The Catalyst

April 2015

JOIFF Shared Learning

Shared Learning is one of the 3 key pillars of JOIFF. Details of the industrial incidents listed on this page which are only a small number of the actual incidents reported during the past 3 months have been circulated through the JOIFF Shared Learning network to the nominees of all JOIFF member organisations.

Message from the JOIFF Chairman

Dear JOIFF members & colleagues,

As you look through this edition of **The Catalyst**, you will find several excellent articles that will be worth your time. The contributions by JOIFF members are exceptional and reflect the objective and technically sound perspective you deserve as members.

JOIFF is a global organization whose

.....cont overleaf

Some Industrial incidents that took place during the first quarter of 2015

🚒🚒 USA - Fire at BPF Energy Toledo Refining Company LLC 🚒 USA - Extensive damage at Husky Ohio refinery unit after explosion 🚒 USA – 2 Killed, 3 Hurt in Explosion, Fire at Oklahoma Oil Rig 🚒 UK - Gas leak in North Sea off Aberdeen probed near the Curlew FPSO 🚒 Brazil - Petrobras refinery explosion seriously injures three workers 🚒 India – Transformer Fire Shuts 120 MW Power Plant at Bhawa Nagar 🚒 US - BSEE, USGC respond to Energy XXI platform fire 🚒 US - Oil from hydraulic line caused fire at gas drilling site 🚒 Russia - Six die in oil station fire 🚒 Brazil - Petrobras offshore explosion kills 3, 6 missing 🚒 Spain – Toxic Cloud (Nitric Acid + Ferric Chloride) Catalonia Spain 'Shelter in Place' 🚒 Libya - largest oil field sabotaged, company releases footage 🚒 US – Crude Oil Train Tank Cars Derail and Ignite 🚒 US - Blast at Exxon Torrance Refinery - Asset Damage, 4 Minor Injuries 🚒 Somalia - Massive blaze Mogadishu petrol depot 🚒 India - 4 million ton gas lost due to fire in Reliance gas pipeline 🚒 USA - Three Workers Killed Following Oil Rig Explosion In Upton County 🚒 South Africa - Massive flames engulf cooking oil refinery 🚒 Mexico - 4 dead, 30 injured after gasoline truck explodes

members operate in a very broad range of cultural, political, legal, and resource constrained environments. Consequently there are a range of standards (and guidance) globally, that our members are subject too. These include National and or local standards and regulations, international standards such as ISO, regional or industry specific such as EU, AIP, NFPA, etc., and a massive range of consultants and training organizations. Many of these voices compete, have different views or completely disagree with each other. Through our three pillars, and the Catalyst, JOIFF provides a trusted and objective mechanism to help our members intelligently make some very critical decisions that will impact their effectiveness for years to come. Our members work hard to identify and apply excellence, to separate themselves from the bad advice, poor engineering, poorly constructed philosophies, the wrong types of equipment, and poor training that occur on a continual basis. JOIFF partners with them in that effort.

JOIFF has often cited various organizations as representing best practice as well as other guidance and standards when we deem it appropriate. We also certify training courses that commercial entities offer. We do not however, rubber stamp holistically, any organization. JOIFF's validation of a standard carries much weight in many parts of the world and is looked to on an increasing basis for objective validation of approach.

There is still much for JOIFF to do in this regard, and we try to pick carefully how we invest our very limited time, and work hard to listen to and engage our membership in these efforts. Keep yourselves involved if you are, and get involved if you haven't put your hand up to support JOIFF efforts, we can put you to work if you have the commitment and will.

Highest regards,
Randal S. Fletcher

Randal S. Fletcher (Randy)

JOIFF Chairman

About JOIFF

Membership of JOIFF, the International Organisation for Industrial Hazard Management is open to any Organisation which is a high hazard industry and/or has nominated personnel as emergency responders/hazard management team members who provide cover to industrial/ commercial organisations. Organisations which do not fully comply with these requirements are welcome to apply for Corporate Membership of JOIFF.

JOIFF's purpose is to prevent and/or mitigate hazardous incidents in Industry through its 3 pillars:

- Shared Learning – improving risk awareness amongst our members
- Technical Advisory Group – raising quality of safety standards in the working environment of High Hazard Industry and
- Accredited Training – enhancing operational preparedness in emergency response and crisis management.

JOIFF welcomes enquiries for Membership - contact the JOIFF Secretariat.

JOIFF Ltd. Registered in Ireland. Registration number 362542. Address as secretariat.

About The Catalyst

The Catalyst is the official newsletter of JOIFF, the International Organisation for Industrial Hazard Management and is published quarterly - in January, April, July and October each year. Our policy is to bring you high quality articles on relevant technical issues and current and new developments and other happenings in the area of Emergency Services Management. In addition to The Catalyst, information relevant to Emergency Services Management is posted on the JOIFF website.

Readers are encouraged to circulate The Catalyst amongst their colleagues and interested parties. The Editors welcome any comments, you can email comments to fulcrum.consult@iol.ie

Disclaimer: The views and opinions expressed in The Catalyst are not necessarily the views of JOIFF or of its Secretariat, Fulcrum Consultants, neither of which are in any way responsible or legally liable for any statements, reports or technical anomalies made by authors in The Catalyst.

New Members

During January, February and March 2015, the JOIFF Board of Directors were pleased to welcome the following new members:

Full Members:

Fire Rescue and First Response Ltd. Auckland, New Zealand represented by Phil Nesbit, Managing Director and Allan Swanson, Director International Operations. Fire Rescue and First Response Ltd. Is an International Training Company that also provides on call Emergency Response Crews as required. Based in Auckland New Zealand it is registered and accredited with the New Zealand Qualifications Authority as a Tertiary Education Provider in Emergency Response and Firefighting. All staff are current practicing emergency responders within New Zealand's emergency services.

