The Catalyst

Jan 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

As I write this, the JOIFF Annual General Meeting (AGM) is only weeks away, and besides dealing with the necessary activities of running a non-profit organization such as JOIFF Ltd., I am especially looking forward to the themes we will be discussing, and the guest presenters. For 2015 we will be focusing on JOIFF Working Groups, and the role of Mutual Aid in industrial response.

I have discussed several times in previous issues of the Catalyst, the powerful reservoir of competence we

Some Industrial incidents that took place during the final quarter of 2014

USA - Lightning sparks oil tank battery fire UK - Dozens evacuated from oil platform after ship carrying radioactive waste catches fire in the North Sea Canada – Shipping container explodes killing firefighter Australia - Ammonium Nitrate truck explosion south-west Queensland injures eight f Azerbaijan Three Azeri workers die in offshore platform accident US - Two injured in ethanol flash fire at biodiesel producer USA - Chemical Safety Board Deploying to Fatal Chemical Release at plant in La Porte, Texas Australia – Road train driver unhooked trainer "moments" before explosion USA – Hazmat fire burns after vacuum truck explodes USA - Static electricity, lack of fire-retardant clothing to blame in fatal gas field blast Turkey - Fire

put out at Turkey's Ceyhan Terminal Crude Oil Storage Tank Israel – Eilat southern oil spill Oman - Muscat Refinery Fire Repair to Cost Millions India – 4 Workers Die in BCPL Propylene Sphere Incident Libya - Fire at storage tank at Es Sider port has spread to more oil tanks

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have in our membership, and the need to get that power put to work for the good of our profession. Working Groups are one key mechanism that we have in JOIFF to tap into that vast reservoir. Most recently a JOIFF Working Group of experts led by JOIFF Member Jeanne van Buren has completed a draft JOIFF Guideline entitled "Inerting Vertical Storage Tanks. Nitrogen, Nature's solution to preventing fires". The draft is currently being reviewed and Jeanne will be presenting a report on the Guideline at the AGM following which it will be sent to the membership for consultation and approval.

During 2015, JOIFF Director for Engineering and Technology Kevin Westwood will chair another working group dealing with one of the key components of any response capability - the Fire and Explosion Hazard Management Policy (FEHMP). We will continue to expand the role of working groups and the target areas of most interest to our members, and of the most critical needs of our profession. As the saying goes… "Our people are our greatest resource and JOIFF seeks to make practical use of that resource for the good of all."

Mutual Aid is no longer a quaint idea and a necessity of weak and poor response organizations (it actually never was) but rather a critical part of any intelligent response organizations organizational construct. The complexities, of response, the cost of training and equipment, the limitations of municipal resourcing, and the close proximity to "neighbors" make Mutual Aid not only critical for effective response, but simple common sense. Getting legalities, organizational complexities and frankly, pride and arrogance out of the way are real challenges, but history has proven time and again that a well-run Mutual Aid organization is one of the most effective organizational resources available to any response organization.

Under the 2015 Theme title "Industry to Industry; Industry to Municipal - The critical partnership for successful response" we will be working hard to promote the concept of Mutual Aid and offering practical guidance on how to make it a viable part of our JOIFF member organizations globally.

Along with the Working Groups, Mutual aid will be one of our key focuses for this year. Expect to hear more about both as 2015 progresses.
With highest regards,
Randal S. Fletcher

Randal S. Fletcher (Randy) JOIFF Chairman

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

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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.

New Members

During October, November and December 2014, the JOIFF Management Committee were pleased to welcome the following new Member.

Full Member:

Broward Sheriff's Office Department of Fire Rescue, Fort Lauderdale, Florida, U.S.A. represented by Chief Greg Holness. The Broward Sheriff's Office Fire Rescue is comprised 746 members that serve the greater metropolitan area of Broward County Florida. The district represented by the new member provides service to one of the largest ports in Florida, Port Everglades. Port Everglades provides $26B in gross domestic product to Florida and is the home to the second largest cruise industry in the World as well as housing the largest container port in Florida. In addition, 108m barrels of petroleum pass through the Port that houses over 154 tanks and 13 marketing terminals. Port Everglades feeds petroleum to 7 counties and is responsible to provide fuel to 3 International airports. The Fire and Rescue Department provides 24/7 response to Fire and Rescue and emergency medical service

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

Press Release: Dr. Sthamer of Hamburg

Sthamex AFFF1% F-15

Dr Sthamer – Hamburg, is pleased to announce the launch of its latest generation Sthamex AFFF1% F-15, utilising the latest C6 Carbon Chain Fluorosurfactants in full compliance with the USEPA 2015 requirements and the European Directive EU 757-2010 on POPs (Persistent Organic Pollutants)

The foam has been certified to EN1568 pt3 1B/1B, ICAO Level B, IMO1312, MED and LASTFire all GOOD with Fresh Water.

It has been specifically developed for use where pressure on storage volume and weight is a problem as the 1% foam needs only a third of the storage space and provides the same level of performance of a 3% foam.

The foam is freeze protected to -15C and complies with the HOCNF regulations for use in the North Sea.

