2004, Issue 3

The Catalyst

The Official Newsletter of JOIFF

Septepber 2004

www.joiff.com

From the Editors

This is the third edition of The Catalyst for 2004 and we welcome our growing numbers of Readers. Our policy is to bring you high quality articles on new developments and other happenings in the area of Emergency Services Management. In addition to The Catalyst, current information relevant to Emergency Services Management is posted on the JOIFF website.

As always, we thank those JOIFF Associate Members who have contributed articles - for this edition, DuPont Personal Protection, Insituform, part of the Kidde Products Group and Pursuit Dynamics. We also thank JOIFF Associate Member EFA Sales for providing a report on the first African Williams Foam Workshop and Ten Cate who announce the appointment of a new Member of their Team. We encourage our Associate Members to provide technical articles on any new products, services and developments that they believe will be of interest to our Members and other Readers.

Preliminary detail is given on the forthcoming Industrial Fire Journal / JOIFF First Worldwide Firefighters Conference which will take place in Manchester, UK on 15th and 16th March 2004 and our regular features - New Members, Training Column, Members Section, Diary, PPE Corner - are also included in this edition.

We sincerely thank our advertisers / sponsors without whom we could not function.

About Joiff

JOIFF, the Joint Occupational Industrial Fire Forum, the Organisation for Emergency Services Management in Process Industry, is a grouping of Companies, represented by their Emergency Services Manager - or equivalent position - and nominated Deputies.

For the purposes of JOIFF Membership, a Process Industry is considered to be any Industrial / Commercial Organisation that is engaged in processing, storage, handling and/or transport of high risk materials and that has nominated personnel as Occupational Firefighters /Emergency Responders.

Associate Members of JOIFF are Organisations or Individuals who do not comply with the requirements for Full Membership but who share the same interests.
JOIFF provides a forum for discussion amongst peers, accredited training, information dissemination and technical advice.

JOIFF welcomes interest from suitable Organisations who wish to become Members or Associate Members - contact the JOIFF Secretariat, details on the back page.

JOIFF Ltd. Registration number 362542.

New Members

During the past three months, the Executive of JOIFF were delighted to welcome the following new Members:

Members:

Merck Sharpe & Dohme (Ireland) Ltd. Ballydine, Clonmel Ireland, represented by Willie O'Donnell, Fire and Security Chief and Roy Johnston Safety and Security Manager. There are a small number of full time Emergency Services personnel in Merck Sharpe and Dohme but the majority are part time and they work a shift cycle 24 hrs. 7 days each week. There are also nurses and trained First Aiders on site and a number of Emergency Vehicles.

LF & RS Washington Hall International Training and Development Centre Chorley, Lancashire England, represented by Malcolm Knowles, Commercial Manager and Kevin Murray, Head of Training Provision. Washington Hall, a JOIFF accredited Training Establishment is a major training provider to industry and Fire Services in the UK and Worldwide, providing training that includes all aspects of Fire Fighter Training, Emergency Preparedness Training, Management, H&S and Fire Safety training.

Limerick County Council Fire Service, Limerick, Ireland, represented by Ms. Carmel Kirby, Chief Fire Officer and Assistant Chief Fire Officer Ken Crowley. Limerick County is situated in the South West of Ireland and Limerick County Fire Service is a Brigade of retained Firefighters spread throughout the County under the Management of the Chief Fire Officer and her team of Senior Officers, the majority of whom are engineers, and a number of administrative personnel.

Members - Associate / Individual:

David Turvey of Northamptonshire, England. David has varied Firefighting experience and a deep interest in and knowledge of industrial fire appliances in the UK and Europe.

(Ms) Jeanne van Buren of Rozenburg, The Netherlands, who is a Senior Specialist Industrial Safety, Fire Department, Rotterdam Port District. Jeanne works on standards for safe storage of dangerous materials, and is a Member of the Board for certifying fire safety concepts and specialised in incident investigation under the SEVESO MARS (Mandatory Industry Incident investigation) regime.