Motiva Enterprises LLC, Norco, Louisiana, USA, represented by Michael J. Allert, Fire Chief and Anthony Fuentes, Assistant. Chief. Motiva Enterprises is a leading refiner, distributor and marketer of fuels in the eastern and Gulf Coast regions of the United States. Products processed or produced daily in the Norco refinery include gasoline, jet-A aviation fuel, low sulfur diesel and anode grade coke. The large Motiva emergency response team comprising Full and Part Time members is skilled in all aspects of Emergency Response, including Hazmat, Fire, Confined Space and High Angle Rescue, and Medical.

Red One Limited, Exeter, England represented by Chris Thain, Director Business Development and Marketing. Red One Limited is the commercial trading company of Devon & Somerset Fire and Rescue Authority. In close collaboration with the Training Academy, Red One Limited markets and delivers specialised fire, rescue and safety training and services to other Fire and Rescue Services and Industrial clients worldwide. The Academy trains firefighters from over 47 fire and rescue services and industrial fire teams across the UK, as well as providing international clients with fire behaviour, fire safety and specialist rescue instruction.

SFCo Fire & Rescue, Abu Dhabi, United Arab Emirates represented by Tom Doole, Fire Adviser/Trainer, Zayed Naser Al Mansoori, Fire Chief and Ahmad Mohammad Zuhair Hassouneh, Mechanical Engineer. SFCo is the Shared Facilities Company that is responsible for the parts of the plant that are shared in the Al Taweelah complex in the United Arab Emirates. This complex consists of 3 power stations and water desalination plants that supply Abu Dhabi with some of its power and water. SFCo Fire and Rescue's emergency response team is responsible to provide emergency response to the complex.

Corporate Members:

Bilco Antifire Engineering Srl Milano, Italy represented by Gianluca Damato, Project Manager and Davide Bianco, Sales Division. Utilising a top quality product range and Italian craftsmanship, Bilco Antifire Engineering Srl provides engineering solutions for passive fire protection of actuators, valves, tanks and cable trays internationally certified to the strictest standard by Lloyd's Register U.K. Flexible fire proofing jackets, as well as fire boxes and high performance thermal insulation can be customized in accordance with customers' requirements and international applicable standards. Bilco has developed patented tested systems in accordance with UL 1709 Hydrocarbon pool fire and ISO 22899-1 Jet fire to guarantee the maximum efficiency in safety and protection of critical devices to limit damages and costs of fire spread, allowing a safe evacuation.

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

JOIFF ANNUAL GENERAL MEETING

The Annual General Meeting of JOIFF Ltd. for 2014 took place on 23rd January 2015 in Dublin, Ireland. Representatives from JOIFF Member Organisations in Angola, Ireland, Malta, Netherlands, United Arab Emirates, United Kingdom and United States of America attended the meeting.

JOIFF Chairman Randy Fletcher welcomed all attending. He said that the purpose of JOIFF's 3 pillars, Shared Learning, Technical Advisory Group and Accredited Training is to ensure development and continual improvement in preparation for and in response to industrial hazardous incidents.

Reports on activities of JOIFF during 2014 and motions relevant to legal requirements for the Company were passed by the meeting. Papers were presented on the draft new JOIFF Guideline "Inerting Storage Tanks with Nitrogen" and on Mutual Aid.

JOIFF Technician

JOIFF Chairman Randy Fletcher presenting Kevin Boffy, Dip.JOIFF, Tech.JOIFF with the first JOIFF Technician certificate issued by JOIFF

F.I.E.R.O. Symposium
- THE MODERN PROTECTIVE FIREFIGHTERS' ENSEMBLES AND THE RISKS -

Compared to fires in buildings 25 years or more ago, fires in buildings today are hotter due to increased fire loads from modern furnishings. Whilst the fuel volume today in buildings tends to be only slightly higher than that of 25 years ago, due to the products used today in the manufacture of fixtures, fittings and furniture, during a fire the heat release is very much higher resulting in much higher heat exposures for firefighters. In parallel with the increasing fire loads in buildings, developments in the materials used in the manufacture of items of PPE have resulted in far higher levels of protection which screens the firefighter wearing the PPE from the increased heat load as firefighters get more protection in their items of PPE.

Modern furnishings produce more toxic gases than what are referred to as "Legacy" furnishings i.e. furnishings used 25 years ago or more. This creates rapid fire progression which exceeds victim survivability. Due to rapid fire progression, flashover conditions, which are the conditions to which many items of PPE used by firefighters are built and tested occur in a fraction of the time today than they occurred 25 years ago or more. Yet in general and widespread terms, tactics and behaviour of firefighters in fighting fires are based on conditions 25 years ago or more - firefighters are not taking account of the higher heat exposures in their tactics.

In the meantime manufacturers have made major advances by improving the protective performance of the constituents of the items of PPE that they manufacture and supply to firefighters. So firefighters have much greater levels of protection against much higher levels of heat release from fire, but the human body inside the PPE envelope that is the firefighter hasn't changed and still is as subject to burns and heat stress today at the same levels as it was 25 years ago. Despite this, not many firefighters have changed their tactics and behaviour in fire exposures – which means that the risk of injury and death becomes even more dangerously high today than it was 25 years ago.

If the Users – the Customers - do not tell the Supplier that their requirements have changed, suppliers cannot be blamed for not knowing – although some would hold the opinion that particularly when the products supplied are to protect life that could be at risk, under Health and Safety protocols, suppliers have the responsibility of ensuring that what they are supplying is "fit for purpose".

If the nature of fire exposures is changing, firefighting tactics should change accordingly. However currently manufacturers are designing and building PPE ensembles based on continuation of traditional tactics – if the PPE ensemble exceeds the thermal limitations of the building in which the firefighter is working, is that ensemble truly designed in a way that supports the safety and efficiency of firefighters ?