For more information please contact:
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www.sthamer.com/englisch/index.html

January 13th 1886 - January 13th 2015
129 Years

Dr. STHAMER HAMBURG

"Clean shaven policy" when wearing respiratory protective devices with tight fitting facepieces

By Dr.Thomas Kruegerke

The protection provided by respiratory protective devices using full face masks or half masks relies on a tight fit between the mask and the wearer's face at the sealing line. This protection cannot be assured for persons having beards or facial hair in the area of the sealing line of the full face mask or half mask.

This worldwide policy reflects requirements and recommendations given in regulations and standards worldwide. Examples are:

USA: Occupational Safety and Health Standards: Personal Protective Equipment:1910.134 Respiratory Protection, section 1910.134(g)(1)(i) and 1910.134(g)(1)(i)(A): "The employer shall not permit respirators with tight-fitting facepieces to be worn by employees who have: Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function".

Canada: Canadian Centre for Occupational Health and Safety: Respirator Selection "Are there some things that you should know before you choose a respirator? " … Workers with beards, long sideburns, or even a two-day stubble may not wear respirators because the hair breaks the seal between the skin and the respirator mask".

United Kingdom: Health and Safety Executive: HSG53 (4th edition, published 2013). Section 4, Using RPE, 82: "The wearer needs to be clean-shaven around the face seal to achieve an effective fit when using tight-fitting facepieces. Training is a good opportunity to make employees aware of this. If workers have beards, or are unable to be clean-shaven, a tight-fitting device will not be suitable so an appropriate loose-fitting device should be chosen."

Germany: BGR/GUV-R 190 (Nov. 2009): section 3.1.5.3 Ergonomie und individuelle Anpassung, 2nd last paragraph (translated): "Persons with beards or sideburns in the area of sealing lines of full face masks, half masks and filtering facepieces are unsuitable for wearing those facepieces."

Russia: Fire Brigade Regulation excludes beards.
Standard GOST R 12.4.189-99 - P. 7.13.3: in the tests for total inward leakage, persons with beards are not accepted for the test. Also the instructions for use have to inform about those limitations.

Europe: European Standard EN 529:2005 Section 9.3.4 Assessing suitability for the wearer
"The device selected should be suited to the wearer and the

factors needing consideration include:
… b) facial characteristics of the wearer including facial hair"
and further on in Section D.4.2 Facial characteristics:
"Facial characteristics such as scarring or unshaven facial hair can significantly affect the protection offered by some devices. This will particularly be true for devices such as half and full face masks which rely on a tight face seal to achieve protection. These devices should not be selected where there is unshaven hair or an irregular facial feature in the area of the face seal."

Global: Draft Standard ISO/CD 16975-1: Respiratory protective devices — Selection, use and maintenance (Draft April 2013): Section 6.3.4 Risk assessment step 3: Suitability assessment … 6.3.4.2 Wearer :
"… c) Hair: It is essential that no hair comes between the sealing surfaces of a tight fitting respiratory interface or interferes with the function of the RPD, e.g. interference with the operation of valves."

N.B.: 1. None of the above mentioned international references differentiate between positive pressure or negative pressure Respiratory Protective Devices. The risk of a reduced protection is seen independent from the technology used.
2. Dependant on the leakage, positive pressure devices may lose a considerably amount of air resulting in a reduced service time or time for escape. Another risk of beards or facial hair is the fact that hair released from the face may end up in the exhalation valve compromising the proper function of the valve.

3. An overview of studies covering this issue is given in Brauer – Handbuch Atemschutz – VI-3. The results of many studies are described there. The result in all studies, including those covering positive pressure devices, show the clear tendency that protection is reduced when facial hair interferes with the sealing line of the full face mask or half mask.

Editor's note: Dr.Thomas Kruegerke is Head of Standards & Certification, MSA Technologies and Enterprise Services GmbH. Dr. Kruegerke is Chairman of CEN committee "Respiratory Protective Devices" [TC79], ISO working group for "Filtering Devices" [TC94/SC15/WG2] DIN committee "RPD independent from the ambient atmosphere"[NA 027-02-04 AA AK3].
For further information, contact info.de@MSAsafety.com

Press Release: Fulcrum Consultants

Leadership programme

Fulcrum Consultants announce that their JOIFF Accredited Leadership programme is now available in electronic format. Fulcrum Consultants have developed their Leadership programme on the same basis as their JOIFF accredited Key Skills programme known widely as the JOIFF Diploma and their advanced JOIFF Technician programme.

The Leadership programme is in 2 parts, Leadership 1: (Team Leader) and Leadership 2: (Officer). Both parts cover the roles in Emergency Service Delivery relevant to the role stated. Team Leader and Officer. For the purposes of this programme a Team Leader is a person who leads a single team of emergency responders (typically a team of 5 to 8 persons) and an Officer is a person who leads multiple single Teams of emergency responders.

To be successful in the Leadership 1, Team Leader Unit the student must demonstrate competence in 5 elements:

- health and safety requirements relative to emergency service delivery
- preparing for Emergency Response
- resolving Incidents.
- ending the operational phase of incidents
- debriefing and analysis following incidents

To be successful in the Leadership 2 Officer Role Unit, the student must demonstrate competence in 6 elements:

- knowledge of the department responsible for Emergency Response
- administration in Emergency Service Delivery.
- human Resources in Emergency Service Delivery.
- planning the work of a Team(s).
- personal development of Team members.
- Inspections and Investigations.

This programme can be achieved by formal qualification or by assessment by suitably qualified Site personnel and results are externally verified by Fulcrum Consultants.