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

MEMBERS' SECTION

At the meeting of the JOIFF Executive in April 2004, Fellowships of JOIFF were awarded to the following persons:

Eddie Davies - Immediate Past Chairman of JOIFF, and one of the founding JOIFF members when he was Chief Fire Officer at Texaco Milford Haven, Wales.
Richard Coates - The original founding JOIFF member and current BP Group Fire Advisor.
Roger Marshall - Retired Fire Chief at Lindsey Oil Refinery and one of the founding members.
Gary Douthwaite - Current Chairman of JOIFF, retired Fire Chief at ICI and one of the founding members.
Dave Murray - retiring Fire Chief at ConnocoPhillips and current JOIFF executive member holding office as treasurer.

Fellowships of JOIFF are awarded to those who it is felt have made a significant contribution to JOIFF.

There has been considerable discussion recently amongst the United Kingdom JOIFF Members about face fit testing for respiratory protective masks. Members may be interested in a Seminar entitled "Respiratory Protective Equipment - the facts about fit testing" being organised by the Energy Institute to take place at their Offices in 61, New Cavendish Street, London W1G 7AR on Friday 8th October 2004. The Seminar will include presentations from a number of key groups on current and future requirements and expectations, a view from manufacturer in design aspects, industry views on practical aspects of fit testing and a view on the medical aspects of RPE.

The Seminar is open to Members and non-Members of the Energy Institute. For further details contact Faye Whitnall at + 44 (0) 20 7467 7116

FIRE MAIN RENEWAL WITH THERMOPIPE

by

Jon Brittain (Kidde Products) & Jon Boon (Insituform)

Fire professionals are increasingly expressing concerns about ageing fire water mains that could let them down when they need them most. Can you rely on your fire water main to deliver sufficient water volume and pressure to service your emergency fire fighting plan? If you're not sure, then read on!

Deteriorating Fire Mains

Underground fire mains are attacked from two sides. From the outside by clay or salts, and from the inside by brackish or salt water. Such corrosion can lead to blockages, fractures and leaks, which in turn can cause serious water supply problems during emergencies.

Repairing cast iron fire main pipes by digging a trench, cutting out faulty sections, and reinstalling new sections can be hugely expensive and disruptive. Now at last there is a new way of solving the problem!

Thermopipe

Thermopipe is a structural relining system that reinstates fire mains to at least their original ratings. Moreover, it is a trenchless "no dig" technology, which means fast installation times with minimal on-site disruption.

Thermopipe

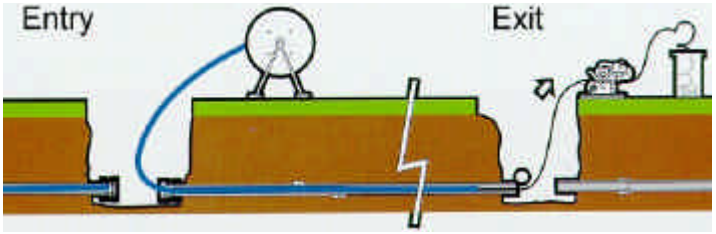
In the Thermopipe process, a factory folded polyester-reinforced polyethylene liner is pulled from an access pit through a deteriorated fire main using a winch. Once in place, it is inflated and heated with steam, enabling it to achieve a close fit with the host pipe. Thermpipe provides a continuous, impermeable pressure pipe lining inside the host fire main. Because of the enormous strength of its polyester reinforcement, Thermopipe is much thinner than conventional polyethylene pipe and so takes up less of the host pipe bore.

Thermopipe is available in diameters from 70 to 200 mm, with 250 and 300 mm becoming available later this year. It can navigate most bends and allows existing services to be reconnected with new factory-manufactured fittings. It has a long-term independent internal pressure rating of up to 16 bar (230 psi).