The conclusions of this discussion at the Symposium can be summed up by the following statements which were made during the event:

- Improved thermal protection of firefighters' protective ensembles has reduced the firefighter's sensory ability to recognise catastrophic thermal environments
- Improved thermal protection of firefighters' protective ensembles means that firefighters continue to use their physical comfort as the primary detection system for potentially catastrophic conditions.
- If the nature of fires is changing the tactics of firefighters and firefighting should change;
- Firefighters are being put at risk by asking their protective ensemble to save them.
- Advances in the protective ability of PPE is not to blame for poor risk assessment and decision making.

One of the Speakers summed up the problem by saying that many firefighters suffer from "Cognitive dissonance – I know better but I do the wrong thing anyway !!" The only way to improve safety of firefighters is to change their behaviour. Another summed up with "The best thing an old firefighter can teach a young firefighter is how to be an old firefighter".

There was much discussion on the items of PPE currently used by firefighters. Current testing of firefighters PPE measures protection not performance. Each item of PPE is tested to different standards of protection which means that in terms of performance, a uniform level of protection for the entire body is not provided. The weakest link in a firefighter PPE ensemble is the SCBA facepiece lens. This has been partly address in the 2013 revision of NFPA 1981 2013 which requires that in testing, SCBA lens will withstand:

- a temperature of 500°F (260°C) for 5 minutes and
- direct flame impact for 10 seconds and
- radiant heat exposure of 15 kW/m² for 5 min (a radiant heat flux of 15 kW/m² is equivalent to an electric fire with 15 bars of 1 kW/m² each.)

Everything that is designed has some limitation. A speaker commented "We will never be able to make equipment that will take the place of the Fire Service knowing what they can and cannot do AND requiring the discipline to stay within those limits."

Editor's note: F.I.E.R.O., the Fire Industry Equipment Research Organisation is based in the south-eastern United States. It is a not-for-profit organisation with the purpose of improving firefighter health and safety founded in 1990. F.I.E.R.O. achieves this through creating and managing educational conferences. It holds 2 major conferences, an annual Fire Station design Symposium and a bi-annual PPE Symposium. In March 2015, F.I.E.R.O. held its 4th PPE Symposium which was attended by more than 300 persons primarily from the fire community around the United States.

PRESS RELEASE: New Industrial Safety and Emergency Response Course

JOIFF Member organisations in the Netherlands H2K and MARSH Risk Consulting have joined forces to set up training dedicated to Safety and Emergency Response for tank terminals and petrochemical and pharmaceutical sites with storage tanks.

Their first course is a three day course entitled “Industrial Safety and Emergency Response” which covers:

- the relationship between the design of storage tanks,
- development of credible incidents,
- fixed and mobile fire protection systems and
- incident response.

Inspection, testing and maintenance of fire protection systems are also addressed during this training. The course is JOIFF accredited and so each person who successfully completes the course will receive a JOIFF accredited certificate of competence.

The training is built around the NFPA codes and standards 11, 15, 16, 25 and 30, while using a performance based process for designing custom made fire protection solutions for various situations, conditions and incident scenarios. The development and options for bund fires are also discussed in detail during this training.

This first three-day training course will take place on September 1, 2 and 3 2015 prior to the large annual “World Port Days Festival” in Rotterdam in the Netherlands. http://www.rotterdamfestivals.nl/public/calendar/wereldhavendagen

Peter de Roos of H2K and Jeanne van Buren of Marsh Risk Consulting are the two instructors. Peter de Roos has long time experience as an instructor for industrial incident response. Jeanne van Buren is a senior consultant who has worked for more than three decades in high risk industry as a specialist in industrial (fire) safety.

Information about this training can be obtained by contacting:

H2K
Nobelstraat 10 BU2
2693 BC ’s-Gravenzande (The Netherlands)
T. ++31 (0) 174 – 41 48 72
E. info@h2k.nl
www.h2k.nl

MARSH

H2K
brandweeropleidingen • trainingen • consultancy

PRESS RELEASE: SEFtec to Build Offshore Training Centre

JOIFF Members organisation SEFtec, Carrigaline, Co. Cork, Ireland, announce that they have joined forces with The National Maritime College of Ireland (NMCI) Ringaskiddy, Co. Cork, Ireland to design, build and run an offshore training centre in the Canary Islands. SEFtec will effectively build the centre from its Carrigaline base and NMCI will provide the “know-how” to run it.

The €3 million euro centre will be the first such offshore centre for survival training in Las Palmas and will provide training for people working on oil rigs. Thousands of graduates are expected to pass through its doors as the importance of Las Palmas port, which serves the west of Africa, continues to grow.

The Spanish minister for Industry, Energy and Tourism and Ireland’s honorary consul in Gran Canaria jointly announced this partnership in Las Palmas some weeks ago. The Irish Minister for the Marine said that this is a great example of how Ireland’s public and private maritime sectors can work together to deliver manufacturing and consultancy services overseas, creating jobs and revenue for the country and promoting Irish niche-sector expertise on a global platform. This further cements Ireland’s position as a world leader in maritime survival training.

In its Carrigaline plant SEFtec currently produces Helicopter Underwater Escape Trainers (HUETs), clean burn propane fuelled fire training simulators that produce realistic, repeatable and safe fire training evolutions and other training simulators and training equipment.

In addition to the contract just signed for The Canary Islands SEFtec are currently involved in new projects in Louisiana USA, Brazil, Angola, Nigeria and Norway.

For further information contact SFEtec at + 353 21 437 6655, sales@SEFtec.ie website www.seftec.ie/

The Advantages and Saving Potentials of Higher Concentrated Foams

By Jens Stubenrauch

Foam concentrates are widely used and the market offers a lot of different types of foams with different possibilities. Also, necessary proportioning rates are in a wide range, often between 6% and 1% with the full range of challenges for the proportioning systems. Now there is a new tendency in the market which offers a huge saving potential and also new operational tactical values.