The JOIFF Diploma, JOIFF Technician and Leadership programmes 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 - as the programme progresses, it provides a traceable system of recording each student's competence.

An important aspect of the programmes is 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. Instruction/ Assessment takes place on site within a time frame established by Site Management usually by the site's in-house trainers/fire team leaders/fire officers who have the relevant background and competence.

For more information on these programme contact fulrum.consult@iol.ie

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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 emergency responders 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.

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During October to December 2014, the following persons were awarded the JOIFF Diploma:

Dove Energy Limited, Yemen

Ken Hamon

Ken started working in the Oil and Gas Industry in 1974 joining Shell as an apprentice and in 1976, he joined the works volunteer firefighting team. From 1981 he worked in Saudi Arabia, UK, Nigeria and Thailand, doing training in emergency response on site and in training schools in the UK during which time he attended emergency response training at the Fire Training schools in Montrose and Moreton-in-Marsh and qualified as a Fire Team Member and subsequently Fire Team Leader. From 2001 to 2009 Ken worked on various floating production storage and offloading vessels around the world and became a member of the Incident Room emergency response teams at junior and senior levels.

In July 2009 Ken joined Dove Energy Limited Yemen and following a major fire at the Central Processing Facility it was evident that Dove Energy required to improve both the quality of their equipment and the standard of their training for emergency response. Ken contacted JOIFF accredited Training Provider Eric Dempsey of Arc Fire Training and invited him to Yemen to oversee their training and competence and to advise on procedures and equipment. With Eric's help they constructed their own Fire Training ground which when completed was awarded JOIFF accreditation and they trained more than 100 members of staff in various JOIFF accredited emergency response courses. The success of this training and the standard of their facility attracted other oil companies within Yemen resulting in training emergency response teams from these Companies.

Following their initial training, Ken enrolled himself and senior members of the Dove Energy emergency response team on the JOIFF Diploma programme. Ken is the first of this group to have successfully completed the JOIFF Diploma programme.

Ken says "Wherever I go from here I will always advocate membership of JOIFF".

INEOS Chemicals, Grangemouth Ltd., Stirlingshire, Scotland

Bruce Duncan	**Station Officer**
Chris Paige	**Station Officer**
Gordon Sherry	**Sub Officer**

The INEOS petro-chemical complex is situated on the shores of the Firth of Forth, to the west of Edinburgh, Scotland. Grangemouth benefits from having access to crude oil and gas from the North Sea and INEOS takes these raw materials and transforms them into petrol and other fuel products and a wide range of chemicals. The operation runs 24 hours a day, 365 days a year and the role of the emergency response team is to respond to any emergency which may occur. This may include fires, road traffic accidents, hazardous materials incidents, rescue from confined space, high angle rescue, flooding, first aid incidents etc.

During 2014, as well as Bruce, Gordon and Chris, another 7 members of the INEOS Chemicals emergency response team were awarded the JOIFF Diploma. Currently many other members of the emergency response team are working on the JOIFF Diploma.

The JOIFF Diploma was also awarded to:

Derek Robertson

Derek started his emergency response career when he joined London Fire Brigade, transferring after some years to Central Scotland Fire Service. Following 18 years in the municipal fire service, he completed offshore certification and worked offshore in the North Sea for 9 months. Following the North Sea he held positions in high hazard industry in Libya, Qatar and Malaysia eventually transferring to work for BP Azerbaijan in the role of Emergency Response and Health & Safety Coach and Assessor. Derek started work on the Diploma in Azerbaijan and having successfully completed it he says:

"I believe that the JOIFF Diploma is an indispensable tool for any response team working within industry, particularly the Oil and Gas Industry. Unlike other international certifications that are only training centre based, JOIFF allows candidates to build a portfolio whilst at the same time allowing them to learn about on-site hazards and risks, unique to themselves, and providing them with an awareness of site topography."

During October to December 2014, the first award of JOIFF Technician was made to

Evolution Risk Assurance, Cleveland, England
Kevin Boffy

Kevin, who has already qualified as Dip.JOIFF, sent The Catalyst these comments on the award of his Tech. JOIFF.

"With JOIFF being at the leading edge of industrial fire fighting training, I am delighted to be awarded the first ever JOIFF Technician qualification. As a big exponent of JOIFF, working through the Diploma and Technician programs has provided greater insight into the need for consistent industrial standards.

As a current Watch Manager with the local authority fire service, the JOIFF development has afforded me the opportunity to develop new skills that enhance my contribution to protecting one of Europe's largest industrial risks.

My curiosity to develop JOIFF programs to a wider field was part of the rationale in setting up my own Emergency Management Consultancy business, Evolution Risk Assurance. Although the business is relatively new, harnessing the JOIFF programs and learning is proving very fruitful. Facilitating new organisations to complete the JOIFF Diploma Process is already well underway and rolling out new JOIFF accredited training programs will commence in January 2015.

The learning and support from the JOIFF system has been invaluable and it is right to put something back into the organisation. I have already had the opportunity to represent JOIFF at seminars such as the Humber Chemical Forum, carrying out a presentation to the key network members.

I would recommend that more people take on board the learning programs and get more involved in supporting JOIFF. The organisation can only develop by more people making contributions across the globe as JOIFF enhances its growing footprint. There is no reason why JOIFF can't have the same impact as organisations such as OPITO has in the offshore safety arena.

