

THE CATALYST

Q4 2021



JOIFF

THE INTERNATIONAL ORGANISATION FOR
INDUSTRIAL EMERGENCY SERVICES MANAGEMENT

1. JOIFF Industrial Emergency Services
Conference 2022

2. A Desert Odyssey

3. Decontamination of PFAS

RelyOn Nutec
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MESSAGE FROM THE CHAIRMAN

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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This edition of the Catalyst focuses on New Technologies – every firefighter's dream – as well as Training – every firefighter's duty to ensure their own competency. I must however add that I have yet to meet a firefighter who did not try to "improve" on new technology during initial training on the specific "new technology", and it takes great leadership to convince the eager firefighters that research and development was actually done before this new technology was acquired.



JOIFF has continued with the regular webinars and we were very privileged to have Dave Munroe talking to us on 29 September 2021 on the issue of "Compressed Air Foam Systems (CAFs) and this presentation will soon be available to members on the JOIFF website in the Members' Area.

After listening to Dave's presentation, I decided to share a few personal lessons I have learnt as it is my humble opinion that JOIFF needs to highlight to our members when we feel notice should be taken.

Lesson 1: When designing a CAF fixed system the nozzle configuration must take the route of a balanced piping design to ensure even distribution of foam. Should the design be similar to a water sprinkler design (linear configuration) the foam will follow the route of least resistance and thus will not cover the total affected area evenly.

Lesson 2: After the CAF system has been installed the certification must be done on the holistic system and not on individual elements that make up the system – this includes also the actual foam concentrate provided for the system.

Lesson 3: JOIFF Members and Catalyst readers must please take note of this lesson, as it is my opinion that this was probably the most crucial lesson that I picked up on; – Comparison between the **ISO 7076-5** and the **FM 5130** Standards: –

ISO 7076-5 states in its introduction: "This part of ISO 7076 is prepared by ISO/TC21/SC6 and is based on **FM Global Class 5130 Approval Standard on Foam Extinguishing Systems**" Dave pointed out in his presentation that ISO 7076-5 is NOT equal to FM 5130 standard on CAF's systems and highlighted the following points where the ISO Standard falls short: –

1. CAF's quality equivalency limits are missing key evaluation elements with regards to foam quality matching criteria. (Expansion ratio and 25% drain time)
2. The certification process lacks experienced examiners – FM Engineers versus Third Party Inspectors.
3. No audit program is required after initial certification.

I would like to draw attention on the fact that there are omissions in the ISO Standard and readers must please take note of this when considering installation of fixed CAF systems.

I trust that you will find this edition of the Catalyst worth your while and please look out for our future events coming up, especially the "Save the Date" of the planned conference and exhibition that will be hosted as a combined event between RelyOn Nutec and JOIFF in Rotterdam on 2 – 3 March 2022.

Please keep safe and until next time – JOIFF Greetings and God Bless!

Regards,

Pine Pienaar FIFireE; FJOIFF; FSAESI
Director: JOIFF
Email: pine.pienaar2@outlook.com



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EMERGENCY RESPONSE

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Hazardous materials adviser revalidation
29 November '21 and 21 February '22

Hazardous materials adviser initial
7 March '22 and 27 June '22

Hazardous materials first responder
23 May '22

Hazardous materials instructor
12 September '22

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JOIFF NEWS

Pfizer, SANDWICH KENT, UNITED KINGDOM Pfizer EMERGENCY RESPONSE TEAM

From Left to right: Katherine Jones – First Responder, Ian O’Connell – Incident Controller, Sophie Millns – Exercise Director – First Responder Team Leader, Jack Pierce – First Responder, Stevie Neal – Exercise Director – First Responder team Leader, Vicky Sillis – First Responder, Craig Kelsall – UK Business Resilience Manager – Casualty, Gerry Johnson – JOIFF Observer, Adam Hopkins – First Responder, Kevin Deveson – Director of Operations – Observer, Nick Berry – Director for Business Resilience - Observer.

During Q3 2021, an audit was

carried out in Pfizer, Sandwich, UK to assess First Responder Competence.

The audit included an examination of Site Risk Assessments, Site Emergency Response Plan, Site Emergency Response Gap Analysis, Response Team training records. This was followed by an exercise simulating emergency response by the Team to an incident relevant to the Site risks.

The audit identified that the Response Teams’ documentation met requirements of adequacy, efficiency and fitness for purpose and during

the exercise the Response Team displayed an enthusiastic and professional approach and a high level of competence.



Left to right: Craig Kelsall, Loss Prevention and Business Resilience Manager for Pfizer UK and Kevin Deveson, JOIFF Director.

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NEW JOIFF MEMBERS

During July, August and September 2021, the JOIFF Board of Directors were pleased to welcome the following new Member.

Masila Petroleum Exploration and Production Company (PetroMasila), Republic of Yemen, represented by Ahmed Abubaker AL-ATTAS, HSE Superintendent, Ali AL-SAYAD, Head of Environment and Maher AL-WAJIH, HSE Manager.

Masila Petroleum Exploration and Production Company (PetroMasila) is a leading national Yemeni company working in the exploration and production of oil and gas and related energy projects. PetroMasila was founded in December 18, 2011 to operate Block 14, after expiry of that block's production sharing agreement with the former Canadian operator. PetroMasila is currently operating Blocks 10, 14, 51 and 53 in Hadhramout governorate.

PetroMasila also operates the

Ash-Shihr terminal on the Arabian Sea, where crude oil, produced from its and other blocks in the region, is transported by a 137km pipeline for storage and export.

PetroMasila also produces diesel and associated gas for use in the generation of power for operational purposes and the supply of electricity to cities and villages in the Wadi Hadhramout region.

Further, PetroMasila has overseen the construction of national energy projects, including bi-fuel turbine electricity generation, as directed by H.E. President and the government of Yemen.

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



JOIFF

ROLL OF HONOUR

During July, August and September 2021, the following persons were awarded JOIFF qualifications:

JOIFF DIPLOMA

INEOS Chemicals
Grangemouth Ltd.
Scotland

Mark Ryan Dip.JOIFF



Mark joined the Fire Service in 1999 and spent 16 weeks at The Fire Service Training School in Gullane, Scotland before graduating and being posted to Cambuslang Fire Station. In 2011 he moved to Clydesmill Fire Station which had a variety of appliances

which gave him additional experience in firefighting, high reach capabilities, water rescue and also the high volume pump with prime mover. In 2018, he made the move into refinery firefighting with a new role as Emergency Responder at INOES Chemicals Grangemouth. Since undertaking this new role, he continued to expand his knowledge by recently completing the JOIFF Diploma.

ADNOC Onshore
Abu Dhabi
United Arab Emirates

Bongani Sibiya Dip.JOIFF
Firefighter



Bongani Sibiya started his career in 2009 as a volunteer firefighter in South Africa and he advanced to a fire fighter/driver operator in 2014 in the city of Ekurhuleni Emergency Services in the East Rand region of Gauteng, South Africa. During the course of his career Bongani obtained firefighter qualifications including first year in Fire Technology, Fire fighter 2, Hazmat Operation and Awareness, Driver and Operator, Fire instructor 1, Basic Ambulance Assistant and Technical Rescue including rope rescue, confined space rescue, vehicle rescue, structural collapse, trench rescue, wilderness rescue, swift water rescue and machinery rescue.

Astron Energy (PTY) Ltd.
Milnerton
Cape Town, South Africa

During the 2nd quarter of 2021, on successfully completing the programme, JOIFF Diploma was awarded to:

Mogamat Bryan, Dip.JOIFF
Genevieve Foster, Dip.JOIFF
Thuto Makolomakoe,
Dip.JOIFF
Reagan Meyer, Dip.JOIFF
Bulelani Mgwali, Dip.JOIFF
Ezekiel Mmesi, Dip.JOIFF
Kanakana Nemaguvhuni,
Dip.JOIFF
Neville Swan, Dip.JOIFF
Mari-Chanel Swart, Dip.JOIFF
Julian Taylor, Dip.JOIFF
Yazeed Valentine, Dip.JOIFF
Kurt Wedel, Dip.JOIFF

JOIFF LEADERSHIP 1 (Team Leader)

ADNOC Onshore
Abu Dhabi
United Arab Emirates

Saud Abdalla Mohamed
Abdalla Grad.JOIFF
Senior Officer, Fire Services



Saud Jafar was a member of Special Forces from 2003 to 2006 after which he changed career and was employed at EGA (Emirates Global Aluminium) where he worked for one year. He then joined Dubai police force in the CID (Crime Investigation Department) where he worked from 2007 to 2011 following

which he joined ADNOC Onshore as a firefighter in 2012.

Saud successfully completed and was awarded the JOIFF Diploma in 2018 and followed this in 2019 when he successfully completed the JOIFF Technician programme.