High concentrated fire fighting foams offers the possibility to be successful in the extinguishing process with proportioning rates of less than 1%. So the storage tank for the foam can be smaller, there is a lower weight because of less amount and also the proportioner is cheaper and has a lower weight. At the moment the company Dr. Sthamer Hamburg offers a new class A foam which is used by only 0.3% proportioning for fighting class A fires with foam. For class B (non-polar) fires 0.5% proportioning is recommended. Also an AFFF foamer and low viscous alcohol resistant foam concentrate is available for 0.5% proportioning.

In the case of fire trucks and/or containers there are much better operational tactical values if a high concentrated foam is used. According the EN standard for first attack fire trucks a standard loading of 120 litres of 3% foam concentrate or 60 litres of 1% foamer is required. If the amount of 120 litres is changed into 0.5% foamer, there is a 6 times higher operational value with the same amount. Another way could be to have smaller tanks compared with similar operational values and the possibility to save space and weight.

But what about the proportioning systems? It is an important issue to think about minimum and maximum flow rates of the water and the foam concentrate. An easy example:

Fire truck: Water pump maximum flow rate 2000 l/min

- Proportioner for 0.1 to 1% proportioning rate, stepless adjustable
- Minimum flow rate in fire fighting use 40 l/min
- Maximum flow rate in fire fighting use 2000 l/min

That means following minimum requirements for the proportioner:

- Minimum flow rate of foam concentrate = 40 x 0.1 : 100 = 0.04 l/min foam concentrate

Problem: A lot of proportioners have a minimum flow rate of 0.5 l/min or more of foam concentrate. The result at the nozzle can be more foam instead of surfactant water.
The reason:

- fire water flow rate is 40 l/min
- flow rate of foam concentrate is 0.5 l/min
- Resulting proportioning ratio is 1.25% instead of 0.1%

Maximum flow rate of foam concentrate = 2000 x 1 : 100 = 20 l/ min foam concentrate

Problem: Many proportioners have limitations because of lower maximum flow rates of foam concentrate. This results in an underdosing in higher fire water flow rates. This effect is it depends on the chosen proportioning rate and maximum flow rate of foam concentrate at the nozzle when only surfactant water is visible instead of foam.

This means that it is an important issue to consider all technical limits and possibilities of the systems - but it isn't so easy to do. In the technical documentation such as data sheets or prospects these issues are usually not found. So the best way to check the possibilities is to make a test.

Proposed test procedure:

- Connect a small hollow jet nozzle to the fire pump.
- The minimum flow rate should be the smallest that is needed in fire fighting. Maybe a volumetric fire water flow rate of 40 l/ min in the case of a small house fire or a forest fire.
- Set the outlet pressure of the fire pump on 6 bar and the proportioning rate for the foam on 0.1%.
- Now work with the nozzle like in fire fighting.
- Run the nozzle on and off in short steps and put the outcoming extinguishant on the bottom. If a surfactant water is visible (white water with small bubbles) the system works well for surfactant water. If a foam is visible the proportioning system is overdosing the foam concentrate.

That's the smartest way to find out if a proportioner is suitable to produce a surfactant water.

In case of a check up, the correct proportioning for foam in higher volumetric water flows is more difficult because an underdosing of foam concentrate is not visible by the foam consistence every time.

To check the right proportioning ratio the conductance of the premix (foam concentrate / water solution) can be measured. This is possible by the use of a conductivity measuring gauge. Such units are widely available and not so expensive. (e.g. on Amazon from 10 Euro) The correct way to carry out the check is as following:

- Prepare test solutions.

It is important to use the same water as for the foaming test and also the same foam concentrate from the same tank or drum. Testing more test solutions should produce the results. The

minimum should be one sample with the maximum proportioning ratio, one with the minimum proportioning ratio and a third in the middle.

- Measure the conductance of each sample and log it in a diagram.
- Do the foam test with the maximum fire water flow rate and maximum proportioning ratio.
- Collect a sample of foam water solution.
- Measure conductance of this sample and log them in the diagram.
- Read the measured proportioning ratio in the diagram and compare it with that chosen at the proportioner.

The market offers a lot of different proportioning systems and each of them offers advantages and has disadvantages. Not all technical details are important for practical use with high concentrated fire fighting foams. The described tests are easy to do and can help you choosing the right system for the special challenges you have. In case of using higher concentrated

foamers i.e. products with only 0.5% proportioning ratio, it is easier to find a system with a wide working range in fire water flow rates because the maximum flow rate of foam concentrate is always small. Also the price for the proportioner is lower and it is possible to save money because of smaller tanks, less weight and smaller emergency stocks.

Editor's note: Jens Stubenrauch, a recognised expert in firefighting concentrates and foam equipment, is Area Sales Manager of Dr. Sthamer, Hamburg, specialist for fire fighting foams, foam nozzles, sprinkler systems and proportioners. He has been a volunteer firefighter for 35 years in his home town Jena in Thuringia, Germany and an executive of the firefighter association of Thuringia. Jens can be contacted at j.stubenrauch@sthamer.com; info@sthamer.com

Editors' Comment

The detail discussed by Jens Stubenrauch in his article could have a major impact on the future developments in fighting fires with foam in High Hazard Industry - including the Aviation Industry - as it allows emergency response teams to make cost effective savings without impacting on safety. Examples of this are set out below using the strict minimum guidelines set out by ICAO – the International Civil Aviation Organisation.

ICAO establishes the minimum level of protection to be provided at an aerodrome for rescue and fire fighting based on the aerodrome category. Aerodrome categories are from 1 to 10, 10 being the highest category. Categories are based on the longest aeroplanes normally using the aerodrome and their fuselage width. For firefighting, ICAO requires that both principal and complementary firefighting agents shall normally be provided at an aerodrome. They require that the principal extinguishing agent shall be foam and the amounts of water for foam production to be provided on the rescue and fire fighting vehicles shall be in accordance with the aerodrome category.

ICAO sets out the minimum usable amount of water to be provided for foam meeting performance level B – for flammable liquids – and the table below sets out some calculations of the differences that using high concentrated foam will make based on these minimum requirements.