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The Directors of JOIFF and The Catalyst extend congratulations to all those mentioned above who can now use the post nominals Dip.JOIFF after their name and to Kevin Boffy who is the first person to be authorised to use the post nominal Tech.JOIFF.

The JOIFF Roll of Honour

Kevin Boffy Tech.JOIFF

Ken Hamon Dip.JOIFF

Derek Robertson Dip.JOIFF

MSA AUER GmbH

The Catalyst is pleased to welcome MSA AUER GmbH as a JOIFF sponsor for 2015. MSA, founded in 1914, has grown to include more than 5,000 employees across the world, protecting workers in more than 140 countries.

On the morning of March 26, 1912, the Jed Mine in West Virginia, USA exploded. In a flash, methane gas ignited and more than 80 miners lost their lives. From this tragedy, mine engineer John T. Ryan Sr. had an epiphany: “If I could spend my life doing what I can to lessen the likelihood of the occurrence of such terrible disasters, I shall feel in the end that my life had been well spent.” This that led to the creation of MSA.

Ryan recruited colleague George H. Deike to help realise his vision. Recognizing the critical importance of dependable, safe mining equipment, they went straight to one of the country’s great thinkers, Thomas Edison. The brilliant inventor helped Ryan and Deike create the electric cap lamp which, over the next 25 years, reduced mine explosions by an astounding 75 percent. Edison would later say in life that of all his inventions, this was the one that did the most for humanity,

The revolutionary Edison Electric Cap Lamp in 1914 was the first safety innovation introduced by MSA and in the decades since, MSA has been at the forefront of hundreds of safety innovations that protect workers, consistently pushing the envelope in ways that provide the highest levels of safety for workers across the world. They have led the way with small first-aid kits and portable methane detectors, and harnessed new technologies to produce state-of-the-art thermal imaging cameras, ballistic helmets, and leading edge systems for gas and flame detection.

Safety is the mission of MSA and MSA invest more resources in safety research and engineering than any other company in their industry. MSA are proud of the work they do and they stand behind every product they make because people rely on them to protect their health and well-being.

MSA is a major supplier of products and services to Industries in many sectors around the Word – Agriculture, Chemical, Construction, Fire Service, Marine, Mining, Oil and Gas, Police and Military etc. When disaster strikes, MSA has a history of responding quickly and sending equipment and safety expertise when and where it’s needed most.

When a massive earthquake and resulting tsunami hit Japan in 2011, MSA sent thousands of air-purifying respirators to help protect emergency responders and clean-up workers from possible nuclear radiation at the stricken Fukushima power plant.

When millions of gallons of oil spilled from the Deepwater Horizon oil rig into the Gulf of Mexico in 2010, MSA helped protect clean-up workers by sending many of their products, including respirators, multi-gas detectors, and hard hats to the disaster scene.

Immediately following the 9/11 terrorist attacks in the USA, MSA shipped more than US $3 million of safety equipment, including thermal imaging cameras, hard hats, and respirators to disaster sites in New York City and Washington, D.C. within 24 hours of the attacks. MSA associates at Ground Zero worked almost continuously for months afterwards, providing on-site support and product training.

MSA are called The Safety Company for a very important reason: Their goal is to provide their customers with dependable, high-quality products, instruments, and service to help ensure a safe return home at the end of each work day. MSA harness precision engineering to craft the highest-quality safety products possible so people across the world are able to work in the safest environments possible.

The Catalyst looks forward to working with MSA AUER GmbH and thanks them for their support of JOIFF.

Press Release: Falck Fire Services UK

On 30th June 2014, Falck and Sembcorp Utilities signed the deal that saw the JOIFF Accredited Teesside based Asset Protection and Emergency Response division of Sembcorp sold to Falck Fire Services UK. The conclusion of this deal was a key step forward for both Companies as it enabled Sembcorp to divest a non-core business area into trusted hands, whilst providing Falck with a firm presence in industrial asset protection the UK.

This deal has also brought a period of uncertainty to an end for both customers and employees. Emergency protection, prevention, preparedness and response are core to Falck, a company committed to investing in the skills and equipment needed to ensure that their people and their customers get the protection they deserve.

For more than 100 years, it has been Falck's mission to prevent accidents, disease and emergency situations, to rescue and assist people in emergencies quickly and competently and to rehabilitate people after illness and injury. Based on this mission, it is Falck's vision to develop a major international organisation working within assistance, emergency, healthcare and safety services.

As part of this vision, Falck are going for growth, but according to UK MD David Roberts, it is more than that. "Developing the business is about growth" says David, "and I am very pleased that this is happening in the vital industrial cluster of the North East. However, developing the business is also about making sure that we listen to customers to truly understand what it is that they need. That's how we seek to create value for our customers. There is no single formula that will work for all, and we will listen, adapt and deliver a tailored, quality service that meets the needs of each individual customer we serve."

One major Teesside producer to recognise this is GrowHow, who recently selected Falck to deliver Asset Protection and Security Services at Billingham, primarily for their expertise, their partnership approach and their commitment to continuous improvement.

GrowHow are very pleased to select Falck to deliver this critical service for them and they are now looking forward to working with Falck, who will be an integral part of their operation, ensuring emergency preparedness and the required level of protection and response.

