



# The Catalyst

The Official Newsletter of JOIFF

December 2001

## FROM THE EDITORS

**W**ith this edition - edition number 4, we celebrate the completion of the first year of The Catalyst! During the year, we covered a number of technical issues - protection against electric arc; competency based training; selection/use/care and maintenance of protective clothing - we have reported on the European Oil Refinery Fire Chiefs Meeting, we have highlighted a number of accidents and advised means of avoiding them and in our third edition, we started a debate about Foam. We would like to thank all our Contributors and Advertisers to date.

In this fourth edition, we welcome the support of Angus Fire through their advert and article and we also carry an advert from the Sponsors of a number of activities of the JOIFF Secretariat during the past year, including The Catalyst, GD Protective Clothing and Equipment Ltd.

The debate on Foam started in the last edition continues and the scope of what is being discussed has widened. Dr. Niall Ramsden of Resource Protection International continues as Technical Editor for this debate. We were particularly pleased to be contacted recently by an eminent authority in High Risk Industry known to many of you, Paul van Wechem from The Netherlands. Paul worked with Shell International for many years and for this edition of The Catalyst, he has contributed an article on an incident that took place in The Netherlands recently. We extend a particularly hearty welcome to Paul and hope that his relationship with JOIFF will be a long and productive one.

In the September edition of The Catalyst, we published an article written by David Meyer of Orion Safety Pty Ltd., Australia. David invited Readers to comment on the point of view that he wrote about in the hope of starting some constructive discussion and we are pleased to publish in this edition a response from Dave Murray. We hope that Dave Murray's response will stimulate other Readers to write in with their opinions. Once again, we are pleased to welcome new Members to JOIFF and hope that those from non Member High Risk Industries reading this will give serious consideration to applying for Membership.

The year 2001 was a very significant year for JOIFF and we in The Catalyst look forward to continuing to support its development and growth. All those involved in the preparation, publication and circulation of The Catalyst wish all its Readers and their families a Healthy, Happy and Peaceful Christmas and New Year.

## JOIFF HONOUR

**U**nder the JOIFF Constitution, the JOIFF Executive have the power of conferring a Fellowship on an individual who in their opinion has made major contributions to the Organisation over a period of a number of years.

The JOIFF Executive took great delight in conferring

the first Fellowship in its history, on past JOIFF Secretary and JOIFF stalwart Rob Wardle on his retirement from many years of service in Dow Corning Ltd., Barry, Wales.

We are sure that all Readers will join us in wishing Rob all the very best for the future.

## ABOUT JOIFF

**J**OIFF, the Joint Oil and Industry Fire Forum, is a grouping of Companies in High Risk Industry represented by their Emergency Services Manager or equivalent position, and nominated Deputies. A JOIFF High Risk Industry is any Organisation that is engaged in processing, storage, handling or transport of high risk materials and that has nominated personnel as Emergency Responders. JOIFF offers to its members a forum for discussion amongst peers, accredited training, information dissemination and technical advice.

JOIFF welcomes application for Membership from suitable Organisations - contact the JOIFF Secretariat, details on the back page.

### *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.*



## MEMBERS SECTION

*Report from the JOIFF Secretary, Kevin Westwood C.Eng., M.I.Fire E*

Here is the report of the JOIFF Secretariat for the past three months.

### 1. Presentation of JOIFF:

- JOIFF Membership Certificates are being distributed at present.
- Work has started to develop the JOIFF Website. The first part of this project was posting details of the recent Seminar. Within the next few weeks, it is planned to introduce a new Section to carry technical detail and debate. Links with other Organisations will also be included.
- The September issue of The Catalyst carried advertising from two Companies. To help pay for the costs of on-going publication and distribution, more Companies have been and will be approached to support The Catalyst with advertising. Companies providing advertising will be encouraged to submit technical detail of their products, services and philosophies and as well as space for them in The Catalyst, space will also be provided on the JOIFF web site.

### 2. Membership:

- The Membership Directory is updated and distributed to Members regularly.
- The Membership Drive continues and new Members were welcomed during this period - details in this edition of The Catalyst.

Please advise the Secretariat of the names of any Organisations that you think might be interested in becoming a Member of JOIFF.

### 3. Contact with other Organisations:

Contacts continue to be maintained with Regulatory Authorities and Organisations involved in Trades associated with High Risk Industry in Countries where JOIFF has Members.

### 4. Finance:

- In conjunction with the Treasurer, Membership records are maintained.
- All Training for which JOIFF Certificates of accreditation are produced results in accreditation fees paid to JOIFF. These fees currently go towards offsetting the cost of operating The Secretariat.

### 5. Constitution:

As JOIFF develops, it is seen that some amendments to the Constitution are necessary. The Secretariat is developing proposals for the Executive to consider prior to putting forward proposals to the Membership.

### 6. Seminar:

The Secretariat were heavily involved in the organisation of the recent JOIFF Seminar on Corporate Manslaughter and COMAH which took place in Washington Hall Lancashire. A report on the Seminar is in this edition of The Catalyst.

## TANK FIRE FIGHTING

*Dave Murray*

*Fire & Security Leader in CONOCO Humber Refinery, U.K.*

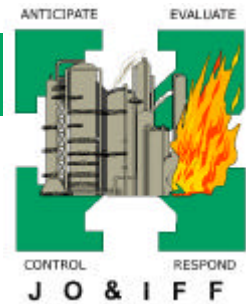
I feel that I must write and comment on David Meyer's article in the September issue of The Catalyst. I have always had a problem with this comment I hear from time to time, "let it burn down it is cheaper than trying to put it out". I never have agreed with this policy and never will. In the past you might have got away with a burn down of a finished product tank but certainly not a crude tank. Crude has the potential to catastrophically boil at some stage in the fire, and a boil over, at risk range, is estimated to be at least approx. 5 times the diameter of the tank. Having said that can I ask, would any one like to live down wind of any tank burning for a few days, while every one stood round and watched?