ICAO Category of Airport	Water (litres)	6% Class B (litres)	3% Class B (litres)	1% Class B (litres)	Water (litres)	6% Class B (litres)	3% Class B (litres)	1% Class B (litres)
5	5,400	648	324	108	3,900	468	234	78
6	7,900	948	474	158	5,800	696	348	116
7	12,100	1,452	726	242	8.800	1,056	528	176
8	18,200	2,184	1,092	364	12,800	1,536	768	256
9	24,300	2,916	1,458	468	17,100	2,052	1,026	342
10	32,300	3,876	1,938	646	22,800	2,736	1,368	456

The JOIFF Roll of Honour

The JOIFF Diploma is a competency programme for both full time and part time personnel who respond to emergencies. It covers necessary key skills, learnt and demonstrated by the student in practical training and exercises that allows them to deal competently with site emergencies.
The JOIFF Technician programme is to allow the emergency responder to enhance their knowledge and skills having already demonstrated their competence in Key Skills.
Both programmes are drawn from National and International Standards and are computer based. Each student is issued with an individual electronic portfolio which sets out a structured training path and in which each student's training and progress is tracked. An important aspect of the programmes are that they are primarily carried out on the site within the area where the student is based using the facilities and equipment that is available to them. The programme is assessed locally and remotely verified.

All students who successfully complete the JOIFF Diploma and JOIFF Technician programmes receive JOIFF accredited certificates. Those successfully completing the JOIFF Diploma programme can use the post nominals Dip.JOIFF and those successfully completing the JOIFF Technician programme can use the post nominals Tech.JOIFF after their names.

During January to March 2015, the following persons were awarded the JOIFF Diploma:
Tony Brown G.I.FireE., Dip.JOIFF, Karl Helme, England. Dip.JOIFF, Tech IOSH

During January to March 2015, the award of JOIFF Technician was made to
Jamie Fleming Dip.JOIFF, *LUKOIL Mid-East Ltd.*

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

Tony Brown G.I.FireE., Dip.JOIFF
Queensland Fire and Rescue Service
Brisbane, Australia

Tony is currently Station Officer, Staff Development Officer, in JOIFF member organisation Tactical Training Unit, Specialist Training Command, School of Fire and Rescue Service Training of Queensland Fire and Rescue Service.

Tony is a Graduate of the Institution of Fire Engineers and amongst other qualifications he is a holder of the Advanced Diploma of Public Safety (Firefighting Management), Diploma of Training and Assessment, Fire Safety Advisor, Certificate IV Training and Assessment, Managing Marine Firefighting & Fire Prevention Activities on a Vessel, Lead Emergency Teams and is Electrical Fitter Mechanic.

Karl Helme, England. Dip.JOIFF,
Tech IOSH

Karl has extensive multi-cultural and technical experience and skills developed in the Fire Brigade, the Security Industry and Her Majesty's Elite Forces. In his career he has held the job roles of Crew Commander and Instructor in Technical Rescue and Urban Search and Rescue, Maritime Security Consultant, Offshore Emergency Response Station Officer in a major Fire Training Provider and HSE Advisor in a large refinery.

Amongst Karl's qualifications/certifications are UK NVQ Emergency Fire Services Operations in the Community, Fire-fighting & Community Fire Prevention, and NVQ A2 Assessor, First Aid Instructor, NEBOSH General Cert + International Technical Cert Oil and Gas Ops Safety, OPITO Course Instructor UK + International Search and Rescue, Rope Rescue Level 2 Supervisor, Tactical Casualty Extrication, ICET Saver Specialist Road Accident Rescue.

Are you in a Fog over Nozzle Pattern Choices?

By Rod Carringer

For years, three very distinct styles of firefighting fog pattern designs have been provided globally on commercially available handheld combination nozzles. Metal cut teeth, molded rubber teeth, and metal spinning teeth, and when properly pressurized, all produce protective fog patterns, but each in its own unique way. Before any of these pattern design options are integrated into fire suppression operations, the performance of each need to be understood.

First, we shall review some of the operational capabilities of the fog pattern selection of a combination nozzle in firefighting operations.

1. A wide fog pattern can provide firefighter protection from direct flame impingement and radiant or convective heat exposure.
2. A fog pattern can be used to provide critical cooling during exposure protection operations.
3. Fog patterns can move tremendous amounts of air during hydraulic ventilation procedures.
4. A “power fog” (15-30 degrees) can be used to produce quick steam conversion in an enclosed superheated atmosphere.
5. Fog patterns can be used to mitigate and disperse a hazardous vapor release.
6. During firefighting foam operations, a partial fog pattern choice can enhance foam aspiration while maintaining reasonable reach.

No matter which style of fog tooth configuration is chosen, the teeth are designed to impinge into the exiting stream of the nozzle providing an operator-selected fog pattern. This impingement into the waterway breaks the straight stream into droplets of differing sizes, which are designed to do specific functions.

- Small droplets provide quick steam conversion due to their high surface area to mass ratio.
- Medium sized droplets make up the body of the pattern for firefighter protection.
- Larger droplets give the pattern its reach and penetration.

Spinning Tooth Fog Pattern

Since the late 1980s, some companies have chosen stainless steel for the manufacture of spinning teeth due to the often extreme conditions nozzles are subjected to. This was done specifically to prevent pattern degradation caused by the bent, broken, or missing plastic teeth that have been in the marketplace for years. When these teeth are not in place, or they do not spin, the potential for direct flame and heat impingement through the pattern and on to the firefighting crew exists. Refer to the National Fire Protection Association 2013 1962: Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances, which indicates clearly that when teeth are bent, broken or missing, “the nozzle should be immediately removed from service and repaired or replaced”.

Another fact, when using any spinning tooth nozzle, is that the hollow central core of the wide pattern creates a low-pressure area, which tends to draw the heat and flames directly back towards the center of the nozzle (and the crew).