Insituform

Thermopipe was developed in 1993 by Angus Flexible Pipelines, a division of Kidde Products. In 1999 it was acquired by Insituform Technologies, a world leader in pipe rehabilitation and trenchless technology. Today it is manufactured by Angus Flexible Pipelines on behalf of Insituform Technologies.

"Thermopipe has been around since the early 1990s", says Jon Boon of Insituform. "It is widely used for re-lining drinking water mains, but it is increasingly being seen as a fast and cost-effective way to refurbish fire water mains".



Thermopipe Installation 1

JOIFF Case Study

A case in point is Esso Fawley, which recently needed to rehabilitate a 43 metre section of salt water fire main that had corroded through underneath a factory floor.

An open-cut solution would have led to the shutdown of a 24 hour a day production operation at enormous cost. However, the fire main was rehabilitated in just two hours by Insituform.

The Esso Fawley main contractor Trant Construction Limited dug two small pits at either end of the fire main, which passed under the wall of the factory. The main was repaired by Insituform using Fawley's own air and steam supply, thereby minimising the cost. Despite some initial difficulties with the internal condition of the pipe which required extensive cleaning by another contractor, Insituform completed the work on time and within the budget. The fire main is now back in service and operating satisfactorily.

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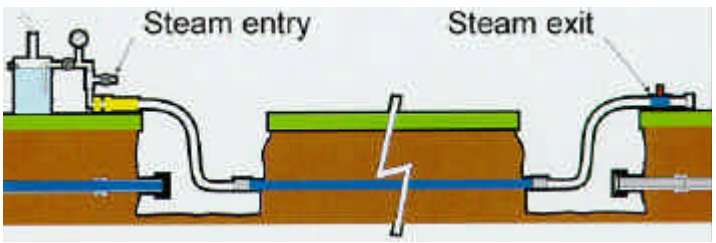
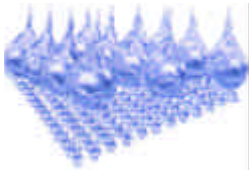


Thermopipe Installation 2



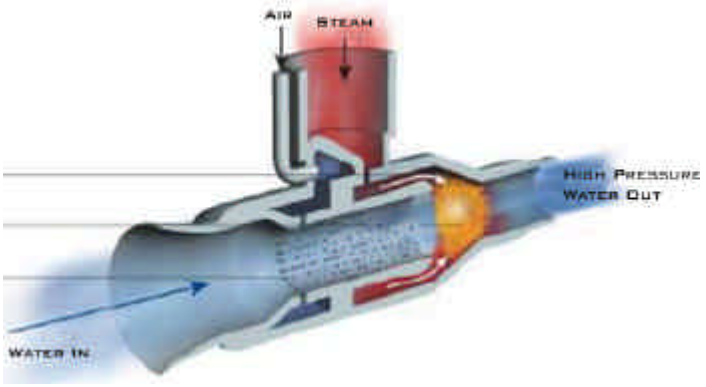
ADVANCES IN WATER-MIST TECHNOLOGY

by

Paul Grimwood. Pursuit Dynamics PLC

Innovative and exciting are two words being used to describe the groundbreaking water-mist technology under development by Pursuit Dynamics PLC in Royston, Hertfordshire. Using in-house computational fluid dynamics (CFD) and computer aided design (CAD) methods, engineers at Pursuit have been able to produce finely divided water-mists with volume-fill rates far in excess of any known system currently available. The wide range of potential applications for this technology has generated much interest within the fire protection industry and additionally offers great potential for surface distribution of special anti-bacterial formulations, using water mist as a carrier, for the surface decontamination of large volume spaces and mass casualty situations.