The problem now for all Oil companies is that it has been proved that large diameter tanks "Can be put out". Might I add safely?

I personally have a problem with so called fixed systems on any tank. "Cost and will they work" if, there has been an explosion in / on the tank ? It

could have damaged the fixed pourers/ systems, then what. The maintenance and servicing of the pourers/ systems, now that poses another question. A site has, lets say at least 30 tanks of mixed sizes and products. Of these there is a fair chance that up to 10 could be Crude tanks with Diameters up to 200ft. I know some sites have larger. What would be the cost of putting fixed foam systems on all these tanks???

A company I know of has successfully extinguished over 80 tank fires, and just recently the worlds biggest tank fire, all with mobile equipment. From what they have learned dealing with these fires along the way, they have developed better fire fighting equipment to deal with the range of fires met. They also make their living on a percentage of what they save the customer. They have willingly shared with us the info on how they put these fires out so we can all learn. This company have developed a range of monitors to deal with these types of fires from 8000ltr to 54000ltrs a minute.



The choice is up to the customer.

Most of these monitors can turn through 360 degrees, so you, the customer can set the monitor in the best position that you can get it to, and you know that you are still going to be able to turn it towards the fire. Can David tell me what is wrong with a monitor being able to turn through 360deg? Plus vertical ranges of -10 to +85 degrees. These monitors also have reach on their side. The smaller the monitors the closer you have to get to the fire and for most tanks this means putting the monitors inside the bund area, so putting your fire crews in an unacceptable risk situation in today's safety conscious environment. The smaller the monitor the more you need and the bigger the hose spaghetti problem becomes.

I wonder what size and how many monitors David would have used to deal with the latest tank to be put out. A 270ft./ 83mtr. diameter tank, with a flow rate of 45500ltr per min. used to put out the fire. If I remember two monitors were used. How many is David going to use on a tank of this size? At 8000ltr 6 would be required, and would he be happy to work inside the bund area of the tank on fire?

I have looked at many films involving tank fires, and have yet to see a down draft on the out side edges of the fire around the sides of the tank. I a few years ago went to the States to a foam workshop and one of the props. used was a 42ft diameter open roof tank. Before we went out to deal with this fire we were told what to look for and what would happen as the foam attack started and as time passed. We were told that the foam fire fighting equipment being used had been scaled down to meet the minimum application rate for that size of tank. When we went out the tank was set on fire and if I remember there was around a three minute pre-burn given.

After three minutes the foam attack started. My first thoughts were that, the size of the scaled down equipment being used, and the application rate, would never put that fire out. There didn't look as though there was any where near enough foam going into the fire. After about 5 minutes if I remember right, you could see the smoke start to change colour, just as we had been told in the classroom, and I think it was around 15 to 20 minutes when the fire was fully extinguished.

David says that it has been recommended by some that the foam stream be put into the centre of the tank fire via monitors. I do not know where he has got this from, as this is known by all to be the hottest part of the fire and with the most up draft, and water which makes up to around 97% of foam, vaporizes at 100 degrees C. What I am getting at is - it was pointed out to us all that if you look at the leading edge of the tank on fire, you would see what looks like a pair of lips, where you could see the flames and smoke curling inwards. This is where the fire is sucking in its air/ oxygen. This is where you aim the foam, into the coolest part of the fire, not into the centre of the fire as David says, as this is where most of

the thermal updraft is.

I feel David could learn a lot by attending this fire school and see the other side of tank fire practical fighting.

I seem to remember that somewhere I have read in the past, that if you meet the minimum application rate and continue meeting it, you should put the fire out in approx. one hour. If you look at how the 270ft tank fire was dealt with and the time taken, I think you will find it took just over one hour. I am all for putting all the foam into the same spot in the fire. The sooner you can establish a large pool of foam, or a foot print as one company calls it, the sooner I would think you could put the fire out.

I have a big problem with so called test data on one foam against another foam. How quick one foam works against an other. FP foams against AFFF foams. Foam "A" has a better burn back than foam "B" and so on. I agree that tests must be done to form a basis for the checks of all foams, BUT what a load of rubbish when you get one lot of people saying that FP foam has a better burn back resistance than AFFF.

I have to agree that on tests carried out they say that FP has better burn back than AFFF. BUT, let me put it this way. We have a tank on fire, lets say it's only a small one 120ft. and the site owner has AFFF foam and sets up to deal with the fire. He then decides he has put out the fire and stops the foam attack. After a short while one of his fire crew alerts him to the fact he can see fire again in the tank. Is the owner really going to stand there and say, "Lets see how long it is going to take to get a fully involved fire again"? I doubt it. He will recommence the foam attack again. This I feel would be done no matter what foam the site owner was using.

No matter which foam you are using, it is recommended that you continue to apply foam after the fire has gone out for around another 30 mins. This is to make sure you cool the tank and product down. I feel that this argument will go on for ever more which foam is better and whether aspirated is better than non aspirated.

BUT the one thing that no one can argue about is, that whatever any one's feelings may be to any of the foams, an AFFF - ATC has put out the biggest tank fire safely and quickly. Just the way the company that dealt with it have always said it would. They have put many tanks fires out using this method, and have always said it would work on any size fire. I think June 2001 proved a point.