Fixed Tooth Fog Pattern

Nozzles that incorporate a bonded/molded rubber or metal machined cut pattern configuration provide a much different pattern than that of the spinning tooth design. Instead of creating a hollow central core in wide fog, the fixed tooth design produces a fully filled pattern as it directs water towards the center of the pattern.

The pattern to the right is being created at 150gpm-570lpm / 100psi-7bar with stainless steel spinning teeth. The pattern overleaf is a fixed tooth full filled fog design at the same flow and pressure. It is apparent that the spinning tooth design, while wider, leaves a hollow central core in the pattern that tends to draw the heat, flame and smoke towards the attack crew. The importance of

the integrity of the spinning teeth cannot be stressed enough during these operations. Bent, broken, or missing teeth allow a path for flame impingement through the pattern. Stainless steel teeth are preferable to plastic in this application. This pattern, while not as wide, directs a larger portion of the available stream towards the center of the pattern, giving a fully filled fog pattern. This style of tooth design and pattern performance tends to push the heat, flame, and smoke ahead and away from the attack crew.

The width of the pattern is also an important component and operational consideration of the stream's performance. The spinning tooth design provides a much wider pattern as it tends to push the water out and away from the nozzle, while the thinner pattern of the full fill design directs the water towards the interior of the pattern. The wider pattern is often preferred when attacking large pressurized fuel fires, or when three dimensional fires may be overhead and the potential for the flames to curl around the edge of the pattern exists.

Whatever your choice of nozzle or fog pattern design, it is important to know and understand the benefits, limitations and operational capabilities of each style. This can only be done through demonstration, training and education. For additional information on product and operational awareness of different handheld nozzles, contact manufacturer's representatives or visit web sites for additional technical information such as certifications or flow and pressure performance ratings.

Editor's note: Rod Carringer is Chief Marketing Officer for Task Force Tips and serves as lead instructor for TFT University, and is a member of the company's Strategic Planning and New Product Development teams. As a life member and past chief of Center Township Volunteer Fire Department, he is active as a Captain, Training Officer, and heads up the department's Fire Prevention and Equipment Specification and Procurement activities. You can contact him on rac@tft.com

F.I.E.R.O. Symposium
FIREFIGHTERS AND CANCER

Editor's note: F.I.E.R.O. held its 4th PPE Symposium which was attended by more than 300 persons primarily from the fire community around the United States. Another article in this edition of The Catalyst reports on discussions at the Symposium on Firefighters PPE and risks today. This article reports on some of the detail discussed at the Symposium on what is now regarded as the most dangerous and under recognised threat to the health and safety of firefighters – CANCER.

Studies in the USA reveal that firefighters are significantly more likely to develop four types of cancer than workers in any other field:

- testicular cancer 102%;
- multiple myeloma 53%;
- non-Hodgkin's lymphoma 51% and
- prostate 28%,

with a possible increased likelihood of cancer risk for skin cancer, malignant myeloma, cancer in the brain, rectum, buccal cavity/pharynx, stomach, colon and leukaemia.

In one survey 756 retired firefighters were studied and 49% were found to be effected with cancer. The International Association of Fire Fighters (IAFF) Line of Duty Deaths (LODD) for the 10 years between 2003 and 2013 show that by the age of 60 almost twice as many firefighters dies from cancer than from cardiac arrest.

Cancer rates amongst firefighters are vastly under-reported because many don't discover they have cancer until after retiring. It is considered that cancer is the most dangerous and under recognised threat to the health and safety of firefighters today.

Firefighters may be exposed during fire incidents to a vast array of different carcinogens produced from many sources including inorganic chemicals (heavy metals) e.g. aluminium, copper, nickel, lead etc.; semi-volatile organic chemicals e.g. fluorene, benzo(a)anthracene etc.; general inorganic acids and bases, volatile organic chemicals e.g. acrolein, benzene, methanol, toluene etc.; complex organic chemical mixtures e.g. gasoline, hydraulic fluid, diesel oil etc.

Many chemicals can be inhaled, ingested and injected but even more importantly absorbed. Much of the smoke in a building fire consists of visible soot particles generated by the combustion of various materials. Soot acts like a "sponge" for hazardous vapours/gases. When firefighters sweat and their pores open up, soot which is a Group 1 carcinogen and a top cancer causing agent gets sucked into the body through the skin on their faces, hands and under their PPE.

Areas of the PPE system with no barrier that absorbs the most contamination is the exposed hood interface. The Fire Hood is particularly dangerous as it is the only item of PPE without a barrier.

For every 5 degree increase in skin temperature body absorption increases 400%. The neck has 4 times more absorption than other parts of the body. The highest absorption area in the body is the groin area.

One of the most dangerous times for exposures is during post fire activities (overhaul). Many firefighters either will not wear SCBA or will remove it as soon as the fire is out but before beginning post fire activities (overhaul). This is the absolute worst time to remove SCBA because of the huge amount of carcinogens in and about post fire locations.
Potential exposures for firefighters are not restricted to firegrounds. In one survey, the most significant source of firefighter exposure to diesel exhaust was from the exhaust remaining in the station after the engine start. Exhaust source capture is the most reliable means to reduce or eliminate exposure of fire station occupants to exhaust emissions.

PPE must be removed out of apparatus bay areas especially out of the open storage lockers and rooms where the PPE is constantly bathed in diesel exhaust. Many firefighters currently put their contaminated gear into the cabs of their apparatus before and after working fires. The interior of fire apparatus is rarely if ever decontaminated of soot, smoke and carcinogens.

Safe work habits require changes in behaviours and attitudes. Firefighters must learn that Fires are hazardous material incidents that cause significant contamination. Protective clothing attenuates but does not prevent exposure to hazardous materials.

Firefighters' clothing is easily contaminated as a source of exposure:

- vapours and liquids penetrate and permeate materials,
- materials absorb liquids,
- soot particles adsorb (condense and form a thin surface film) and retain gases,
- particles and solids entrain porous materials.

Cleaning/decontamination may or may not remove contaminants.