In 2020, Saud was awarded the status of JOIFF Graduate in recognition of his professional attainment in industrial Emergency Services Management activities and in supporting the development and profile of JOIFF during the period of his service.

Saud has played an important part in encouraging many of his colleagues in ADNOC Onshore Fire Service to improve their knowledge and competence by participating in the various JOIFF eLearning programmes. He has acted as Assessor for many of his colleagues in their work on the programmes and he has mentored a number of his colleagues to become Assessors themselves.

Saud completed the Leadership 1 (Team Leader) programme during Q3 2021 and he looks forward to starting the Leadership 2 (Officer) programme.

The Catalyst and the Directors of JOIFF extend congratulations to all those mentioned above.



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INDUSTRIAL EMERGENCY SERVICES MANAGEMENT CONFERENCE 2022

1 & 2 MARCH 2022



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Fire Academy

NEWS FROM JOIFF

ACCREDITED TRAINING PROVIDERS

With the continual slowly lifting of COVID travel restrictions, it was possible for some more overdue JOIFF accreditation audits to be carried out.

EDDISTONE CONSULTING LTD. United Kingdom



JOIFF accredited Training Provider Eddystone Consulting Ltd. recently successfully completed an accreditation audit and received their certificate of JOIFF accreditation. Left to right: Tim Bird, Managing

Director, Rebecca Harby, Quality, Learning & Development Manager and Gerry Johnson FJOIFF, JOIFF Director of Standards of Training and Competence.

INTERNATIONAL SAFETY TRAINING COLLEGE. Malta

JOIFF accredited Training Provider International Safety Training College recently successfully completed an accreditation audit and received their certificate of JOIFF accreditation.

Presentation of JOIFF Certificate of JOIFF Accredited Training Provider following successful audit

From left to right: Brian Cranmer, Learning and Development Manager, Gerry Johnson, FJOIFF Director of JOIFF, Kevin Deveson, Director of JOIFF, Kevin Keeler Managing Director, Duncan



A DESERT ODYSSEY

by Eric Dempsey MJOIFF JOIFF Accredited Training Provider Arc Fire Training Services Ltd. UK.

Between 2009 and 2013 I visited Yemen many times due to my association with Dove Energy, a refinery at Sharyoof in the south-western Yemeni desert. The relationship went from strength to strength and with the help and support of the JOIFF team we built a training academy from scratch to JOIFF Accreditation requirements that included a fully equipped fire training ground with all rigs and facilities, classrooms, SCBA and equipment maintenance, specialist

laundry, hose repair etc. I trained locals as classroom assistants, fire ground assistants and we created a library and printing team for the production of course folders and documents.

News of the Academy quickly spread in Yemen and a number of other High Hazard Industries sent their emergency response teams to carry out training - all of the courses and programmes that I presented at were JOIFF Accredited.

The impetus of the training continued to develop but unfortunately, in 2014, Civil war followed by a Proxy war began and all training ceased. Western oil companies were forced to withdraw and PetroMasila took over the concessions formerly ran by Dove, PetroSarr, Dome and Total E & P and others.

The war has destroyed much of the infrastructure of the country and an uneasy truce line exists.

Earlier this year, I was asked by PetroMasila if I would return as they had received no meaningful training since I left. I returned to Yemen in August 2021, JOIFF welcomed PetroMasila as a JOIFF member organisation and Training began on the old Dove Energy fire ground. As PetroMasila is approximately an hour's drive from the old Dove Energy Fire ground, this causes daily logistic and transport difficulties for regular training, so they are building a new fire ground closer to their facilities.

With an armed ex-SAS bodyguard for protection, under very hot ambient conditions, I began the training. My initial assessment of the levels of key skills competence gained by questioning, a quiz, and asking the students to don full fire kit and SCBA under pressure told me that I needed to combine aspects of my Foundation Course with the Fire Team Member course and that we were going to have 4 very long days. This really confirmed to me the value of continuation training and refresher training - use it or lose it.

Each day was theory and lectures in the morning and practical work each afternoon. It was hard work for me and my fire ground team and the courses just flew by,

accompanied by gallons of water and formula for rehydration. We upped the requirements of each exercise daily until by day 4 of each course the practical was a thrilling extravaganza watched by a large audience.

I followed these courses with Crisis Management and Emergency Response courses for managers and supervisors for roles in strategic, tactical and operations commands. I selected 2 persons from each of these courses to become champions for that course and they all attended a Train the Trainer Course and an Incident Controller / Crisis Management & Emergency Response course on the next run.

At the end of all the courses we had a big party, a senior manager presented the certificates of JOIFF accreditation and JOIFF badges, a large thank you cake and some very nice presents. It was very pleasing and nice to see another satisfied client.

The journey home is worthy of a book in itself ! A 4 hour drive across the desert to Al Mukalla Terminal and the presence of a heavily armed jeep front and back and an ex SAS bodyguard did nothing to detract from the romantic scenery. Overnight

stay, fly to Aden and stay in a comfy Power Station for 2 days while PCR COVID tests were arranged. Fly from Aden to Amman overnight, London and finally Manchester and only 20lbs lighter !

A very successful run with all courses JOIFF accredited and a total of 63 students trained.

And even more satisfying, a few weeks after returning home, I was informed by PetroMasila that they had 2 fires at Block 10. The Fire Intervention teams I recently trained attended both incidents swiftly and dealt with both fires in a highly competent and professional manner.

JOIFF Accredited Training Provider Arc Fire Training Services Ltd. UK.



Above: Fire Training Ground



Above: The Successful Fire Team after the recent fire. Insert: Students awarded their JOIFF accredited certificates of competence



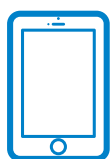
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BREXIT AND THE UK CHANGE FROM THE CE MARK

Following the United Kingdom's departure from the European Union on 31st January 2020, the EU and U.K. jointly agreed on a transition period that ended on 31st December 2020. During the transition, the EU still recognised U.K. Notified Bodies, and manufacturers could sell CE marked products into the U.K. market. Following the publication of the EU-UK Trade and Cooperation Agreement at the end of 2020, the U.K. introduced a 1-year transition which allowed most CE marked products to be placed on the Great Britain market until 31st December 2021. The U.K. government recently announced a further 1-year extension to the transition of CE to UKCA marking. CE marked goods can be placed on Great Britain market to end of 2022.

UKCA (CONFORMITY ASSESSED) MARK:

UKCA (Conformity Assessed) is a new product marking for goods to be placed on the market in Great Britain (England, Scotland and Wales). Once the Brexit transition period is over, goods which are CE marked will need to have a UKCA mark, and where necessary, certification from a UK Approved Body. The UKCA mark covers most goods that were previously marked under the European Union's CE mark.

For UK businesses looking to trade with the European Union, the UKCA marking will not be accepted for products placed on the European or Northern Ireland markets. For the products that continue to remain on the market in Europe, a CE marking will still be required.

The EU-UK Trade and Cooperation Agreement secures tariff-free access between the EU and the U.K. markets but does not change the compliance process, so the UK Conformity Assessed (UKCA) marking and conformity to the

U.K. legislations remain mandatory for placing goods on the market in Great Britain.

WHAT ARE THE REQUIREMENTS FOR UKCA MARKINGS?:

The new UKCA marking declares that the product conforms to all applicable U.K. legislative requirements and that appropriate conformity assessment procedures have been successfully completed. The UKCA marking will be required on products subject to the U.K. equivalent legislation to all of the EU directives/regulations that required CE marking. The UKCA essential/technical requirements and conformity assessment procedures and standards are largely the same as they were for CE marking.

PLACING PRODUCT ON THE MARKET IN NORTHERN IRELAND:

Northern Ireland has different rules to Great Britain (the mainland UK). From 1st January 2021, products can be placed on the Northern Ireland market with either the CE mark, using CE certification held by an EU27 notified body, or with UKNI marking using certification from a UK Approved Body. The UKCA marking alone cannot be used for goods placed on the Northern Ireland market.

WHEN TO USE THE UKCA MARKING:

The new UKCA marking can be used before 1 January 2023 if all of the following apply. The product:

- is for the market in Great Britain
 - is covered by legislation which requires the UKCA marking
 - requires mandatory third-party conformity assessment
 - conformity assessment has been carried out by a UK conformity assessment body.
- This does not apply to existing stock, for example if goods were fully manufactured, CE marked and ready to

place on the market before 1 January 2021. In these cases, goods can still be sold in Great Britain with a CE marking even if covered by a certificate of conformity issued by a UK body before 1 January 2021. These goods will need to be placed on the market before 31 December 2022.