I also think David's comment about test data on Aspirated Vv non - Aspirated being most effective also went out the window in June 2001. David admits that Aspirated foam will not throw very far, and as I have heard and say my self, "Distance is a firemen's best friend"

The one thing I have to agree with David on is the simpler the equipment is the easier it is to use, I have to ask David "What can be any easier and simpler





than the monitors, whether it be the 8000ltr, 23000ltr, 46000ltr or 54000ltr, set up one, and you can set up and use them all. No matter what the size is.

In closing David says that the equipment should be versatile. What's better than a foam monitor that will throw foam over a great distance, can be used as plain water monitor, and can have the pattern changed from a jet to a wide-angle spray in a few seconds. This allows the monitor to be used not only for tank fire fighting but also putting a large volume of cooling water/foam into a process unit fire should the need arise. Perhaps not the 46,000 / 54000ltr monitors, but the 8000 or the 23,000ltr could be used.

I used the 8000ltr monitor on our gas plant fire in April. Reached further than all other monitors we were using.

I close in saying these are my own views and not necessarily that of the company I work for. Having said that, should we ever have a tank fire and I cannot put it out I am sure I will be looking for a new job, but I am confident as my tank fire fighting arsenal comprises of:-

Proven Equipment - Proven Foam - Proven Tactics, and the tactics, that have been used at real tank fire emergencies.

*Comments from Dr. Niall Ramsden, Technical Editor for The Catalyst feature on Foam:*

*Dave Murray's article expresses some very strong opinions. In the Industry there are, of course, a full spectrum of opinions on this issue. The LASTFIRE project supplied by many JOIFF Companies, including Dave Murray's, clearly showed that there is no single "right way" for handling tank fires that applies universally to every site. What is right is that the policy must be decided and approved*

*beforehand so that there is no confusion if it ever happens! Essentially there are 3 different "acceptable" ways of dealing with a tank fire - pump out and controlled burndown, system application or monitor application. Each has advantages and disadvantages, but each has been proved by successful implementation at some time. The final decision on the right approach for a particular facility can only be decided from a detailed review in line with the methodology in LASTFIRE which will take account of the issues and concerns in Dave Murray's article.*

*As independent consultants (with, I hasten to add team members who have had to fight tank fires) we have now been involved with sites where, after a detailed analysis, each of the 3 options has been chosen as the most appropriate one.*

*Regarding Dave Murray's comments on foam testing, I agree it is time we got away from this old chestnut of AFFF vs. FP. Does it matter what the foam is made from if it does the job you want? What is important is that the foam is fit for purpose. It is undoubtedly the case that some foams on the market are not fit for application in storage tank fires. That is why it is important that some sort of test against relevant performance criteria is available. Obviously a combination of criteria including extinguishment and vapour suppression must be defined - and hence the LASTFIRE test we developed. Different foams of the different generic types have performed well (and badly!) on this test clearly showing the difference in quality on the market. One particular foam, a synthetic based one, which performed well is unfortunately no longer available.*

*Please remember that the above is based on exclusive work in the industry on a totally independent basis. The editor has no vested interest in selling foam, systems or equipment.*

## JOIFF AWARDS:

*JOIFF Chairman Gary Douthwaite recently presented JOIFF Certificates of Accreditation as an approved Training Site to IFTC Teeside and to Washington Hall, Lancashire.*

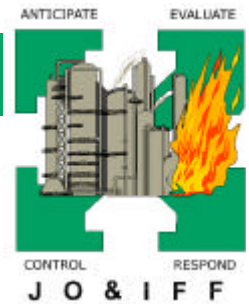


*from right to left: Gerry Johnson, Fulcrum Consultants; Mick Garner, Head of Training IFTC; Derek Dodwell, General Manager IFTC; Gary Douthwaite, Chairman, JOIFF; Kevin Westwood, Secretary, JOIFF; Alec Feldman, Fulcrum Consultants.*



*Peter Holland  
Chief Fire Officer  
Lancashire Fire and Rescue*

*Gary Douthwaite  
Chairman  
JOIFF*



## "APPROVED, BUT NOT SUITABLE"

*Paul van Wechem  
Firelite Consultancy, The Netherlands.*

### Introduction

In The Netherlands a major fire incident occurred last year in a warehouse containing chemical waste. The warehouse was equipped with an approved Hi Ex inside air foam system. The system functioned properly, but did not manage to extinguish the fire. Excessive emissions of hazardous smoke and fume threatened the local community, which ultimately led to political action. This, in turn, initiated an official study to investigate the suitability of Hi Ex foam systems and to come up with recommendations to prevent recurrence. The report of that study was issued a couple of weeks ago.

### Findings of the study:

- There is nothing wrong with the design and engineering of these systems.
- All information revealed during the study was, although in cases deeply hidden, available in the codes and their references.
- Products/chemical fires that can effectively be extinguished with Hi-Ex inside air foam:
  - Class A materials
  - Class B materials
  - Materials specifically mentioned in NFPA code 11a and related documents
- Products/chemical fires where it is doubtful whether they can be effectively extinguished with Hi-Ex inside air foam:
  - Oxygen generating materials like cellulosinitrate, provide oxygen to the combustion process.
  - Non chemically bound oxygen in, for instance, filter mats containing lacquer could provide oxygen.
  - Situations where self-heating can occur, for instance oily insulation materials.
- Products/chemical fires that can not be effectively extinguished with Hi-Ex inside air foam:
  - Silicones, in particular when present as aerosols, destruct foam.
  - Sodium and calcium react violently with the water in the foam.

Immediately following the publication of the report the Dutch Ministry of Environment advised the local Authorities to check the design parameters of each of the, at least, 180 systems installed in Holland and to check whether the actual situation still complies

with the situation assumed during the design stage.