"We are delighted to be awarded this contract", says David "and we are very pleased that GrowHow trust us to live up to their high quality standards. We are looking forward to a long term partnership with GrowHow and making a significant contribution to maintaining and enhancing the strong reputation for safety performance at the Billingham site and across Teesside. In addition, the securing of a long term commitment from Lotte Chemicals last month and finalising agreements with other key operators in the Teesside area is fundamental to our long term plans"

Paul Frankland, Falck's UK Technical Director underpins the success and competency strengths of the business through the long track record of maintaining JOIFF accredited standards. "The Teesside business has been at the leading edge of Industrial Fire Fighting competence utilising all of the key frameworks developed through JOIFF. The move to another JOIFF accredited organisation such as Falck Emergency will see the continuation of service and competence improvement which matches our business values"

"I also would like to say a big thank you to all of our customers for such positive support and patience as we have been working through our transition" continues Paul, "I am especially grateful to Sembcorp for their support whilst Falck systems have been implemented and for marking their confidence in Falck through signing a long term contract with us for asset protection services."

Why are Fire Engines Red ??

The most widely-accepted reason that fire engines are painted red dates back to the 1800s -- a time when there was a lot of competition between the fire brigades of neighbouring cities and towns. The firefighters of each brigade took great pride in their pump. Each brigade wanted their rig stand out by being the cleanest, having the most brass, or being a regal colour.

Because red was the most expensive colour, that's what colour most crews chose to paint the pump.

Other sources cite the tradition of painting fire engines red going back to the early 1920's. Henry Ford wanted to make cars as inexpensively as possible and only offered cars in one colour: black. With all of these black vehicles on the road, the fire service began painting their vehicles red in an effort to stand out.

Today, it is not uncommon to see white, yellow, blue, orange, green, or even black fire engines, in addition to red. And while some studies hint that colours such as lime-green may be more visible to the public than traditional red, the vast majority of fire departments continue to use red fire engines -- a colour instantly recognised by everyone as that of a fire engine.

Provided by http://www.qbfire.com/traditions.asp

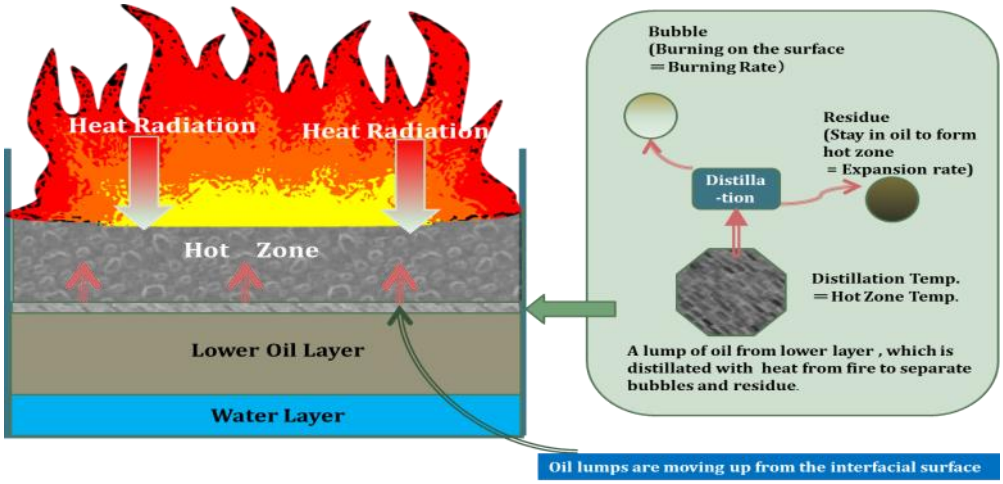
Prediction of Hot Zone Temperature and its Extension Rate up to Boilover

by Yoshiyuki Kato

A simulation program was developed to predict hot zone temperature and its extension rate for a crude oil fire in a large tank. The calculated results are summarized in this report. Possibility of boilover and required time to cool down the hot oil after extinguishment of a crude oil tank fire were also studied by using another simulation program developed separately. In case of a large tank fire, it was found that possibility of boilover occurrence after extinguishment seems too little and so long days are required to cool the hot oil.

1 Hot zone calculation model

The simulation program (EXCEL VBA) had been developed based on the theoretical model as illustrated below.



2 Calculated results of the hot zone formation

2.1 Calculation condition

(1) The crude oils used for the hot zone calculation are eight types having a different distillation curves each other. One of them is Crude oil No. -2.

Crude oil No. −2

Oil Name	Unknown（Crude Oil）
Density	0.8558 g/cm3 @15℃
API	33.8 （60° F）
Sulfur	1.8 %
Kinematic Viscosity	6.721 cSt @ 30℃

Fraction and Cut Temperature

Temperature		wt	
From（Tf ℃）	To(Te ℃)	(%)	cum(%)
−89	−0.5	2.3	2.3
36.1	70	6.9	9.2
70	100	3.4	12.6
100	150	8.6	21.2
150	190	7.2	28.4
190	235	7.8	36.2
235	280	7.7	43.9
280	343.3	11.0	54.9
343.3	565	28.2	83.1
565		16.9	100.0

(2) Tank on fire;80[m] dia. x 22[m]height, initial oil level; 20 [m],Water level 1 [m]
(3) Initial oil temp. 30 [degC], water temp. 30 [degC], Ambient temp.35 [degC]
(4) Minimum hot zone temperature required for boilover ; 120 [degC]
(5) Burning rate of 162 [kg/m2/h] is applied for every crude oil.