UKCA AND CE APPROVAL FROM BTG AND SHIRLEY

BTG are now UK Approved Body number 0338 for the U.K.'s PPE Regulations, and were previously a Notified Body for more than 25 years, trusted by manufacturers all around the world to test and certify their products. BTG's reputation is built on the experience and research done by its predecessors, the Shirley Institute and the Wool Industries Research Association (WIRA), including developing many of the tests now used in EN and ISO protective clothing standards.

In order to allow clients to access both U.K. and EU markets, BTG have set up Shirley Technologies (Europe) Limited in Dublin, who are now EU notified body 2895, able to offer CE marking for the same scope. Together, BTG and Shirley can offer both UKCA approval and CE marking based on a single technical assessment, meaning manufacturers can get both CE and UKCA certificates from one type-examination or audit. In this way, BTG and Shirley continue to offer their unrivalled knowledge and expertise to manufacturers, no matter which approval they need.

If you have any questions regarding Brexit and UKCA, please contact BTG's UK certification team at certification@btg.co.uk





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1 & 2 MARCH 2022

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INDUSTRIAL EMERGENCY SERVICES MANAGEMENT CONFERENCE 2022



JOIFF In association with RelyOn Nutec are pleased to announce The JOIFF Industrial Emergency Service Management Conference 2022 will take place on March 1st & 2nd 2022 at the Hilton Hotel - Rotterdam - The Netherlands.

World Class Presentations, Unique Face To Face Networking, Direct Contact With Suppliers & Industry Specialists, Live Fire Demonstrations

As part of the ongoing Shared Learning commitment to the high hazard industry JOIFF are pleased to announce that we will be hosting the JOIFF Industrial Emergency Management Conference 2022 in Rotterdam, The Netherlands 1st & 2nd March 2022.

This will be both a live in person event and also a hybrid/virtual event with global subject matter experts from around the world presenting on the subjects that matter most to the Industrial Emergency Services Management Specialist.

Plus live demonstrations at the RelyOn Nutec Fire Academy.

To ensure that this unique Shared Learning is available to everyone JOIFF will not be charging delegates a registration fee to attend this Conference.
(Does not apply to travel, accommodation or refreshments outside of the Scheduled Conference)

World class presentations, unique face to face networking, direct contact with suppliers and industry specialists.

There are 20 international speakers covering the full range of Industrial Emergency Management topics over the 2 day Conference, latest technical advances, case studies, technical presentations, live demonstrations, suppliers presentations & supplier exhibition.

Who Should attend:

Fire Engineers - Fire Safety Consultants - Fire Risk Consultants - Occupational Safety Managers
Process Safety Managers - Safety & HSE Managers - Emergency Services Personnel - HSEQ Managers
Risk Managers - Emergency Response Personnel - Security Managers - Operations Managers
Industrial Safety Managers - Inspection & Training Managers

FOR DELEGATE REGISTRATION PLEASE GO TO WWW.JOIFFCONFERENCES.COM

As is tradition at all JOIFF International Conferences - JOIFF and its Partner Sponsor RelyOn Nutec will be hosting a unique social & networking evening aboard the Spido River boat for a 3 hour river tour with food and refreshments - all conference delegates are invited.



If you would like further information on how you can promote your company at this unique event please contact the Event Director - Paul Budgen Tel: +44 (0) 1 305 831 768 or email: pbudgen@edicogroup.net

If you would like to submit a presentation for consideration please contact Conference Coordinator Lora Lammiman email: lora.lammiman@edicogroup.net

JOIFF ACCREDITED TRAINING

JOIFF ACCREDITATION:

Accreditation is a status that indicates a Training Provider has met or exceeded criteria of quality. JOIFF accreditation is a system of quality control of the policies, procedures and protocols operated by an organisation that provides training.

To obtain JOIFF accreditation, a Training Provider must meet the set down criteria for the three pillars that make up effective provision of training emergency response personnel:-

- Establishment/organisation including facilities, Safety Management Systems and procedures;
- Instruction and
- Courses/programmes.

All aspects together must be to the required standard for JOIFF accreditation to be awarded.

The applicant organisation must demonstrate proprietary ownership of all 3 pillars and must also be able to demonstrate that the required standard is part of the regular operation of the organisation and that they have in place on an on-going basis, effective systems and procedures that will ensure continual provision of all these outcomes.

Accreditation is for a given period and is renewable subject to review.

COMPETENCE:

All JOIFF accredited training is competency based, aimed at developing competence of emergency response personnel when dealing with potential accidents/incidents to which the emergency responder will be required to respond within their Area Emergency Response Plan.

Competency Based Training, works from the premise that a suite of competencies relating to a job role or to learning objectives have been identified and verified and is based on the achievement of these competencies. Competency Based Training, which is required for technical skill acquisition, builds in measurement of ability and is considered core to the successful application of learning in the workplace, thus ensuring that the student has the ability to carry out the job to a specified standard. Only when it has been confirmed by verified

assessment that the person has achieved these competencies, can it be said that that person is competent to effectively do the job.

Critical to the control of the credibility, integrity, quality and efficacy of Competency Based Training is having in place at all stages of the training process, procedures of assessment and evaluation. A further key requirement of such training is transparent traceability through a system of record keeping at all stages of the Training process.

Competence requires to be demonstrated on an on-going basis, so JOIFF accredited training includes a requirement that each JOIFF certificate of accreditation issued has a validity date. Training for competence by its nature is not a "one-off" exercise, it must be an on-going and evolving system which takes into account new legislation, technologies, procedures and practices as well as providing personal development opportunities for each person involved in the programme. When the initial core competence is achieved, the highest standards of performance can only be maintained by a programme of improvement and broadening of knowledge and skills and the development of personal qualities necessary for the execution of professional and technical duties by those employed. This includes refresher Training, the acquisition of new knowledge, and development of more skills not only to keep up-to-date with new legislation and practices but also with current job related changes and issues. It also should provide the opportunity for career development.

TRAINING CERTIFICATION:

In the field of training, there are generally 3 types of certification – certificate of attendance, certificate of qualification and certificate of competence. A certificate of attendance indicates that a person has attended a training course, a certificate of qualification results from a person being examined and being found successful in a particular subject or group of subjects at a particular time, and a certificate of competence results from a person being assessed as competent in a particular skill or set of skills.

A student to whom a JOIFF accredited certificate of competence has been

issued, indicates that the student has been assessed and has successfully demonstrated competence in knowledge, skills and understanding in particular activities as a result of participating in a JOIFF accredited training course/ programme.

To provide traceability of training provided, the JOIFF system of accreditation includes a requirement that Training Providers must submit quarterly returns of certificates of accreditation issued. The returns must include

- Name of the JOIFF accredited course concerned;
- Venue at which the JOIFF accredited course concerned took place;
- Start and finish dates of the JOIFF accredited course concerned;
- Validity of certification of the JOIFF accredited course concerned;
- the number of each certificate issued.

Only approved JOIFF accredited Training Providers are authorised to issue JOIFF accredited certification.

JOIFF accredited eLearning programmes: The JOIFF Accredited eLearning programme the JOIFF Diploma covers key skills for emergency response in high hazard industry and ensures competence within both emergency response and knowing the facility in which the emergency responder operates. The programme consists of 24 Units in which there are over 100 elements and in excess of 700 competences. The outcome on successful completion is that student is awarded a Diploma certificate and can use the post nominal Dip.JOIFF

Other JOIFF Accredited eLearning programmes the JOIFF Technician programme, the Leadership (Team Leader) and Leadership 2 (Officer) programmes provide the platform for persons engaged in emergency response to enhance their knowledge and skills having already demonstrated their competence in key response skills in high hazard industry. To achieve full success in demonstrating the competences in these programme requires the student to do individual research and study.

For further information on any of the points covered, contact the JOIFF Secretariat at joiff@fulcrum-consultants.com



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BLENDED LEARNING

Blended learning has become a “buzzword” in education and training circles. Certainly in current times with restrictions on travel due to the COVID-19 pandemic, online digital learning has been a mean to plug the gap in training demands and moreover is a mean for training establishments to survive a very lean period. The pandemic has forced a change in thinking and created a need for innovation, however digital formats are not blended learning without looking at the exact learning outcomes particularly from skills based competencies. In short a digital learning does not always fulfil the skills based competencies required to perform a job. Blended learning does, because it addresses both knowledge and skill competencies.

RelyOn Nutec is historically a face-to-face skills based training provider, but has seen changes over the years from traditional formats to blended learning. This article highlights the true definition of blended learning and how it can be used to optimise your training needs. Blended learning means different

things to different people. However Doctor of Education Margaret Driscoll from IBM group in 2002 concluded there may be four concepts to blended learning:

- 1.To combine or mix modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal.
- 2.To combine various pedagogical approaches (e.g., constructivism, behaviourism, cognitivism) to produce an optimal learning outcome with or without instructional technology.
- 3.To combine any form of instructional technology (e.g., videotape, CD-ROM, web-based training, film) with face-to-face instructor-led training.
- 4.To combine or mix instructional technology with actual job tasks in order to create a harmonious effect of learning and working.