### Most probable cause

In The Netherlands, like in so many other countries, there is a national Code of Practice to select, design and engineer fire protection systems for fighting fires in chemical warehouses and other enclosed storages of chemicals and other dangerous materials.

The code gives a number of options to control such a fire. Methods typically to be considered for these hazards are sprinklers, deluge systems, gaseous extinguishing systems, high expansion foam systems and such.

Guidance is given to the user in selecting a suitable method for the chemical concerned. This code also refers, as usual, to other codes, which in turn refer to again other codes. This phenomenon complicates the guidance process. And complicated matters are prone to be misinterpreted by non-professionals.

The code accepts the installation of a High Expansion inside air foam extinguishing system, provided it has been proven that fire of the stored chemicals can be effectively extinguished with high expansion foam. It shall also be demonstrated that good foam can be formed with the combustion fumes generated by the initial fire. Other aspects to be considered during the selection phase of Hi-Ex inside air foam systems are the type of storage (stacked, on pallets, in bulk), the dimensions of the warehouse, speed of response of the fire brigade and such.

High expansion inside air foam systems are particularly popular in situations where responsible disposal of large quantities of contaminated fire water would be a difficult and thus costly affair.

The very attractive price of a Hi Ex inside air foam system compared to the alternative extinguishing systems probably dominates the overall selection process. Basic technical considerations may therefore not have received the attention they should have received.

Authorities readily approve the proposed protection method, provided the procedures laid down in the codes are properly followed. The theoretical end result is that Society at large is adequately protected against these hazards.

In the case of the Dutch fire incident one has to assume that certain critical aspects have been overlooked during the design as well as during the dormant operational phase. An added complication may be the nature of the chemical waste disposal industry. Their "feedstock" varies frequently. The chemicals considered during the design phase of the



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extinguishing system are most probably in the meantime replaced by something completely different. The end result was an approved but, unfortunately at the time of the fire, unsuitable system.

### Recommendation

It shall be clear that the probable causes as described above could apply to any engineered extinguishing system.

- It is therefore recommended to involve independent specialists, in particular during the basic design stage of any fixed installed extinguishing system.
- The system custodian shall ensure that the system is only operated within its original design parameters. It is also the responsibility of the custodian to consult the specialists in case the original design parameters change.

*Comments from Dr. Niall Ramsden, Technical Editor for The Catalyst feature on Foam:*

*This incident history clearly shows the need for a more pragmatic approach to system design, whether the system be for detection or protection. The Oil and Gas Producers Association have identified a major concern that too often general engineering contractors design and specify systems without a real understanding of performance criteria or operational issues. Consequently the OGP commissioned and issued a document Fire Systems Integrity Assurance which outlines the procedures that should be followed to specify, design, install, commission, operate and maintain fire systems. Most of the JOIFF member Companies are members of OGP in their upstream operations.*

#### *About the Author:*

*Prior to his retirement from Shell in June 1999 Paul van Wechem spent over 29 years in line and staff functions in the oil, gas and petrochemical branches in Shell's Central Office and various Operating Companies. In 1990 he was appointed "Senior Engineer Fire Safety Services" for Shell International's downstream activities. In that function he actively took part in the LASTFIRE project. During his career he has been extensively involved in the technical, operational and fire safety of Shell-managed projects and installations Worldwide. Immediately following his retirement he set up his own firm, called Firelite Consultancy. The firm provides advice on Fire Safety for the oil-, gas- and petrochemical industry in the widest sense. Paul can be contacted through the Secretariat and at his E-mail address: firelite@planet.nl*

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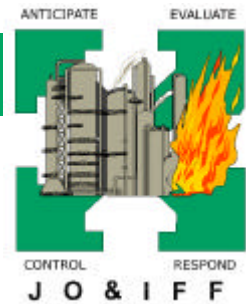
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## PPE CORNER

In terms of World Trade, the Standards of the International Standards Organisation - ISO - are becoming more and more relevant because Standards of the European Standards Organisation - CEN - and of the United States - in terms of PPE for Emergency Services Personnel these are National Fire Protection Association (NFPA) Standards - are, in World terms, Regional Standards. PPE for Firefighters covers a wide range of activities from rescue work, through chemical and biological protection to potential exposure to explosion and flashover. In recognising this, the Technical Management Board of ISO has approved the establishment of a new ISO sub committee to write Standards for the wide range of PPE used by Firefighters.

This new subcommittee will be known as TC 94 SC 14 - "TC 94" is ISO Technical Committee 94, which is responsible for *Personal Safety - Protective Clothing and Equipment* and "SC" stands for Sub Committee. Its terms of reference will cover *Personal Safety - Protective Clothing and Equipment/Firefighters Personal Equipment*, a very wide ranging scope.

The first meeting of TC 94 SC 14 was held in London in October, attended by representatives from 10 Countries. SC 14 will be chaired by Australia, who will

also provide the Secretariat for the SC and it was agreed that the work of SC 14 will be divided into functions as opposed to items of PPE or to parts of the body as tends to be the practice in CEN and NFPA. Initially, five Working Groups will be established - WG 1, to deal with "General Requirements" such as Definitions, Selection/Use/Care and Maintenance etc., WG 2 to deal with Firefighting (excluding Wildland Firefighting), WG 3 to deal with Wildland Firefighting, WG 4 to deal with Hazardous Materials and WG 5 to deal with Rescue.

Readers of The Catalyst who would like to become involved in this most important work should contact their National Standards Organisation seeking representation on one or more of these Working Groups. Some Countries operate National Committees that mirror the activities of the International Committees and involvement with the National Committee will give influence in shaping the National position.

JOIFF will be represented on TC 94 SC 14 through the JOIFF Secretariat, and if any Member would like to make any points with regard to the work of this Sub Committee, please contact The Secretariat.

