Explosion at Plastics Refinery injures 3
Beirut	More Than 100 dead & 4000 1njured as Ammonia Nitrate stockpile ignition causes Huge explosion at Port
Spain	Lightning Strike Causes Storage Tank Fire at Repsol
UK	Investigation After 55-tonne Gas Leak at Apache Beryl North Sea Platform
China	Tanker Catches Fire off Port of Shanghai, 14 missing
Iraq	Lightning Strike Hits Tank at Qayara Refinery
Sri Lanka	Fire on oil tanker extinguished after 3 days
Norway	Equinor's Melkøya LNG Plant to be closed for up to a year after fire
Russia	Explosion & Fire at munitions depot forces thousands to evacuate
Malaysia	Rescue operation as OSV collides with oil platform - 1 dead, 186 rescued
Iraq	3 dead, 51 injured in gas pipeline explosion
Nigeria	Lagos tank farm fire extinguished after 24 hours
India	Oil well fire extinguished after 5 months
China	6 killed, 3 hurt in natural gas terminal fire
South Africa	7 injured in Durban oil refinery explosion
Taiwan	Pharmaceutical factory explosion. 1 dead, 2 injured.

After all major incidents, recommendations are made, but how many of these recommendations reach those in similar organisations with similar risks? If the recommendations appear at all, many times they are abridged or have restricted circulation because of the fear or insurance claims or court proceedings.

There is no such thing as "no risk" and a great deal of Emergency Services Management is built around reducing residual risk. For effective reduction of residual risk, the prime requirement is information – and what better information can there be than that from an organisation that has suffered from an incident in the type of risk that others need to reduce ?

Industry needs to ask itself if it is doing enough to educate the Industry on lessons learnt, so that the number of incidents such as these can be reduced and when they occur, they can be effectively and competently dealt with to reduce potential loss.

Places limited so book now to avoid disappointment

LASTFIRE
Large Atmospheric Storage Tank Fires

GESIP

Foam Application and Tank Fire Workshop

With increasing pressure on foam users to adopt policies minimising environmental consequences of their actions, it has never been more critical to ensure that firefighters are fully trained in the latest issues of flammable liquid fire response.
This Workshop provides a unique opportunity to hear about best practice application techniques, large scale research work and the current issues of foam application - as well as the opportunity to take part in hands-on firefighting in realistic conditions!

The course content is based on the Course Director's many years of experience running such events internationally. It draws heavily on the collective knowledge and experience of the LASTFIRE Group (www.lastfire.org) - the global industry organisation developing best practice guidance in Storage Tank Fire Hazard Management and leading the World in large scale end-user testing of new generation foams, including Fluorine Free types. LASTFIRE has also developed best practice guidance in Foam "Cradle to Grave" Assurance. The research test results and the Assurance Process will be described and discussed during the Workshop. This, with Hands-On demonstrations and exercises, makes this a truly unique independently run event.

2021 COURSE DATES

27th April - 29th April
7th - 9th December

Independent and Applicable to all foam users:

- Industry
- Aviation
- Municipal
- Defence

Classroom and Hands-on

Workshop Directors

Dr Niall Ramsden

- Extensive worldwide experience of foam testing and application
- LASTFIRE Coordinator
- NFPA 11 and EN13565 Pt 2 committee member
- Adviser at the Buncefield Terminal Event
- UL 162 Steering Panel Member

Nicolas Vacle

- Senior Instructor, GESIP

Delegates will also be able to attend the planned large scale (50m x 6m fire pit) research testing of Fluorine Free Foams for two days during the week before the event subject to delegates paying their own additional costs

GESIP Testing and Training Centre

The GESIP Testing and Training Centre is situated North of Paris. Previously an operating refinery, it has been transformed to one of the Worlds leading facilities for industrial fire fighting. In recent years a number of aviation and industrial related organisations, including LASTFIRE, have used it as the centre of choice for research work into foam application, particularly of new generation Fluorine Free and C6 Fluorosurfactant containing foams. Facilities now include a unique 50m x 6m burn pit!

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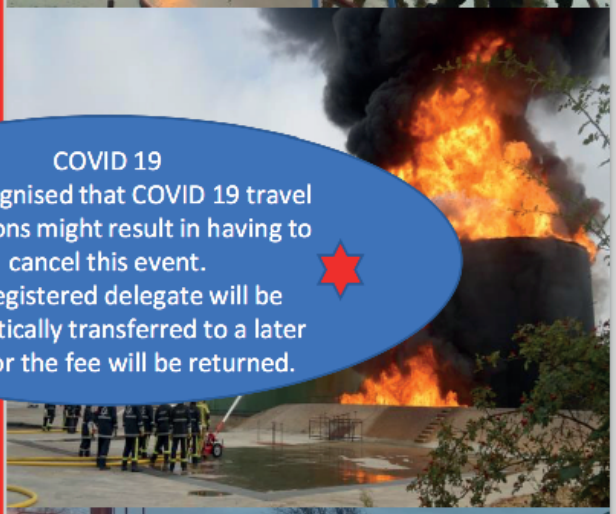
LASTFIRE
Large Atmospheric Storage Tank Fires