In other words “blended learning” designates the range of possibilities presented by combining internet

and digital media with established classroom forms that require the physical co-presence of teacher and students.

Blended learning has to have an appropriate balance between face-to-face and online activities. This will vary depending on the training, instructional goals, student characteristics and learning styles, instructor backgrounds and online capabilities. What is for certain, blended learning course design must contribute to improved learning!

Our business at RelyOn Nutec has a wide variety of safety training and each training will have a different balance to blended learning. One of our strongest and renown training sectors is emergency response at industrial facilities. In the past we have designed and developed courses on a traditional face-to-face classroom interaction with 30-40% classroom theoretical and 60-70% practical exercises.

Technology has created a revolution. Much of the theory can now be

Evaluation of the fire protection effectiveness of fluorine free firefighting foams

FINAL REPORT BY:

Gerard G. Back John P. Farley
JENSEN HUGHES NAVAL RESEARCH LABORATORY
Baltimore Maryland, USA Washington, DC, USA
January 2020

NFPA RF Report 2020

165 UL Fire tests show Fluorine-Free Foams need higher rates:

- 2 – 4 times AR-AFFF rates for IPA Fires (Gentle Application)
- 3 – 4 times AR-AFFF rates for Mil Spec Gasoline (Forceful Application)
- 6 – 7 times AR-AFFF rates for E10 Gasoline (Forceful Application)

Scan code for full
NFPA RF Final Report



FAA Part 139 Cert Alert No 21-05 2021

Safety concerns of Fluorine-Free Foams identified:

- Notable increase in extinguishment time;
- Issues with fire reigniting (failure to maintain fire suppression); and
- Possible incompatibility with other firefighting agents, existing firefighting equipment, and aircraft rescue training and firefighting strategy that exist today at Part 139 air carrier airports.

Scan code for full
FAA Cert Alert



US FAA Part 139 Cert Alert No 21-05 issued October 4, 2021

“While FAA and DoD testing continues, interim research has already identified safety concerns with candidate fluorine-free products that must be fully evaluated, mitigated, and/or improved before FAA can adopt an alternative foam that adequately protects the flying public.”

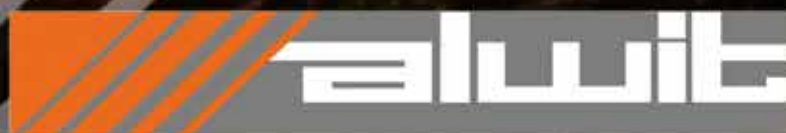
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stripped from the training at our facility. The Powerpoint “death by slide” mentality can be replaced by more interactive means, means to engage the delegate, improving participation and consequently information retention. Classroom can be sometimes replaced with workshops, virtual sessions or digital learning. In the Netherlands for example, most of the Dutch firefighter syllabus has already been converted to an electronic learning environment.

The material that can be digitalised could be given to the delegates before they join the practical elements at the training facility. This results in two massive benefits for the delegate, client and training provider.

Firstly the delegates can undertake an interactive digital lesson at their own pace and when it suits them. They will be engaged, tested and it will be

verified if they understand the course content before they participate in the practical training. As all participants will have completed the online sessions and been assessed prior to the practical training, they will all

“blended learning” designates the range of possibilities presented by combining internet and digital media with established classroom forms that require the physical co-presence of teacher and students.

have the same level of understanding regarding the specific topics, making the practical sessions more effective and efficient. This was a concern, for example in our command training, where students had different levels of knowledge and understanding of techniques to mitigate incidents. By moving these elements online the course can concentrate on the command strategies rather than the techniques. The practical elements have now evolved from

a demonstration of techniques to a blend of virtual and live fire scenarios challenging the delegate to command.

Secondly there is a financial benefit. The blended version of course delivery reduces the time spent in the classroom, which in turn cuts down on overnight accommodation, travel, subsistence, as well as time away from your home or workplace.

There are many ways to achieve learning goals with blended learning, providing the correct strategies and balances are achieved to maximise the learning abilities for the delegates.

Talk to our consultants at RelyOn Nutec Fire Academy for further advice on specific blended learning opportunities.





DEVELOPING NON-TECHNICAL SKILLS IN EMERGENCY RESPONSE

Training for emergency responders (ERs), specifically technical training, is centred around ensuring ERs in the public and private sectors are safe, effective, competent and confident in their response to incidents. But what about the skills that aren't 'technical'?

After reviewing training requirements of more than 800 learners, experts at the Hazmat Academy, NCEC's training platform, have found that there is still a lack of focus on developing and practising non-technical skills, which can fundamentally affect the management and outcome of an incident. Dorset & Wiltshire Fire and Rescue Service has already identified the benefits of such training and included it in its training programme.

Non-technical skills are defined as 'the cognitive and social skills that complement workers' "technical skills" and, as such, contribute to safe and efficient task performance'¹ (Flin, O'Connor and Crichton 2008) and can be developed to complement an ER's everyday skill set. These skills are:

- Situational awareness.
- Communication.
- Decision making.
- Leadership.
- Stress and pressure.
- Teamwork.

SITUATIONAL AWARENESS

The three stages of situational awareness are:

- The ability to know what is going on around you by gathering information.
- Making sense of this information.
- Anticipating what could happen next.

ERs need to be able to demonstrate strong situational awareness in all three stages to fully understand the implications of acting on information received. They also need to consider that everyone perceives information differently based on the context, and their own subconscious bias and experiences. The danger with situational awareness is that it can be affected by several components, which include lack of awareness in training, human limitations, stress, fatigue and bias. ERs need to be trained to recognise these components to have a better

chance of making the right decision.

COMMUNICATION

Communication is vitally important when responding to incidents. It must be of a suitable style and frequency for each situation. For maximum effectiveness, ERs must be aware of how their communications are received.

The following should be considered:

- Do you communicate effectively in 360 degrees?
- Do you consider the required frequency and most effective style of communications for each stakeholder?
- Do you communicate well under pressure?

If the answer to any of the above is no or if you're unsure, then you need to review your communication skill set.



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DECISION MAKING

This is defined as the process of reaching a judgement or making the choice between options, perhaps better understood as a course of action to deal with the incident. In a pressured situation, the cognitive capacity of even the most resilient ERs can become overloaded and compromised. Cognitive capacity can be affected by:

- Too much information.
- Habit.
- Biases.
- Health.
- Groupthink.
- Distractions.
- Levels of experience.
- Emotions.
- Pressure.

Applying learnt controls and tools is necessary to enable the decision maker to reach a successful outcome when dealing with incidents.

Leadership

When leading a response team, ERs need to reflect on how their leadership style in an emergency is interdependent on their leadership style in a non-emergency situation. At any incident, the lead responder must enable and empower ERs to approach them with new information. The leadership style before the emergency sets the tone of how team members react during the emergency.

Leaders must have the ability to be flexible in their leadership style in response to dynamic situations, taking on a more directive style when managing incidents and being more consultative in times of less risk.

Stress and pressure

There are many different factors to be considered regarding an individual's ability to work in a stressful environment. Through self-awareness, training, using stress reduction techniques, being physically fit and being able to ask for support, ERs can reduce the risk of negative impact from stress. When commanding dynamic incidents, ERs can minimise the associated stress in the preparation phase² by carrying out relevant training, which can assist them in becoming more familiar with that incident type.

Teamwork

When developing teamwork skills, ERs must be mindful that they won't always be part of the same team. They must reflect on how they are perceived by and respond to other team members, how they behave within a team and the impact their behaviour has. Within every highly effective team, there is a culture in which feedback is routinely given and accepted.

HOW DO YOU ENSURE NON-TECHNICAL

DID YOU KNOW?

Non-technical skills were first recognised in the late 1970s and early 1980s following a series of major incidents in the aviation industry. The issues faced by the aviation industry coincided with NASA developing the Shuttle programme. NASA, spending billions, wanted to bottom out the cause of aviation disasters. The research identified that the 'Human in the Loop' was the weak point, and five key areas were identified at that stage – situational awareness, communication, decision making, leadership, stress and pressure. Since then, the ability to work as part of a team has been identified as an additional non-technical skill.

SKILLS ARE DEVELOPED & PRACTISED?

It is necessary to continue to train and test technical skills to enable ERs to be safe, effective, competent and confident. Non-technical and technical skills training can occur simultaneously to assist with the time constraints placed upon response teams and organisations.