## JOIFF SEMINAR

An attendance representative of JOIFF Members, major Industry, Police Authorities and Fire Service attended the first JOIFF Seminar which was held in October at Washington Hall, the Training Centre of Lancashire Fire and Rescue Service. The subject of the Seminar was Corporate Manslaughter and the requirements of the Seveso II Directive - known as the COMAH Regulations.

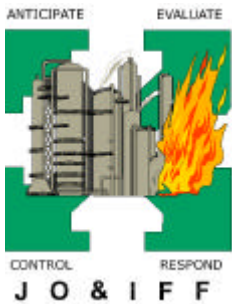
Mark Scoggins presented a Lawyer's view on the implications of Corporate Killing and Major Incidents. He pointed out that in the event of an accident to persons, property and/or Environment as well as the possibility of being sued for perceived negligence, Managers could also be subject to exposure at internal debriefs/inquiries; Safety and/ or Environmental Authority Reports; Public inquiries; Inquests/Fatal Accident Inquiries; Criminal prosecution; Trial by media, Central

Government, Municipal Council and disciplinary proceedings, with penalties that could include fines, costs and a jail term. He pointed out the legal obligations of Employers and Employees in ensuring the maintenance of a Safe Working Environment for all and he gave examples of incidents that had ended up in Court.

He explained the importance of Risk Assessment in the establishment of a Safe Working Environment and pointed out that assessments need to be reviewed regularly by Employers if there is reason to suspect that they are no longer valid. He concluded by asking how many had revisited their Risk Assessments as a result of the incident of September 11th because this incident clearly showed that many hazard scenarios considered impossible prior to that date were no longer impossible.

John Sparke, General Manager of Phillips Petroleum Seal Sands, gave background to the operation

of his Company and its importance in the Worldwide supply of Petrochemical products. He explained his Company's COMAH strategy and submission - safety equipment and safety systems to guard against negligence within a Management attitude of a safety culture reducing hazardous acts. He stated that conscientious Companies that take responsibility to ensure the Health and Safety of their employees have nothing to fear from COMAH. Tim Beals, a Principal Inspector of the UK Health and Safety Executive outlined details of major incidents which have led to the necessity for the COMAH Regulations - incidents such as Flixborough, Seveso, Bhopal, Piper Alpha etc. He explained that the underlying principles of the COMAH Regulations are to carry out Risk Assessments and then set goals of all measures necessary to prevent a major accident and limit consequences



to persons and the Environment. He set out the general duties of Operators of High Risk Organisations, the responsibilities vis a vis Safety Reports and what they should contain, on and off site plans and information to the Public. He outlined the scope and extent of the Regulations and the supports that were available to help in their implementation.

Ron Edmonds, Emergency Planning Consultant, said that compliance with the COMAH Regulations should be looked at positively, to see a value beyond the law and in the process gain business strengths and a likelihood of never being involved

in litigation. He discussed how important it is to understand business hazards and demonstrate safe operation. Failure to do so could result in an incident that will damage shareholder value and possibly lead to restrictions or termination of business, with senior managers being charged with criminal offences. He concluded by suggesting that an Emergency Plan can be either a written document detailing the procedures to be followed when an emergency occurs or an extension of the way a business should be operated.

The Seminar concluded with a Paper by Dr. Niall Ramsden of Resource Protection International who said that COMAH is a means of maintaining and demonstrating

incident response capability. He detailed the various aspects that together make up an effective system of Fire and Explosion Hazard Management to establish a site specific rationalized, relevant and cost effective policy to reduce potential fire and explosion consequences. He confirmed that COMAH is not just a paper exercise, but that it needs maintenance and demonstration of its effectiveness on site. This includes a regular programme of testing equipment, plus pre-planning procedures plus training people for competencies.

During the break for lunch, participants were provided with the opportunity of seeing in action, the rebuilt and modernised Fire Training rig in Washington Hall.

## NEW RESEARCH REVEALS ITS "BACK TO THE FUTURE" ON TANK FIRES

*Mike Willson*

*Business Development Manager Foam and Foam Equipment. Angus Fire*

Major new research from an intensive 3 year study into the mechanics of foam spreading and extinguishment on large scale foam applications has recently published its findings, which has major implications for storage tank fire protection. This project was called FOAMSPEX. FP and AR-AFFF foams were tested and contrasted as the main foams used in large storage tank fire fighting and the key findings were as follows:

### **Foams only spread 30m ? - not true**

Firstly the myth that foams will only spread 30 metres across a fuel surface was scotched and distances of 90 -100 metres flow were achieved with FP and AR-AFFF foams. This verifies that foam from fixed systems as well as large monitors should be capable of extinguishing colossal 100+metre dia. tanks.

### **More fuel pick up with larger nozzles**

We have known for some time that local application rates in the foam delivery area (footprint) from monitors goes up dramatically with nozzle size. FOAMSPEX confirmed that as this local application rate increases, more fuel is picked up because of greater turbulence at the impact point, so selecting a foam that resists fuel pick up is crucial, favouring the FP foams.

### **NFPA 11 and current practice confirmed**

Results of FOAMSPEX are consistent with NFPA 11 confirming that higher application rates are required for larger diameter tanks.

### **Poor foam conversion from nozzles**

What is more startling was their findings on the conversion rate of foam solution to aspirated foam bubbles from different nozzle/cannon designs. With a well designed aspirating foam cannon the conversion rate of foam solution to bubbles is 100% for both FP and AR-AFFF type foams. When tested through non-aspirating nozzles this conversion rate fell dramatically to typically just 8% for FP and 11% for AR-AFFF. This could explain why some of the tank fires attacked in the past took several days to control and extinguish - not enough aspiration.