2.2 Calculated results

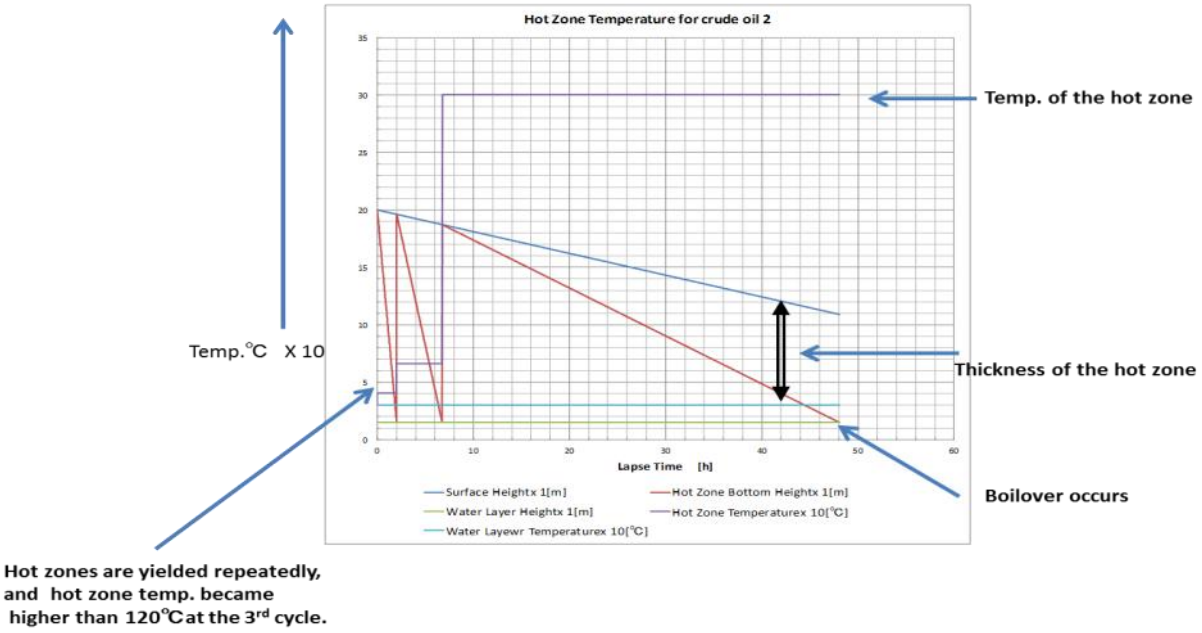
The results are shown in the next graph for crude oil No. 2, and summarized in the associated table for all crude oils. Variations in the hot zone temperature with time, extension rate, lapse time from initiation of fire to occurrence of boilover are just depending on the distillation data.

The simulation model used in this study may not match all experimental results on the hot zone formation due to the assumptions, such as;

- Density of oil is constant against the change in temperature
- Burning rate is constant through whole period of fire

However, it should be noted that most of boilover experiments were performed with small tanks and extremely thin oil layers, which is quite different from an actual tank fire.

Crude Oil	1	2	3	4	5	6	7	8
Initial oil surface height[m]	20	20	20	20	20	20	20	20
Hot zone Temp. [degC]	373.4	300.4	314.4	359.9	399.1	290.3	306.7	283.0
Last oil surface height [m]	7.4	10.7	9.5	7.8	6.4	10.4	9.8	10.7
Lapse time at boilover [h]	68.1	49.4	55.3	66.3	70.8	49.9	54.3	49.4
Hot zone extension rate [m/h]	0.09	0.20	0.15	0.1	0.08	0.19	0.16	0.20
Distillation cycle number	1	3	1	1	1	1	1	1



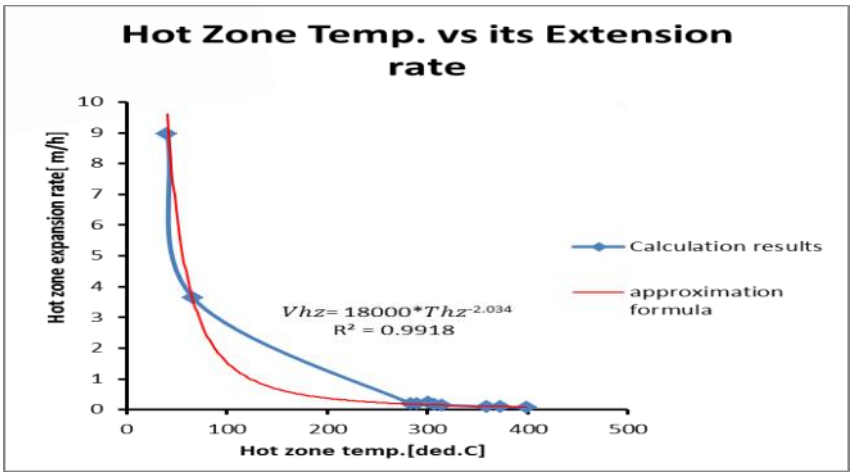
2.3 Extension rate of the hot zone

The following graph shows relation of the hot zone temperature and the extension rate calculated for eight types of crude oils. The approximation formula for relation between the hot zone temperature T_{hz} [degC] and its extension rate V_{hz} [m/h] is;

$$V_{hz} = 18{,}000 * T_{hz}^{-2.034}$$

When T_{hz} = 120 [degC], then V_{hz} = 1.06 [m/h].