- Cleaning is intended to remove "normal" soils including most soot.
- Most volatile chemicals will evaporate out of clothing – the exception is chemicals in soot.
- Conventional cleaning will not remove many types of substances.
- Normal washing kills most microorganisms.
- Additional cleaning steps may be needed to remove difficult/persistent soiling

Summary

Firefighters are routinely exposed to hazardous substances during operations. Protective ensembles are not completely effective in preventing contamination. Contaminated clothing is a significant source of exposure. Exposure to contamination can be minimised by proper PPE use and cleaning, good hygiene practice. However cleaning may not always be effective as some contaminants are difficult to remove.

Firefighters must

- commit to actions that minimise contact with contaminants,
- know the limitations of cleaning and when/how to analyse for contaminants.

For more information go to the websites:
Firefighter Cancer Support Network: http://www.firefightercancersupport.org
International Firefighter Cancer foundation: www.FFCancer.org

Respiratory Protection for Sour Oil & Gas Operations

When a Tight Face-Piece is not the Safeguard.

By Mohamed Elagrab, QSSP,MB

Respiratory Protection Standards & Testing

Performance tests for the CE certification of Self Contained Breathing Apparatus (SCBAs), Airline Respirators or Emergency Escape Breathing Devices (EEBDs) are done in accordance to the applicable standards: EN137, EN14593-1, EN402 and EN136. One important requirement in these standards is the Total Inward Leakage Test to prove a tight fit of the used facepiece to the wearer. The corresponding tests are done with human subjects with harmless aerosols, i.e. Sodium Chloride (NaCl) or Sulfur Hexafluoride (SF6). The results of these tests give information about the leakage, often expressed as a protection factor.

H_2S Permeation

H_2S is known to permeate specific materials often used in the manufacture of face pieces, lung governed demand valves, breathing hoses or other components. Even with a perfectly tight face piece (i.e. a high protection factor), a considerable amount of H_2S can permeate through the respirator components. This weakness will not be detected during tests in accordance with the EN Standards mentioned above. Furthermore, there is no national or international recognized standard or regulation detailing special testing for SCBAs, Airline Respirators or EEBDs against H_2S.
In order to investigate the effect of H_2S permeation on respirators, whilst excluding any leakage effect, MSA designed and conducted a test protocol. MSA PremAire Escape and standard EEBDs available in the market were tested.

Test highlights:

(Test conducted at an ISO accredited third party laboratory)

- 15 minute rated EEBD with complete components
- H2S Concentration inside test chamber = Up to 45% (450,000ppm)
- Test Duration > 30 minutes

The concentration of H_2S was measured inside the face piece (put on a test head)

Test Results

1. The concentration of H_2S detected inside MSA facepiece was only 2ppm.
2. The concentration of H_2S detected inside facepieces of standard EEBD's was up to 50ppm.

Conclusion

High protection factors (reflecting low leakages) are not indicative of respirator fitness for use in atmospheres containing extremely high concentrations of H_2S. Under those critical conditions permeation of H_2S through the respirator materials becomes an issue.

As more oil & gas operations are moving into sour phases, it becomes important to rely on respirators made of the right materials to reduce H_2S permeation to a minimum.

Editor's note: Mohamed Elagrab, QSSP,MBA isProduct Line Manager, Industrial SCBA, MSA Technologies and Enterprise Services GmbH. He has over 12 years' experience working closely with Oil &Gas customers around the world to design, supply and customise supplied air solutions. JOIFF Member since 2011. For further information, contact info.de@MSAsafety.com Website MSAsafety.com

Ageing Plastics and Composites

By Jeanne van Buren and Rinze Benedictus

Introduction by Jeanne van Buren

You may have read previous articles from my hand in the role of senior consultant at Marsh Risk Consulting, but I am also a member of the board of the Centre for Ageing Materials and Structures. In this role Professor dr.ir Rinze Benedictus of the University of Delft and I participated in this year's EEMUA collaborate conference in Leeds. The title of the presentation of the Ageing Centre was: Ageing Plastics and Composites. From a cross industry perspective the learning curve concerning ageing of aviation industry was used to explain where we stand with ageing of composites and plastics.

In 1954 loss of integrity of the cabin in two Comet airplanes, due to metal fatigue, resulted in the crash of these planes. Since these crashes the aviation industry learned that ageing had to be considered for the useful life of planes and had to be addressed in the inspection, testing and maintenance. Much was learned about the factors that determine the level of ageing of planes during operation. One hour of flying can be equivalent to several hours of ageing depending on the conditions encountered during the flight. Reliable techniques were developed for non-destructive testing of metals as well as international recognized standards for performing repairs and inspection to ensure continued integrity of metal objects and constructions.

The presentation showed that much more research is required before the ageing mechanisms of plastics and composites can be properly understood. The mechanisms for ageing of these materials differ from that of metals. In addition non-destructive methods for inspection and testing are still being developed. It is also necessary to identify methods for repairs, inspection, testing and maintenance suitable for each type of plastic and composite. This may pose a major challenge as there are countless possibilities for combining reinforcement materials and resins to form composite.

The examples below were provided by professor Benedictus during the conference to illustrate some of the significant differences between ageing of metals and composites used in aviation.

Example 1: Damage due to impact

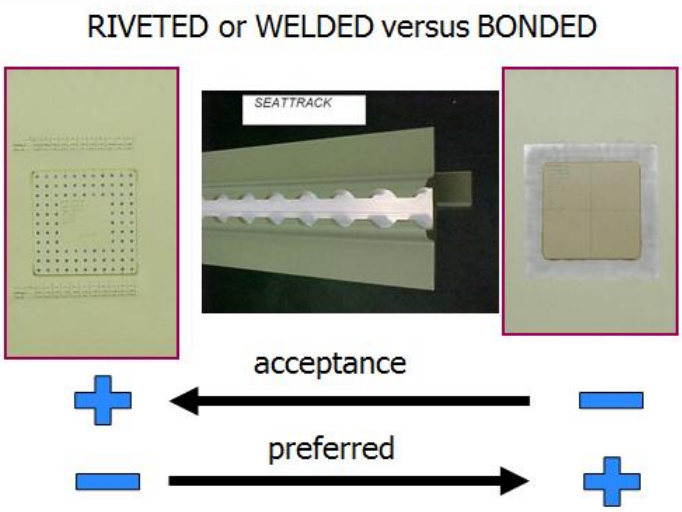
When a metal object has suffered an impact, the side where the impact occurred has visible damage which often provides an indication of the severity of the force it has been exposed to. With composite materials this is not the case as is shown in the images below. The impact side has less visible damage than the inside of the inside.