### **Higher drop out rates on AR-AFFF**

FOAMSPEX also verified another factor we had known for some time but had not quantified. When foam streams from non-aspirated nozzles were measured, surprisingly high 60% drop out rates were achieved for AR-AFFF against only 50% for FP.

### **Lowest drop out rates with aspirated cannons**

In contrast the drop out rates for foam streams from aspirated cannons were significantly less. When FP foam was used only 30% drop out occurred, with 40% drop out rates for AR-AFFF foam. So when aspirated cannons are used typically 50% more foam is delivered onto the risk area than if non aspirated nozzles are used.

### **Film formation has undesirable edge**

The FOAMSPEX study confirmed what has been suspected for many years that foams with low interfacial tensions pick up more fuel when applied





forcefully. As expected AR-AFFF picks up significantly more fuel than FP foams. Monitor attacks being more forceful applications are therefore likely to be more effective when a FP foam is used.

#### AR-AFFF suffers high fuel pickup rates

For the first time this was actually quantified under realistic conditions. For example AR-AFFF picked up 63% Avgas (volatile class 1 hydrocarbon) per metre drop (a way of standardising impact velocity) compared with only 11% Avgas fuel picked up per metre drop with an FP foam.

#### FP foams flow better on fires

AR-AFFF foams can, in some cases, flow up to 4 times faster than FP foams on cold fuel surfaces. However surprisingly AR-AFFF slows up under fire conditions while FP foam flow rate actually increases under fire conditions, significantly narrowing the gap in terms of speed of flow under real fire scenarios. The often stated "superior" flow characteristics of AR-AFFF on tank fires to provide faster control looks now to be a false assumption.

#### Updraft effect myths scotched

We have heard many myths about the updraft effects of big fires on foam bubbles. A major part of this FOAMSPEX project was understanding foam flake characterisation. Evidence was produced to show that updraft air movements help keep the foam stream together and minimise drop out rates. An uplift effect from the hot air also allows the foam to land more gently on the fuel surface and hence pick up less fuel. Plunging effects seem therefore to be minimised onto ignited fuel surfaces compared to unignited cold fuels.

#### Aspirated FP through cannons is way forward...

These findings tend to conclude that aspirated foam cannons using FP foams are better suited to large tank fire applications than the more expensive AR-AFFF type foams with their non-aspirated nozzle applications. There are also reassuring similarities with the findings of the LASTFIRE test protocol developed to simulate a bulk storage tank fire where

FP70 Plus achieved a higher pass level for forceful aspirated application than the more expensive AR-AFFF foams. This test was developed and sponsored by 16 major oil companies worldwide who formed the LASTFIRE group.

It seems that full aspiration is now likely to be the most effective way forward and whichever foam is chosen Angus Fire can help you as your Partners in Protection. A fuller article discussing these important issues is available directly from Mike Willson at Angus Fire (e-mail: [mike.willson@angusuk.co.uk](mailto:mike.willson@angusuk.co.uk) or fax: +44 1844 213511)

The 273 page book called **FOAMSPEX** with the full findings of this 3 year study has been published by SP Swedish National Testing and Research Institute, the lead research institute in the consortium carrying out the work. Copies of this book and a short video are available direct from Henry Persson the project leader at SP in Sweden (Fax: +46 33 13 55 02 or e-mail: [henry.persson@sp.se](mailto:henry.persson@sp.se)). Also the full LASTFIRE report, risk workbook and summary video are available from Resource Protection International in Aylesbury, UK (Fax: +44 1296 395669 or e-mail: [ramsdn@resprotint.co.uk](mailto:ramsdn@resprotint.co.uk)).

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#### About Angus Fire

*Angus Fire have recently been confirmed as the World's largest manufacturer of foam concentrates, with the widest product range of synthetic and modern protein based foam concentrates. In addition they are well known for their Duraline and HiVol fire hoses, Fetch deployment and retrieval systems and have recently introduced a new range of upgradeable Streamline Monitors. Angus were selected as partner for SP the Swedish National Testing and Research Institute and TRI in Italy for the FOAMSPEX research project which was part funded by the European Commission under their Environment and Climate Programme concerning Industrial Safety.*

## NEW MEMBERS

During the past three months, JOIFF welcomed the following new Members:

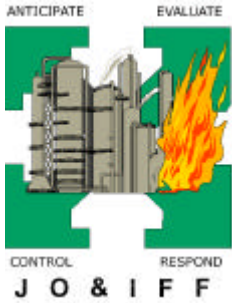
**BP Bulwer Island Refinery, Queensland, Australia**, represented by Colin Braybrooke, Fire Marshal / Training Supervisor and Ron Levesque HSEQ Co-ordinator. In BP Bulwer Island, all operations personnel (operators) are trained as front line firefighters and graded staff are trained as back-up emergency response team. The Refinery has a number of appliances to support the Firefighting Teams.

**BP Refinery, Lavera, France**, represented by Frédéric Gil, Emergency Response and Process Safety Advisor. Frédéric participates in process safety issues, is the focal point for sharing lessons learned through the "BP refineries Quarterly Safety Bulletin" and assists the BP Group Fire Advisor.

**BP Exploration Operating Company Ltd., Sullom Voe Terminal, Shetland, Scotland**, represented by Tommy Clark, Marine Emergency Response Coordinator. BP Sullom Voe has a full time Industrial Fire Brigade giving 24 hour cover over 5 shifts supported by a number of appliances including specialised Foam Tenders Foam Carriers.

There have been a number of changes of personnel in JOIFF Member Companies and Members will receive an updated Membership Directory next month.