This means the calculated results well mach with the phenomena in an actual tank fire as reported by LASTFIRE.

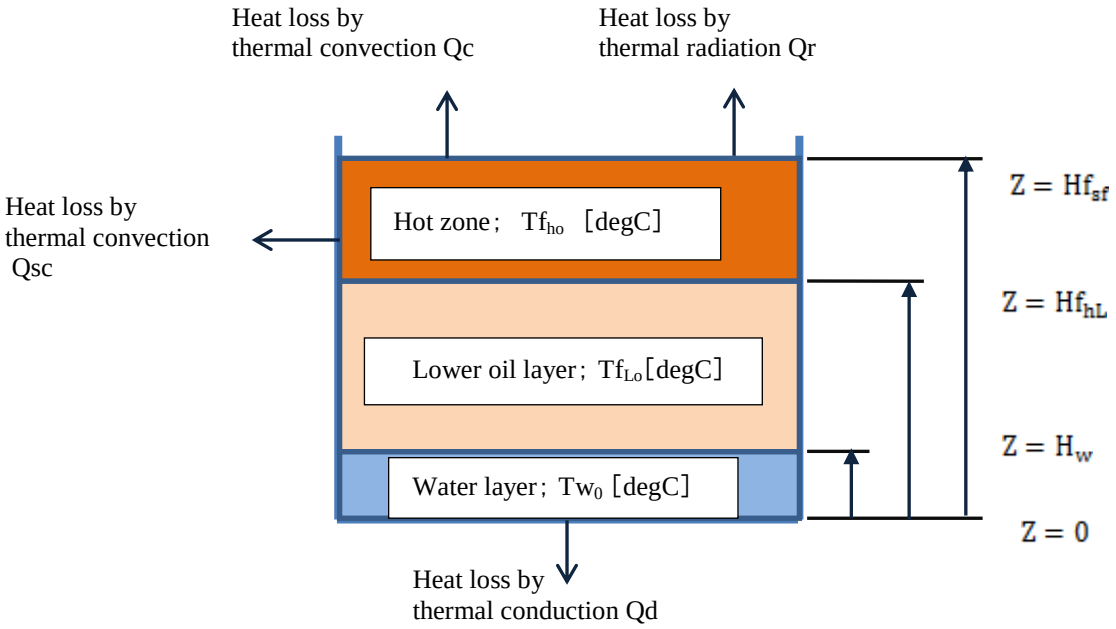


3 Temperature profile in the tank after extinguishment

There are two purposes of this study, one is to predict boilover occurrence, and the other is to predict how long time is required to cool the oil.

3.1 Calculation model

The simulation program (EXCEL VBA) had been developed based on the calculation model shown below.



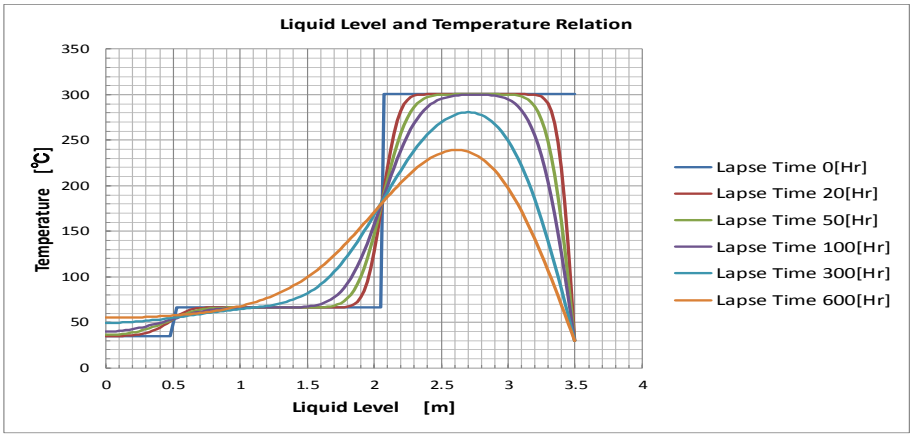
Just after the extinguishment, the upper side oil is hotter and lighter than the lower oil and water. So convection does not occur likely and the heat transfer is mainly by thermal conduction. Heat loss from the oil surface may be considerable large, so the upper side of the hot zone will be cooled within a short time and its density becomes heavier than the oil just below the surface and also heavier than the lower oil layer, because components of the hot zone are obviously heavier than ones of the lower oil layer. This heavier oil surface zone will spread entirely like a lid of the pan and still remains at the upper position. That means convection may not occur likely and thermal conduction will be continued as a main heat transfer.