It is recommended that if training leads want to reduce the risk of human error and improve the safety of ERs, they should look to integrate non-technical skills into training programmes at the earliest opportunity. ERs should continue to develop and practise these skills regularly.

Authors: Station Manager Antony Bholah – Dorset & Wiltshire FRS
Ed Sullivan – NCEC Hazmat Academy Manager

References:

1. Flin, Rhona & O Connor, Paul & Crichton, Margaret. (2013). Safety at the Sharp End: A Guide to Non-Technical Skills. CRC Press, 1-317.
2. Civil Contingencies Act Enhancement Programme (phase four of the six phases of integrated emergency management).



ENHANCING FIREFIGHTER TRAINING THROUGH BLENDED LEARNING

Firefighter training is evolving as new technologies, equipment, techniques, and restrictions impact the ways in which firefighters initially learn and then maintain their skills. Merely learning to “put the wet stuff on the hot stuff” is no longer sufficient!

Hands-on training to learn live firefighting techniques is the cornerstone of firefighter development within fire and rescue services around the world. However, it's also an area of training that's never ever complete. There will always be innovation, improvements to old techniques and the need for continuous professional development to ensure that firefighters always remain safe and skilled.

The days of sitting in a classroom being taught the basics of firemanship, fire

behaviour, incident command and the rules and regulations of building fire safety, before heading to the fire training ground to practice drills, have been replaced by ‘blended learning’, a more holistic, and ‘person-centric’ approach to knowledge and skills acquisition and development.

Practical skills acquisition and refresher training of firefighters is an expensive, but nonetheless essential part of Fire and Rescue Service operations and employers have a duty of care to ensure that their staff remain safe, competent, compliant, and confident in their skills and current in terms of their certification. While blended learning is not intended to ever replace the requirement for exposure of firefighters to practical, realistic, and safe fireground training, an investment in blended learning can help

a Fire Service train its people faster, train more regularly and deliver its training requirement more cost-effectively, especially for fire services with high numbers of retained or volunteer firefighters and fire officers.

Blended Learning encompasses technology driven e-learning, traditional classroom based theoretical learning, practical fireground skills training and development and leads ultimately to multi-agency exercises to develop, test, and refine collaborative working with colleagues across the entire Emergency Service and Civil Contingency sector.

KNOWLEDGE TRANSFER AND SKILLS ACQUISITION

Ensuring the effective acquisition and transfer of firefighting skills, knowledge and experience is the primary goal of



Fire Training academies and instructors within fire services around the world. Competence and currency are essential to ensure that Fire and Rescue Services and their staff can deliver the services that are required in the safest and most effective manner.

Skill's 'fade', where competence declines over time through lack of practice, is a problem that impacts many firefighters, especially as the number of actual fire incidents they attend has decreased over the years, in large part due to the continuing investment in community fire safety and prevention. To combat this issue, skills training must be regular, repetitive, engaging and as realistic as possible.

The delivery of an initial firefighter training curriculum must still cover all the basics of safe firefighting, delivered following an effective risk assessment process and risk management / mitigation methodology, but thereafter, how the necessary information, skills and techniques are communicated to the firefighter is changing rapidly.

Increasing use of computer, web and mobile technologies is transforming the ways in which we educate our firefighters. Today, a firefighter can access training courses and programmes on-line via their pc, tablet, or mobile phone. They can download information directly from the web, work through their on-line training courses and then complete a test of their knowledge from almost anywhere, at any time.

Utilising slide shows, course materials, images, embedded interactive video and animation, even 'show and tell' classes such as pump operations and ladder drills can initially be provided on-line, providing learners with an opportunity to see and understand the course content and to familiarise themselves with equipment or techniques before they even reach the training ground and get 'hands-on'.

This approach is particularly useful in the preparatory phase of training, where on-line assessments can be built into the training packages to assess and monitor the efficacy of the learning and the degree of understanding demonstrated by individual students.

Such an approach is very helpful to Course Instructors, as they can immediately identify any knowledge

shortfalls across and within the cohort and highlight areas of weakness and strength in understanding before any practical training begins. Individuals can receive further coaching before the practical course, ensuring that the entire class has reached a minimum standard of knowledge. Course content can also be modified to focus on the weaker areas of understanding, enhancing the training, maintaining student engagement, and saving time (and cost) in the classroom. Overall, while each individual firefighters' hours at the Training Academy itself may reduce, the number of hours students engage in blended learning may in fact increase. Training Academy fire ground capacity and utilisation can also be improved, making the training operation and organisation more cost effective.

SIMULATION SAVES TIME AND PROTECTS THE ENVIRONMENT

Classroom course content and delivery is also changing as new technologies are utilised to enhance the learning experience.

Recent developments both in Virtual Reality (VR) and Simulators bring additional learning opportunities for firefighters, while allowing training to be conducted within a safe, non-threatening and controlled 'virtual' environment.

Such software programs immerse the student into a virtual world created to simulate the incidents and situations that a firefighter may find themselves facing during their working day. These

simulations can be based on real-life experiences or imagined scenarios and can be escalated as appropriate to the individual's role and responsibilities. Simulations can also expose the learner to hazardous situations that they may be less likely to encounter regularly (such as a nuclear incident or aircraft crash, for example) and that are difficult and costly to replicate in a real-world environment, while enabling the student to practice firefighting techniques or procedures repetitively and with the ability for the course instructor to provide instant feedback during the training.

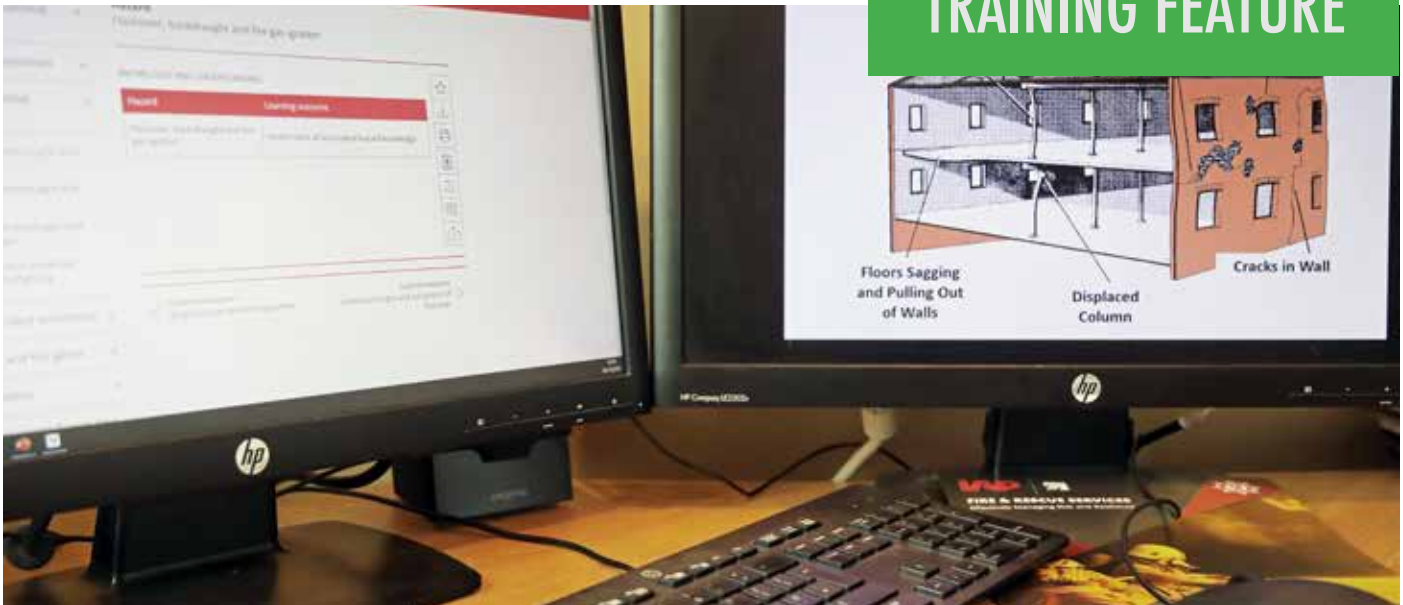
With the continuing emphasis on fire services to reduce their environmental impact, simulation can remove much of the need to conduct live fire burns, reducing smoke pollution, water run-off, excess foam and contamination of fire kit, equipment, and PPE from potential carcinogenic deposits.

SIMULATIONS V. LIVE FIRE TRAINING

Simulations and VR however cannot replicate the practical fire training experience in its entirety. The immersive sound, smell, heat, flame, and behaviour of a real fire are still essential for a firefighter to witness first-hand on the training ground as this 'experiential' training is what fuses and reinforces the prior knowledge and study into a learned skillset. The training experience should always realistically reflect what firefighters are likely to face in real life, so that they are ready and prepared.