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



## ARCTIC FOAM - THE STORY SO FAR

Steve Smith.

Solberg Scandinavian AS.

*(Editors' note: Due to pressure on space, the article below is published in abridged form. The full article will be posted on the JOIFF web site.)*

Solberg Scandinavia were producing Light Water foams under licence from 3M for some time. On 16th May 2000, 3M announced that despite having the largest share, they were pulling out of the Fire Fighting Foam market. Solberg Scandinavian reviewed the options of which at the time there were three:

1. Close up shop, as far as foam production was concerned, and look at developing our engineering section. Considering our staff and our loyal customers, this option could not be considered.
2. Continue manufacturing foams under licence for someone else.
3. "Go it alone" - we had the facilities, the know how and the motivation.

The Company discussed the various scenarios and it was agreed that option 3 was the only










way forward. 3M assured us that they would give all the help and assistance we would need in order to produce a 100% compatible foam concentrate that would be a 'drop in' replacement. It had to be totally mixable with their old stock and not affect the fire fighting capabilities of either foam, be as environmentally friendly as humanly possible and have all the relevant approvals to assure customers it was at a suitable standard. Working closely with 3M we were able to formulate an excellent foam compound that has all the characteristics of the old foam, but contains 60% less fluorosurfactants.

We then looked at which approvals are appropriate. EN-1568 is the latest European Standard for Foam and we can pride ourselves that we are the first to gain such recognition. Arctic Foam also complies with the exacting standards of FM, UL, US Mil Spec, NFPA, ICAO, LASTFIRE, DNV Offshore Maritime and OSPAR. We

also wanted to focus on fire protection in ship's engine rooms based on the requirements of the IMO. We carried out more than 100 fire tests during an 18 month period and can now boast that we are one of the very few companies that has an IMO approved foam/mist fixed engine room system.

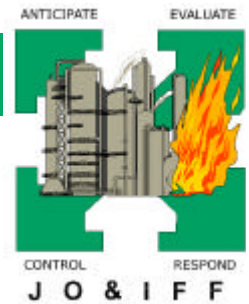
Solberg Scandinavian AS is accredited to the ISO 9002 Quality Standard and has systems in place to continuously monitor the quality of our foam concentrates and all our quality influencing activities. It is the continuous aim of Solberg Scandinavian AS to supply fire fighting foam concentrates, services and equipment that reduce risk, are environmentally acceptable and provide absolute value to meet or exceed customer expectations

Web page: [www.arcticfoam.com](http://www.arcticfoam.com)  
e-mail: [steve@arcticfoam.com](mailto:steve@arcticfoam.com)

 <p><b>Fire Hose</b> Duraline, the world's leading fire hose and Hi-Vol large diameter hose</p>	 <p><b>Engineered Systems</b> One-stop-shop for fire suppression systems from initial design, through equipment supply, to full scale commissioning.</p>	 <p><b>Fire Pumps</b> Portable fire pumps with wide range of pumping capacities.</p>
 <p><b>Foam Concentrates</b> World-beating brands including Niagara, Alkoseal, Petroseal, FP70 Plus, Tridol and Forexpan</p>	 <p><b>Foam Equipment</b> Comprehensive range of portable and fixed foam proportioning and delivery devices</p>	 <p><b>Hose Reels</b> Surface swinging, fixed and recess swinging hose reels plus full range of fire equipment cabinets.</p>
 <p><b>Hose Retrieval</b> FETCH and FireKat deployment and retrieval systems for Hi-Vol.</p>	 <p><b>Monitors</b> Ground, trailer-mounted, manual, oscillating and remote control.</p>	 <p><b>Extinguishers</b> Complete range of portable and mobile fire extinguishers.</p>

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### "THE REACTOR COLUMN."

Write to The Reactor, Mr. R., with comments, problems, ideas or anything at all that you would like to be heard. The Editors may decide not to print a letter or part of a letter and letters may be edited. No letter will be published unless the name and address of the Writer is given to the Editors, but names and addresses will not be published without the writer specifically requesting it.

(Editors' note: For the September issue, Mr. R. had planned to publish details and some Reader and Reactor comment relating to published statistics on Firefighter fatalities in the United States of America, but we held back its publication due to the tragic events of 11th September. However we do believe that the detail will be of interest to many Readers, so we have asked Mr. R to present the detail in a factual fashion and here it is):

In the July/August 2001 issue of the National Fire Protection Association Journal the statistics on US Firefighters fatalities during the year 2000 were published and they showed that during 2000, 102 firefighters were killed in the line of duty, 14 of them during training activities. The NFPA article reports that there have been more than 2700 Firefighter fatalities since 1977 that resulted from injuries or illness while the victims were on duty, an average of 112 deaths a year for the 24 years covered.

(During the 1990s, the number of Firefighter deaths in the UK was 33, and during the same period, there were 961 Firefighter deaths in the USA, nine times greater than the UK based on population figures. Mr.R.)

In the November 2000 issue of the NFPA Fire Command magazine, a Staff Writer includes details of a NIOSH (United States National Institute for Occupational Safety and Health) report that says the contributing factors to firefighter fatalities in the United States of America are:

1. Lack of incident command / incident management;
2. Inadequate risk assessment;
3. Lack of firefighter accountability;
4. Inadequate communications
5. Lack of standard operating procedures.

The NFPA Staff Writer comments that because risk is inherent in the occupation of being a firefighter, some firefighters assume that an injury or fatality is part of the risk - some firefighters wear it as a badge of courage. END.