GESIP



Day 1

Classroom
Welcome/introductions/safety briefing
Introduction to Foam, Foam Types and Foam Properties
Current situation - Foam and the environment. What is the future?
Properties of flammable liquids - overview/refresher
How to use Foam and Foam Application Equipment
Lunch
Classroom
Case history Exercise - Denver Tank Fire
Laboratory and Fireground
PPE issue/site tour/SCBA
Laboratory demonstrations - flammable liquid properties
Fireground - demonstrations
Ethanol fire
Low/medium/high Expansion Foam Equipment
Matching/mismatching of foam application equipment

Day 2

Classroom
Atmospheric tank and Pressure Vessel Fire scenarios
Foam Application to Tanks - Options and issues
Foam application design calculations
Lunch
Fireground - demonstrations
LPG related scenarios
Foam pourer application
Fireground - Hands on: -
LPG fire
Small process fire - Foam application
Rimseal fire simulator (Dry powder and foam)

Day 3

Classroom
Current Research on Foam and Foam Application
Foam and Foam System Assurance
Fireground- Hands on
Truckloading spill fire
Tank fire
Lunch
Classroom
Buncefield and other major multiple tank events case history and legacy
Course review and Q and A

COVID 19
It is recognised that COVID 19 travel restrictions might result in having to cancel this event.
Any registered delegate will be automatically transferred to a later event or the fee will be returned.

Price includes 3 nights accommodation, lunches and dinner, daily bus transport to/from hotel/venue and full PPE

FOR REGISTRATION AND FURTHER INFORMATION contact info@lastfire.org

FEE PER ATTENDEE €3375 (€3100 FOR LASTFIRE MEMBERS)

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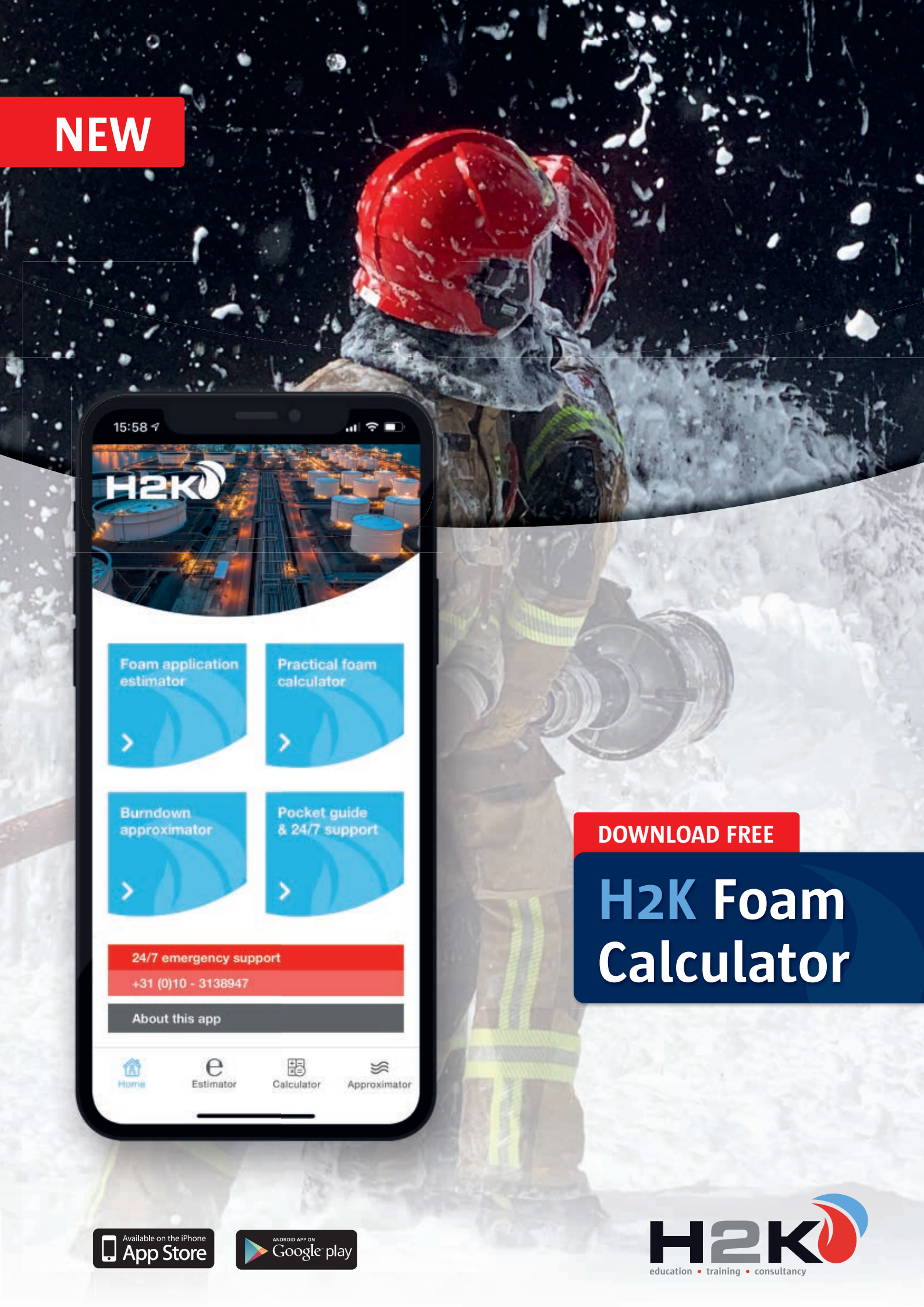
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