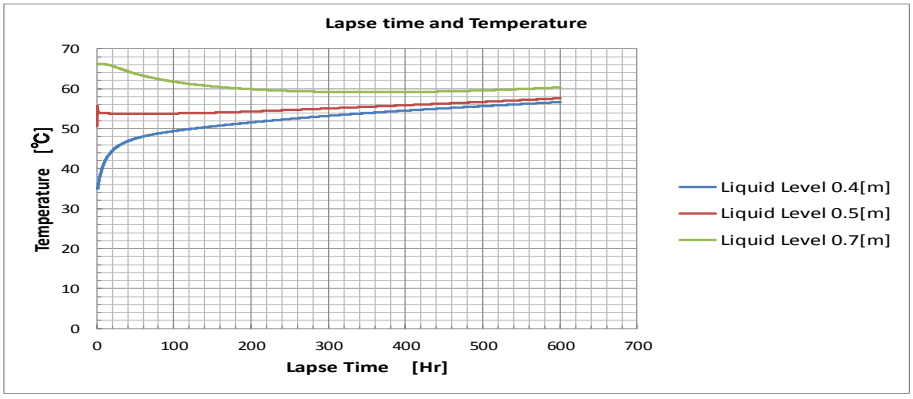
Heat transfer by thermal conduction is too slow in comparison with thermal convection. Therefore so long time is required to heat up the water layer.

3.2 Calculated results

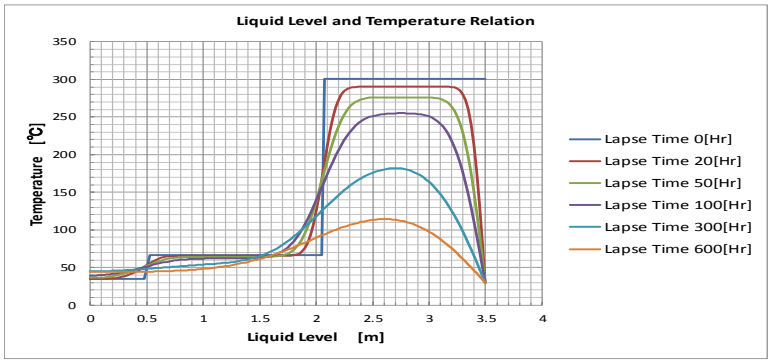
When the tank (80m diameter) containing Crude Oil No. -2 is on fire, and extinguished after 8 hours burning, oil temperature and oil level in the tank were calculated 300.4 [deg.C] and 3.49 [m] from 5[m] of the initial level respectively. Water temperature was assumed to be 35 [degC]. The results are indicated in the following graph.

-Case A; Heat loss through tank wall is not included in the calculation.

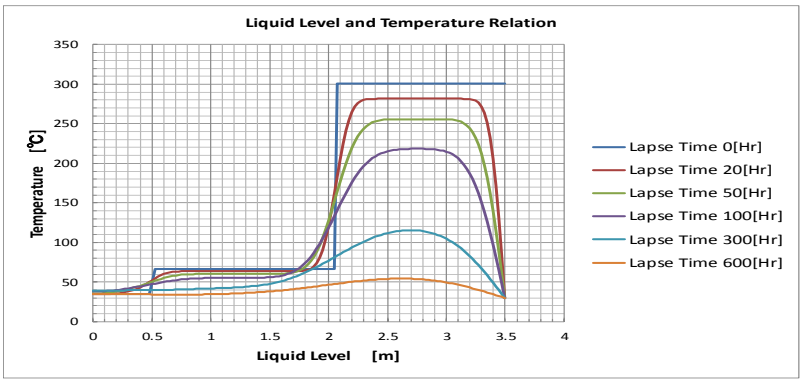




-Case B; Heat loss through tank wall by wind only is included in the calculation.



-Case C; Heat loss through tank wall by water stream is included in the calculation.



3.3 Possibility of boilover occurrence

It is found that temperature near the interface between water and oil is lower than 70 [degC] in any case. So it can be said that in such a large tank fire case, possibility of boilover occurrence after extinguishment seems to little.

3.4 Variation of the oil temperature with time

When a large tank had been fired and extinguished, it is not easy to cool the oil and requires so long time for the cooling.
In case of cooling by wind only with its velocity of 6 to 8 m/s, oil temperature is ; -600 hours after extinguishment, oil level is 3.49 m ; 115 [degC], In case of cooling by water streams, oil temperature is ; -300 hours after extinguishment, oil level is 3.49 m ; 115 [degC]

4 Conclusion

The simulation programs seem practical enough for rough prediction of boilover occurrence and for estimation of a required period for cooling the hot oil after extinguishment,

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This article is a summary of a more detailed article about this subject written by Mr. Yoshiyuki Kato. The full article is available for free download from the following link on the JOIFF website at http://www.joiff.com/documents/YoshiyukiKatoArticle.pdf

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Diary of Events 2015

January

18th – 20th **Intersec**, Dubai, UAE

23rd JOIFF Ltd. Annual General Meeting, Dublin, Ireland

February

2nd - 4th **Fire and Materials 2015** San Francisco, USA

March

12th – 14th **Secutech** India Mumbai India

24th – 25th **Securex** Africa 2015 Lagos Nigeria

30th – 31st **GSC Fire Safe Congress** Abu Dhabi UAE

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

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 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.

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"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!"

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The dates overleaf 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 Training Programme for 2015

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: r.deklerk@falck.nl
Fire Incident Command Course (5 Days)	23rd – 27th March 6th – 10th July 7th – 11th September 23rd – 27th November	
Site Incident Controller Training 2 Days	26th – 27th January 16th - 17th February 20th – 21st April 1st – 2nd June	Eddistone Consulting Email: opportunities@eddistone.com Tel: +44 1433 659 800
Site Main Controller 3 Days	28th – 30th January 18th – 20th February 22nd – 24th April 3rd - 5th June	

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