Firefighter safety and environmental





protection is critical during all live fire training evolutions.

Utilising gas fires in training rigs can help to reduce smoke emissions and heat exposure, while carbonaceous (wood) burns are widely recognised as providing the most realistic fire situation for fire fighters, but with the attendant issues of potential smoke emissions (unless scrubbers are incorporated in the training rig design), heat exposure and contamination of structural fire kit and equipment to the carcinogenic products of combustion.

Complex fire behaviour such as flashover and backdraft can be very effectively demonstrated using containerised training rigs with carbonaceous fires.

PERSON-CENTRIC BLENDED LEARNING

Another advantage of a blended learning approach to firefighter training is that the various methods of training and learning delivery suit individuals with different core learning styles.

Visual learners may be more successful using interactive e-learning media to see how equipment and techniques should be used, while auditive learners may prefer lectures within the classroom teaching environment, where they can listen to presentations and speak to the instructor and their peers. Reading/writing learners may prefer more traditional textbooks and course materials while a kinaesthetic learner will be more comfortable learning through physically experiencing the task.

By taking a blended learning approach, each student can effectively learn through a combination of delivery methods, focussing upon the method

or media that best suits their individual learning style.

TRAIN LIKE YOU MEAN IT...

The single over-riding rule with any emergency service training is to train like you mean it, because one day your own life, or the lives of your colleagues and the public we serve may depend upon it. The practical skills gained should become second nature as muscle memory makes responses almost automatic, while the techniques and considerations of dynamic risk assessment enable your strategic and tactical decision making to guide your actions and responses.

Irrespective of how we choose to deliver firefighter training, the emphasis must always be the safety of our staff.

Regular acquisition and refresher training courses that are constructed and delivered in compliance with the appropriate national or international requirements and guidance, delivered by experienced, competent, professional Fire Instructors are essential to ensuring that the highest standards of firefighter training are developed, delivered and maintained.

ABOUT G3 SYSTEMS

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AUTHOR: CHRIS THAIN

Business Development Manager – Fire & Rescue Services - G3 Systems Ltd



Chris Thain manages Fire & Rescue Service business development for G3 Systems Ltd, a UK based company that provides fully managed and compliant on-site Fire and Rescue Services for industrial, aviation and military clients around the world, specialising in operations in austere and hostile working environments.

G3 Systems Ltd. is a wholly owned subsidiary of IAP Worldwide Services Inc. – a global provider of services to government and commercial customers. Chris previously worked with Devon and Somerset Fire and Rescue Service, where he directed and managed the commercial trading business of the Fire Authority. www.g3-systems.co.uk



H2K OPENS TRAINING CENTRE FOR FIREFIGHTING COURSES

Industrial training provider H2K has expanded its operations by opening a training location in Dordrecht-Rotterdam. After granting of requested permits the summer before, constructors have finished the building project in February 2021. This spring season, the first candidate firefighters have concluded their onboarding training at the new H2K-location.

On the 4,000m2 plot in Dordrecht a fire school has been established out of nowhere. The site houses a school building including classrooms, offices, canteen, training shelter,

changing rooms and logistics hub. On the outside area you can find a training field with gas-fired objects for industrial fire training and basic interior firefighting operations. "Our new location is focused on teaching basic skills. It concerns tasks such as effective cooling, safe entry procedures, working with SCBA and the use of rescue tools in car accidents", H2K managing director Ronald de Roos explains.

H2K has been working intensively for years with Spinel Safety Centre (www.spinel.nl) of the Dutch Zuid-Holland Zuid Safety Region practically a few steps away from the

new location. "The training location and layout of our new location are strongly influenced by the presence of Spinel Safety Centre". Spinel houses more diverse and complex training objects and props that are complementary to our own facilities," says De Roos. "Our pupils start their education at the H2K training field and conclude these at Spinel as soon as the basic skills have been learned. This creates extra capacity for growth at Spinel, which will strengthen our cooperation."

Since 2018, H2K is certified by the Dutch Fire Service College (IFV) for providing state accredited firefighting



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basic courses. Making them one of only two private companies allowed to do so. It is within this specific business area that H2K has seen a significant increase in demand and hence made the strategic decision to build a new location focussed on basic courses.

The firm Sapphire CTC is responsible for delivering the fire training props. A small industrial structure with 3 layers acts as basic object for beginner courses in industrial firefighting. "The object may seem small, but do not underestimate the complexity that we are able to achieve in scenario's here", project manager Jochem van de Graaff illustrates. "We've asked some of our clients if we could re-use discarded and cleaned components from their actual installations. In our opinion this gives the entire plant a great sense of reality in which all parts seem connected. Also we have included a functioning foam-water sprinkler system, stationary water and foam monitors, control cabinets, alarm bells, etc. At various points throughout the plant, we can create leakages of anhydrous ammonia or hydrogen, bringing an extra layer of complexity into scenarios", Van de Graaff concludes.

The second object is aimed at teaching basic skills in structural

firefighting. This container built smoke house gives pupils the possibility to practice procedures for safe entry, SCBA-drills, inside manoeuvring, etc. Part of the renewed basic course for public firefighters in The Netherlands is a so-called 'transitional attack'. For educating and training this specific technique a gas-lit window fire is installed.

The school building itself houses 3 classrooms of which one can be turned into a digital exam room. A small office space for the H2K day manager and canteen are present as well. Changing rooms, showers, service desk for bunker gear and equipment, coffee pantry, room for after-action-review have all been designed with most recent insights on regulations for occupational hygiene in mind. "A 3-coloured zoning system is being used", Jochem van de Graaff tells. "In all rooms we use traffic light coloured trims to accentuate the particular zone. Red is only bunker gear, orange is underwear or sweat clothes,

green is clean clothing. This is to make sure that we minimize contact with soot and ashes by our students."

Since completion in February already more than 350 courses have taken place at the newly build training centre. For next year the first open-enrolment courses have been confirmed with full classes. If Covid-19 doesn't stir up the planning, an estimated 4,500 students will visit the new H2K location in 2022.

The location has been listed for JOIFF accreditation and the audit has already been planned for November this year. The H2K's office will remain in Schiedam.





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INDUSTRIAL DISASTERS

CAN THEY BE PREVENTED?

Every year, industrial incidents/accidents cause hundreds if not thousands of injuries and deaths and untold damage to businesses and the environment. So many of these incidents/accidents are caused by events that start with a small error or omission that is ignored and/or not rectified at the time it occurred and is compounded by other a small errors or omissions to the point where compounded, they become the catalyst for a disaster. Industry should learn from these events so that such an event does not happen to them. Regrettably, this does not seem to happen as so many disasters could have been mitigated and in some cases, prevented from happening if early remedial action had been taken.

The primary aim of JOIFF since it was established continues to be Shared Learning. An important aspect of JOIFF's Shared Learning policy is to ensure that in learning about incidents that have taken place, JOIFF Members can benefit from the misfortunes of some to educate against the same mistakes being repeated by themselves i.e. if such Shared Learning is acted upon, this could prevent many future incidents/accidents and subsequent losses.

Some disasters that took place in the 3rd quarter of the year.

27TH JULY 2021: CURRENTA GMBH & CO. WASTE DISPOSAL PLANT LEVERKUSEN CHEMPARK, GERMANY.

An industrial explosion and subsequent fire at Currrenta's waste disposal plant in the city of Leverkusen in Germany caused serious concern

to local residents as the toxicity of the smoke that billowed out from the site was being assessed.

Shortly after the incident, management of Currenta admitted responsibility for the incident and set up on a special website where information about the explosion event, current developments and the changes and measures they are taking for the future were provided.

The first interim report on the incident says that it likely that the self-explosion temperature of the stored material in tank 3 in the BÜRRIG disposal centre led to self-heating effects. As a result, there was an exponential increase in temperature and pressure in one of the tanks leading to the pressure exceeding the tank's load limit. The safety devices were not able to dissipate the pressure and when the pressure was above the design pressure of the container, it exploded.

The explosion caused the waste

liquid and the heating oil previously pumped into the tank to be mixed with the ambient air and it ignited immediately causing a fire in the tank farm, involving another seven storage tanks of the tank group which were destroyed and damaging the hazardous waste incineration plant itself.

The State Office for Nature, Environment and Consumer Protection found no questionable residues of chemicals in analyses of the plant and soil samples after the fire in Leverkusen and gave the all-clear with regard to dioxin and dioxin-like substances. But the incident resulted in at least one worker being killed and more than a dozen others injured.