Example 2: Damaged metal object can be repaired by welding and riveting.

(*for image see overleaf)* Composite objects are repaired by bonding. There is no non-destructive method for testing the strength of the bond. Drilling holes in composite material to attach the patch will affect the strength of the composite.

There are major issues we still have to learn concerning Maintenance, Repair, and Overhaul and Operations (MROO) when using composites and plastics in industrial installations and equipment where the influence on ageing of these materials

due to exposure of chemicals should also be addressed. The OEM (the original equipment manufacturer) and the user of the constructions of objects made from composites and plastics can join forces to setup databases with MROO experiences and results.



It would also be beneficial if the aspects of ageing is addressed in design and ITM (Inspection, Testing and Maintenance) standards and codes used for composite and plastic objects and constructions. By doing this we can apply the lessons learned from the sometimes tragic experiences from the past and possibly prevent future incidents occurring as a result of ageing metals.

Editor's note: Jeanne van Buren is a senior consultant with Marsh Risk Consulting, based in Rotterdam and consults on specific risks related to the power, energy and (petro)chemical industry sectors. This includes identifying potential hazards, evaluating these hazards and quantifying the associated risks and counselling on risk mitigation and control measures. She reviews and sets up ITM processes for clients and provides ITM training courses in Dutch and English. For more information contact Jeanne van Buren at Jeanne.vanburen@marsh.com tel. +31 10 4060 404

Rinze Benedictus is board member of the Fibre Metal Laminate Centre (FMLC) and of the Hechtingsinstituut (Adhesion Insitute), scientific advisor of the Dutch National Aerospace Laboratory (NLR) and Ministry of Economic Affairs with respect to the program on self healing materials. He also participates in the Aerospace Innovation Agenda of that same ministry. He is a member of the program council of Materials to Innovation Institute (M2I, formally know as NIMR). He has published over 60 journal papers in different fields of physics, materials science and aerospace engineering. He has over 50 patents assigned to his name.

Diary of Events 2015

April				
	20th – 25th	FDIC	Indianapolis	USA
	28th – 30th	Secutech	Taipei	Taiwan
June				
	8th – 13th	INTERSCHUTZ	Hanover	Germany
	16th – 18th	FIREX International	London	England
	16th – 18th	IFSEC International	London	England
	22nd – 25th	NFPA Conference & Expo.	Chicago	USA
July				
	15th - 16th	IFE International Conference and AGM		
August				
	26th – 29th	Intern. Assoc. of Fire Chiefs Conference & Expo	Atlanta	USA
September				
	22nd - 24th	Securexpo East Africa	Nairobi	Kenya
	23rd – 24th	Emergency Services Show	Birmingham	England
November				
	2nd - 4th	Civil Defence Exhibition and Conference	Doha, Qatar	

Please contact the JOIFF Secretariat with details of any event that you think that JOIFF Members might be interested in attending.

Note: The Catalyst is not responsible for the accuracy of dates and / or venues announced.

This diary is based on information given to the Editors and is published in good faith.

JOIFF TRAINING NOTES

"TRAIN AS IF YOUR LIFE DEPENDS ON IT, BECAUSE SOMEDAY, IT MIGHT!"

JOIFF accredited training is within a Competency Based Training framework and involves course content, instruction and the facilities of the training provider/training establishment.
All students who successfully complete a JOIFF accredited course/programme are issued with a JOIFF Certificate of Competence which has its own unique number.

JOIFF TRAINING PROGRAMME FOR 2015

"If you think that you can do it, that is confidence. If you can do it well on an on-going basis, that is competence!"

The following dates have been provided by JOIFF accredited training providers.
If you wish to find out any information or make a booking,
please contact the training provider direct, contact email addresses provided.

JOIFF Accredited Course	Dates	Venue / Organiser
Site Specific Courses Fire & Safety Foundation 4 x 1 Day Modules Incident Controller 2 or 4 Days SCBA Initial & Refresher Confined Space Entry Confined Space Train the Trainer (with SCBA for High Risk)	As required	On your own site. Subject to Risk Assessment & Facilities For further information contact arcfiretraining@ntlworld.com
Industrial First Responder Course (5 days)	1st - 5th June 6th – 10th July 19th – 23rd October	Falck Risc, Rotterdam, Netherlands Email: industrie@falck.nl
Industrial Fire Team Leader Course (5 days)	20th – 24th April 28th Sept. - 2nd October.	Falck Risc, Rotterdam, Netherlands Email: sales@falck.nl
Fire Incident Command Course (5 Days)	6th – 10th July 7th – 11th September 23rd – 27th November	Falck Risc, Rotterdam, Netherlands Email: r.deklerk@falck.nl
Site Incident Controller Training 2 Days	20th – 21st April 1st – 2nd June	Eddistone Consulting Email: opportunities@eddistone.com Tel: +44 1433 659 800
Site Main Controller 3 Days	22nd – 24th April 3rd - 5th June	
Industrial Safety and Emergency Response 3 Days	1st – 3rd September	H2K T. +31 174 41 48 72 E. info@h2k.nl www.h2k.nl

JOIFF Secretariat:

Fulcrum Consultants
P.O. Box 10346, Dublin 14, Ireland
Email: fulcrum.consult@iol.ie
Website: www.fulcrum-consultants.com

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Published by **ABCom**