Mr R. continues:

In the November/December 2001 issue of the NFPA Journal, the statistics of US Firefighter injuries of the year 2000 were published. During 2000, 84,550 injuries to firefighters were reported. Of these, 3,650 required hospitalisation. The figure of 84,550 is reported as the fewest reported since 1977 when 106,100 injuries were reported. 51% of the year 2000 injuries occurred during Fireground operations, 18.6% during other on-duty activities and 16.2% occurred during non-fire emergencies. The four major types of fireground injuries during the year 2000 were strains and sprains, wounds, burns and smoke/gas inhalation.

Before jumping to any conclusions about these figures, it is necessary to ask - are the US Firefighting techniques the most dangerous in the World or are US Firefighters the best and most open gatherers of statistics ?? In other parts of the World, we do not have a very good record of gathering statistics on Firefighter injuries and deaths and if you don't count what happens, it is logical for those who are not present to conclude that nothing has happened.

Dear Mr. R.,

As we all know, one of the most important tools that we use in High Risk Industry is Foam, not only in Firefighting but also in some hazmat incidents. What with the disappearance of 3M from the Market and the importance of Foam to our activities, I was pleased to get the email sent to JOIFF Members some time ago advising of the start of a discussion on Foam in The Catalyst and looked forward to what was to come. I couldn't believe the comments from the Editors in the September edition,

that only 2 of the Companies contacted responded and as offered, I asked for a copy of the list of the Companies. Once again disbelief - the largest Companies in the Foam business were included on the list and the 2 Companies that were shown as replying are not major players - well certainly not yet !! Are the big boys so certain of their market that they can ignore JOIFF - I would have liked to hear what they have to say on the questions asked ? All I can say to my colleagues in JOIFF and to the others reading your column is to

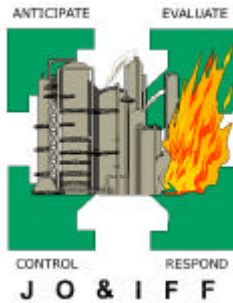
remember those who support you the next time that you are buying - it's a two way street, or should be.

Yours etc.

Comment from Mr. R.

Our reader will be pleased to note that one of the "Big Boys" has provided an article and an advert for this edition and on behalf of the Editors we say a big Thank You to Angus Fire.





## JOIFF TRAINING NOTES

**J**OIFF accredited Training continued during the past three months and personnel from Conoco Humber Refinery, Lindsey Oil Refinery, Phillips Petroleum and Shell Stanlow have qualified as JOIFF accredited Crew Leaders, personnel from Bassell Polyolefins, BP Hull, Conoco Humber Refinery and Lindsey Oil Refinery have qualified as JOIFF accredited Auxiliary Firefighters, personnel from Ciba, Bradford and from ENRON, Teesside have qualified in JOIFF accredited Firefighting Courses. We particularly recognise the achievements of the Firefighters of BP Hull, the vast majority of whom are now JOIFF accredited Auxiliary Firefighters, of Conoco Humber Refinery and of Lindsey Oil Refinery, who have a number of JOIFF accredited Crew Leaders and Auxiliary Firefighters and of ENRON Teesside the vast majority of whom are now JOIFF accredited in Practical Firefighting.

As advised in the September edition of The Catalyst, Humberside Fire Brigade Industrial Training Centre have developed a 2½ day Course for JOIFF accredited Fire Extinguisher Instructors. The Instructors in the Centre carried out a "dry run" on this excellent course and are very pleased to confirm that it is most certainly "best practice" and

competency based to comply with the requirements for the Management of Health and Safety at Work in any Country. JOIFF Members and other interested Organisations should contact the Training Manager at Humberside Fire Brigade Industrial Training Centre, telephone 01482 462815 (outside UK + 44 1482 462815) for booking information.

It is overdue time to plan for your Training requirements for next year. Under a system of Competency Based Training, which is the System that all Training should follow, a broad base of competencies are required and the progress of each person should be audited. Emergency Services Personnel are responsible for activities not only in Firefighting, but in many other activities and it is important - if for no other reason, for legal liability - to ensure that such Personnel have been provided with such Competencies, which should be followed by a robust on going Training Programme to ensure their readiness when needed.

Please contact Fulcrum Consultants for further detail on Training and to book places or to develop site specific Courses - detail on Fulcrum Consultants at the bottom of this page.

Dates	Detail	Venue
February 4th - 5th	2 day Practical Firefighting Course	IFTC Teesside
February 4th - 14th	9 day Breathing Apparatus Instructor Course	IFTC Teesside
February 11th - 13th	2.5 day Fire Extinguisher Instructor	Humberside
February 11th - 13th	3 day Auxillary Firefighter	IFTC Teesside
February 18th - 22nd	5 day Crew Leader Course	IFTC Teesside
February 25th - 26th	2 day Practical Firefighting Course	IFTC Teesside

## USING CASH MACHINES ? - BEWARE !!

Thanks to a colleague for this information:

"The other day I was getting some cash out at one of my Bank's cash points. I put my card in and a message came up on the screen saying The machine is temporarily out of order. A woman approached me and told me that this had happened to her the other day and what I needed to do was to key my pin number in and then press cancel twice. I did this - without

thinking to ask her to look away - and my card was not returned. I left the machine thinking that it had swallowed my card, but when I returned to the bank the following morning to collect my card, it wasn't there.

According to the police this method of stealing bankcards is called the "Lebanese loop". A plastic envelope is made up that fits the hole in the machine perfectly. When you put your card in, the machine knows it

is there but cannot read it and therefore the message comes up on the screen. Once the pin number has been given away and the card left in the machine, it is then "looped" out and the spending starts! I had £500 taken from my account before I realised what had happened and cancelled it. Watch out when you are told by a stranger, who is conveniently nearby, says Press Cancel Twice. You have been warned."

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