JULY 10, 1976: SEVESO DISASTER

An explosion at an ICMESA chemical plant in Seveso, Italy, released massive amounts of dioxins into the atmosphere. The chemical-release



Currenta Waste Disposal centre for incinerating chemically contaminated waste

took place during a mandatory shutdown by Italian law of plant operations over that particular weekend. This caused an interruption to a batch process prior to the completion of the final step which had to be carried out at a temperature above what was achievable using the normal process utilities available at the plant. It was decided to use the exhaust steam from the onsite electricity generation turbine and pass that around an external heating coil installed on the chemical reactor vessel. Other parts of the site had already started to close down as the processing of other batches finished, which reduced power consumption across the plant, causing a dramatic drop in the load on the turbine and a consequent increase in the temperature of the exhaust steam.

This much hotter steam then proceeded to heat the portion of the metal wall of the reactor above the level of the liquid within it to the same temperature. Operators of the reactor were unaware of the presence of this additional heating as they did not have a steam temperature reading among their instruments, and they stopped the batch as they normally would – by isolating the steam and turning off the stirrer in the reactor vessel. The abnormally hot upper region of the reactor jacket then heated the adjacent reaction mixture and with the stirrer not running, the heating was highly localised and confined to just the portion of the upper layers of reaction mixture adjacent to the reactor wall. This increased the local temperature to the critical temperature and the reactor relief

valve eventually opened, causing the aerial release of 6 tonnes of chemicals, which settled over 18 km² (6.9 sq.mi) of the surrounding area.[]

The chemical release affected many people in the area, killed thousands of local farm animals and forced other animals to be killed to protect the food chain. The effects of this release affected the population for decades after the incident.

This disaster led to the Seveso Directive, which was issued by the European Community and imposed much harsher industrial regulations. Updates of the original Seveso Directive continue to be in effect today.

12TH AUGUST 2015: TIANJIN PORT CHINA DISASTER

On 12 August 2015, a series of explosions took place at a container storage station at the Port of Tianjin. Fires caused by the initial explosions continued to burn uncontrolled throughout the weekend, resulting in eight additional explosions.

The warehouse building is recorded in a 2014 government document as being a hazardous chemical storage facility for calcium carbide, sodium nitrate, and potassium nitrate. Safety regulations requiring that public buildings and facilities should be at least 1 kilometre away were not followed, and local inhabitants were unaware of the danger. The authorities stated that poor record keeping, damage to the office facilities and major discrepancies with customs meant

that they were unable to identify the substances stored. State media revealed that the Company had only received its authorisation to handle dangerous chemicals less than two months earlier, meaning that it had been operating illegally when its temporary license had expired in June 2015.

The official casualty report was 173 deaths, 8 missing, and 798 non-fatal injuries. Of the 173 fatalities, 104 were firefighters.[7]

25TH SEPTEMBER 1998: GAS PROCESSING EXPLOSION LONGFORD, VICTORIA, AUSTRALIA.

A catastrophic explosion occurred in the Esso Longford gas plant at Longford in the Australian state of Victoria. During the morning, a pump supplying heated lean oil to a heat exchanger in a Gas Plant went offline for four hours, due to an increase in flow from the Marlin Gas Field which caused an overflow of condensate in the absorber.

Investigators estimated that, due to the failure of the lean oil pump, parts of heat exchanger experienced temperatures as low as -48°C (-54°F). Ice had formed on the unit, and it was decided to resume pumping heated lean oil in to thaw it. When the lean oil pump resumed operation, it pumped oil into the heat exchanger at 230°C (446°F) and the temperature differential caused a brittle fracture in the exchanger. About 10 metric tonnes of hydrocarbon vapour were immediately vented from the rupture and a vapour cloud formed and drifted downwind. When it reached a set of heaters 170 metres away, it ignited which caused a burning vapour cloud. The flame front burnt its way through the vapour cloud, without causing an explosion. When the flame front reached the rupture in the heat exchanger, a fierce jet fire developed that lasted for two days. As there was no blast wave, damage was localised to the immediate area around and above the exchanger however the main fire was an intense jet fire emanating from the heat exchanger.

Two workers were killed and others were injured and gas supplies to the state of Victoria were severely affected for two weeks.

Could any these disasters have been prevented ? What do you think ?



Tianjin - crater caused by the explosion

DECONTAMINATION OF PFAS FROM FIRE SUPPRESSION SYSTEMS

INTRODUCTION

As extremely persistent fluorosurfactants termed per- and polyfluoroalkyl substances (PFAS) which have been used in firefighting foams containing since the 1960s are being discovered in drinking water above safe levels in many countries, it's clear that the use of all PFAS (C6 and C8) in firefighting foams will soon be curtailed by advancing regulations.

In light of this, many organisations globally have already moved to use fluorine free firefighting (F3) foams or are transitioning as these foams have been available since 2002 and proven to be effective at extinguishing very large-scale real-world fires via a series of tests done by LASTFIRE. A 40 m long fire extinguished at Dallas Fort Worth Airport in 2018 [1] and successful extinguishment of a series 50 m long fires in a purposely built test pan in France in 2021 [2].

There are several differing F3 foams that are widely available and have demonstrated comparable extinguishment performance to foams

containing PFAS, such as aqueous film forming foams (AFFF). So for the vast majority of foam applications there should be no delay to implementing the transition to F3 foams, especially considering that prior LASTFIRE tests, at smaller scale, demonstrated that some F3 foams performed better than some C6 AFFFs [3].

As a result of the increasing confidence in the extinguishment performance of F3 foams and awareness of the potential environmental liabilities associated with PFAS a global foam transition program has commenced within many major organisations.

This article aims to assist stakeholders with foam transition describing experience from transitioning projects, with suggestions to assist with successful migration away from PFAS-containing (C6 and C8) foams. It has become evident that fire suppression systems require specialist decontamination to remove entrained, crystalline forms of PFAS the coat their interior, so a summary of how this can be achieved is provided to ensure that replacement foams do not

become grossly contaminated with PFAS.

REGULATIONS

Regulations pertinent to PFAS generally comprise either (1) those that restrict foam usage or map out a timeline to phase out PFAS in firefighting foams (2) those that provide regulatory limits for specific PFAS in environmental matrices, such as acceptable levels in drinking water.

FOAM REGULATIONS

Regulations restricting the use of PFAS in firefighting foams, have been promulgated in Queensland since 2016 with South Australia instituting a ban in 2018 [4]. In the US Washington State instituted a ban on training with PFAS-foams in 2018 with a timeline of further restrictions. Currently a further 20 US States have adopted restrictions on PFAS-foam use including limitations on training, notification of PFAS content and/or release, storage restrictions etc. In Europe a timeline for phase out of C8 foams was promulgated in 2019, with C8 foams defined as those that contain more than 0.025 mg/L perfluorooctanoic acid (PFOA) or 1 mg/L of PFOA-precursors. Therefore, to determine whether a firefighting foam comprises a C8 product via measurement of the PFOA-precursor content, analytical tests using the total oxidisable precursor (TOP) assay is required. As multiple fluorosurfactant manufacturers did not sign up to the PFOA stewardship program to reduce C8 content in firefighting foams [5] it may not be easy to categorise a firefighting foam as a C6 or C8 foam, without chemical analysis using TOP assay. Some C6 fluorosurfactants have also recently been assessed using TOP assay and found to contain significant concentrations of C14 PFAS, which are also subject to recent regulations in Europe.

As part of REACH regulations in Europe, no training with C8 foams was stipulated in 2019 and from July 2021 all organisation holding more than 50 kg of C8 foam across all the sites they operate must report the nature and volume of the



Tetra Tech Foam Transition Projects

foam to local regulators, as a stockpile of persistent organic pollutants, with the Irish EPA highlighting €100,000 fines for non-compliance [6]. From January 1st 2023 C8 foams cannot be used unless 100% contained and they cannot be used at all from July 4th 2025. Further regulations have been proposed to address C6 PFAS and all PFAS in Europe by the European Chemicals Agency (ECHA).

ENVIRONMENTAL REGULATIONS

Drinking water standards for PFAS continue to be set at exceptionally low levels in what may be perceived as a “race to the bottom”. The concern being that as compliance level are set so low, they are at comparable levels to those identified in multiple environmental matrices as “background” detections such as rainwater. The regulatory level for PFOA in drinking was recently set at 2 ng/L in Illinois [7] whilst in Denmark a 2 ng/L level has been set for the sum of PFOA, perfluorooctane sulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS) and perfluorononanoic acid (PFNA) in drinking water [8].

In the US the EPA recently released a PFAS strategic roadmap [9] which, amongst many other actions requires the EPA to setting enforceable drinking water limits for certain PFAS under the Safe Drinking Water Act in the winter of 2022 and by the spring of 2022, draft a proposed rule designating certain PFAS as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Whilst in the UK the drinking inspectorate recently instructed water companies to assess every raw drinking water abstraction for some 47 different PFAS [10] following announcement of new lower drinking water standards for PFOS and PFOA (at 100 ng/L) in January 2021 [11]. Meanwhile European regulations on PFAS in drinking water required that the sum of 20 individual PFAS are below a 100 ng/L limit value [12].

It's clear from reviewing all the recent regulatory attention that use of PFAS-containing firefighting foams will be banned globally over the next few years.

FOAM TRANSITION

Foam transitioning typically involves replacement of C8-PFAS foams with C6-PFAS foam or F3 varieties, but as a result of the comparable extinguishment performance between F3 foams and C6-foams and the significant environmental liabilities and associated with use of all PFAS, the vast majority of foam transitions now involve migration to F3 foams.

For successful foam transition a site-specific strategy is essential which is prepared by a multi-disciplinary team of consulting fire engineers, experienced environmental engineers and scientists, fire equipment vendors, foam vendors and both fire engineering and environmental contractors.

A foam transition strategy generally involves several stages including:

- Assessment of fire risk scenarios and determination of need
- Evaluation of multiple fire suppression strategies and comparison of risk reduction options
- Review of options available to provide effective fire suppression
- Assessment of replacement foams available and whether any suppression system modifications are required
- Assess strategies to maintain active fire suppression during foam changeout
- Perform a cost benefit analysis to compare replacement specific components vs. decontamination
- Implementing decontamination using a cleaning agents such as PFAScrub™, with verification of progress and success done via assessment of total PFAS within the cleaning agent and on the surfaces of fire suppression system components
- Manage waste firefighting foams and PFAS saturated cleaning agents via multiple disposal routes

Stepping back and evaluating the fire hazard scenarios and need for fire suppression can assist with determining the most pragmatic way forward when evaluating how to maintain effective fire suppression whilst removing PFAS-based foams. The most cost-effective approach may not be to retrofit a F3 foam into the existing fire suppression system, as many alternatives may be available which provide robust options for fire suppression.

DECONTAMINATION

The typical approach to cleaning out and decontaminating fire suppression systems involves draining the foam to be changed and applying a multiple water rinse of the fire suppression systems and firefighting equipment [13].

Water is a very poor solvent to dissolve the crystalline bilayers of self-assembled PFAS (SA-PFAS) that form lattices of supramolecular assemblies and bind on surfaces, so water (and hot water) cannot effectively decontaminate PFAS from fire suppression system infrastructure. The analogy of trying to clean fat from a greasy frying pan with water hold true here, as repeat washes with water will not effectively remove cooking fat or PFAS deposits from surfaces.

The drivers for effective decontamination of fire suppression systems are to avoid

potential future exposure to PFAS. This can be as a result of the F3 foam (containing high levels of PFAS emanating from the fire suppression system interior) being used in fire extinguishment and training and then impacting the ground and groundwater or causing exposure to firefighters as they inhale F3 foam aerosols containing PFAS, whilst using the F3 foams.

To assess whether effective decontamination of fire suppression systems has been achieved a method to measure the concentration of PFAS that are present in firefighting foams is required. All PFAS-containing firefighting foams contain fluorosurfactants which are polyfluoroalkyl PFAS that are precursors to the regulated PFAS. When these precursors interact with soil and groundwater they are biotransformed to create PFOS, PFOA, PFHxS, perfluorohexanoic acid (PFHxA) etc. which are regulated. However, the precursors are not detectable by conventional chemical analysis, so methods are required that can detect these precursor fluorosurfactants and two technologies are currently widely available commercially (1) TOP Assay and (2) Total Organic Fluorine analysis by Combustion Ion Chromatography (TOF-CIC).

PFAS decontamination work needs to be verified using TOP assay or TOF-CIC to be able to detect and measure the fluorosurfactants present in firefighting foams and entrained on surfaces within fire suppression systems.

Water will flush residual liquid foam concentrate out of the suppression system, but this does not remove surface-bound SA-PFAS so this will result in replacement foams eventually containing high concentrations of PFAS. For example, following a double water rinse to remove the PFAS-foam at an aircraft hangar, some 1.6 g/L of total PFAS (by TOP assay) was reported to be found in the replacement F3 foam [14]. This compares to the target of 1 ppb total PFAS (by TOP assay) that has been stipulated as the acceptable level in F3 foams by Queensland government [15, 16] and the US National Defence Authorisation act (NDAA) which has also stipulated a target of 1 ppb [17] total PFAS. As the vast majority of PFAS used firefighting foams are not detectable using conventional analysis, use of the TOP assay or TOF-CIC are essential tools to demonstrate effective decontamination. A surface swab approach coupled to TOP assay is the best approach currently available to demonstrate that effective decontamination has been achieved.

Some PFAS decontamination technologies

use coagulants [18] which have been described as cationic (positively charged) hydrocarbon surfactants that bind to anionic (negatively charged) PFAS and cause them to sediment. This technology is being used for water treatment but has been adapted for decontamination but evidence of its success has not been provided as analysis of the precursor fluorosurfactants present in the firefighting foam has not been done. As many of the precursor fluorosurfactants in firefighting foams are cationic and so will not bind to the coagulation agent, it's not clear how this technology could effect their removal and work as a decontamination agent, or how it dissolves away crystalline form of PFAS adhering to fire suppression system interiors.

SUMMARY

Tetra Tech is using a specialized biodegradable cleaning agent termed PFAScrub™ to effectively remove PFAS residuals from fire suppression systems to limit future liabilities and cost associated with PFAS contaminating F3 foams as a result of inadequate decontamination. We bring together a team of consulting

fire and environmental engineer together with experience decontamination contractors to provide cost effective and pragmatic solutions when organisations are considering foam transition. Having done foam transition work across 4 continents we can smoothly manage all aspects of a foam transition project, from dealing with fire regulations, insurers etc. to disposing of old foams and environmental compliance.

By Ian Ross Ph.D.
PFAS Global Lead Tetra Tech

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PRODUCT FEATURES



TRAINING WITH FOAM

Since 1998, BIOEX firefighting foam manufacturer offer a wide range of foam concentrates. In 2002, BIOEX launched the first multipurpose fluorine-free foam on the market : ECOPOL. The company have a wide experience in fluorine-free foams. BIOEX provides a fluorine-free training foam, called BIO T. BIO T foam concentrate is used for live fire training on class A and class B fires or foam system calibration. It helps BIO T training foam concentrate is ideal to learn how to handle operational foam concentrates, test foam equipment and improve emergency fire team training. It contributes to have good reflexes in emergency conditions.

BIO T, A FLUORINE-FREE FOAM DEDICATED TO TRAINING EXERCISES

The BIOEX research and development team has designed a true ecological and economical alternative for quality training.

BIO T is a conventional firefighting foam concentrate replicate. It simulates the appearance, proportioning and foaming characteristics. BIO T offers good foaming properties for training exercises. BIO T generates a light foam blanket allowing the fast fuel re-ignition for repeating training exercises. This has the advantage of giving firefighting teams the opportunity of training using a single training system and make successive tests in the same fire pan. The rotation of teams training on this system also makes it possible for trainees to see how to apply additives and then handle them, thus giving a certain objectivity to handling fire-fighting foam concentrates in live conditions. Extinguishing properties and foam

stability of BIO T foam concentrate have been deliberately reduced. The foam blanket collapses more quickly allowing quick restart for training exercises. Firefighters can improve their foam application and fire extinguishing techniques by perfecting how to apply foam blanket during quality live fire training. Once the training session is over, the BIO T foam is easy to clean due to its rapid drainage.

BIO T is used where regular firefighting foam training is required for example offshore industry, airports and training platform – NOT suitable for real firefighting application. BIO T offer the possibly to training with foam on class A fires, as well class B hydrocarbon and polar solvent fires.

BIO T is a Newtonian synthetic foam, compatible with all equipment in the market. The foam concentrate is usable at 1%, 3% or 6%, mixed with fresh, brackish or sea water. It is applicable at low, medium and high expansion, in gentle or forceful application.



AN ENVIRONMENTALLY-FRIENDLY FOAM SOLUTION FOR TRAINING

BIO T is an environmentally-friendly training foam solution. BIO T is totally free of fluorosurfactant and any Persistent Bioaccumulative Toxic substances. The foam concentrate is easy to eliminate and biodegradable. Depending on the capacity of the sewage treatment station and the waste contract, BIO T training foam concentrate can be eliminated without using incineration.

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

In 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...

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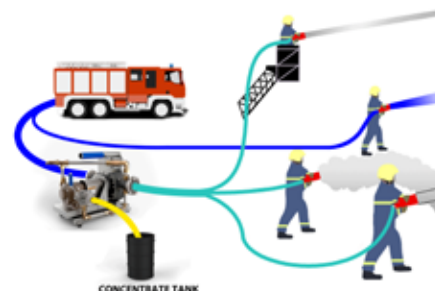


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