The PDX® prototype water mist nozzle consists of a small cylindrical unit which inlets steam, compressed air or inert gas as the driving force through an annular channel. This serves to create a supersonic, high shear flow of entrained water, where steam condensation and high shearing forces lead to a finely dispersed mist of micron sized water droplets. Despite the use of steam in the unit, temperature at the nozzle exit is measured at 52 ^{0}C falling to 24 ^{0}C at 5m and 13 ^{0}C at 20m. The supersonic flow measured within the nozzle demonstrates velocities in excess of 1500metres/second (3000mph), which give rise to low-pressure effects within the annular chamber. These effects may be used for further entrainment of additives (or additional water) through several side ports in the unit, which again



atomizes to a fine mist due to the rapid Mach 3 velocity changes.

The baseline research demonstrated a simple transfer of current platform technology of the PDX® fluid processing and pumping configuration to an efficient water mist generator. Current capabilities illustrated by the research include -

1. Water droplet generation showing 80% of mist volumes within the critical sub20 micron size range, which has been experimentally shown as more efficient than Halon systems in the suppression of Class A and B fires;
2. A fluid flow rate of 29 litres/minute (1740 l/hr) for the baseline unit, this is greatly extendable with minor design changes;
3. An effective range of approximately 40m, over which significant wetting occurs;
4. The ability to entrain other fluids into the flow (chemical additives etc), or to entrain additional water;
5. High volume-fill rates around 20m3/second using a single PDX nozzle.

PDX water mist nozzles have been used successfully in several live fire tests against liquid pool and pressurized spray fires in direct streaming applications. The potential for total flooding fire suppression is currently being evaluated and a mobile capability is also under development to make

this technology available to frontline firefighters

It was possible to fill a 600m3 compartment (to approximately one metre visibility) in 74 seconds with a fixed unit or 25 seconds whilst operating the unit in a rotating movement pattern; It was also

Extinguishing system	Average droplet diameter	Reaction surface [m^3/l water]
Conventional sprinkler	>1	<2
Fine spray Nozzle	0.1	20
PDX Water-mist Nozzle	0.01 (10micrometers)	200

possible to fill a 1400m3 compartment in 2 minutes 32 seconds (fixed unit); no other known systems are able to match these volume-fill rates.

continued..

Editor's notes:
Pursuit Dynamics plc, listed on the Alternative Investment Market of the London Stock Exchange (PDX.L), is a UK based company that has developed a strong core technology in the fluid handling and process industries. Pursuit Dynamics plc is an Associate Member of JOIFF.

Paul Grimwood served for 30 years within the UK fire service and has closely researched water-mist fire suppression since 1984. He is the author of 'Fog Attack' (DMG Publications 1992) and '3D Firefighting' (FPP/IFSTA - USA 2004).

Paul can be contacted at
PaulGrimwood@pursuitdynamics.com

PPE Corner

Standards Australia and the South Australian Metropolitan Fire Service (SAMFS) hosted the fourth annual meeting of International Standards Organisation Subcommittee SC 14 in Adelaide, Australia, at the SAMFS Training Centre, between May 31 and June 4, 2004. At the meeting, one day was set aside as a workshop wholly devoted to work involved in WG 5, the Working Group established to develop standards on personal protective equipment (PPE) for Firefighters engaged in non-fire rescue. The scope of this work covers road accident rescue, high angle rescue, urban search and rescue, trench rescue, confined space rescue, swift and still water rescue and industrial rescue all of which have been categorised by WG 5 into four distinct groups; rope rescue, rescue from water, rescue from vehicles and plant and special rescue.

The event was planned to facilitate discussion and to demonstrate techniques under each of the four aforementioned groups of rescue identified by WG 5 to provide a greater appreciation of what is involved in rescue, so that the suite of standards to be written for rescue PPE is based on assessments of hazard and risk. The aim was also to lay the foundations for a forum of discussion amongst rescuers on procedures, techniques, etc. to support the hazard and risk analysis on which the ISO standards will be based.
The practical demonstrations were led by SAMFS training officers and South Australia's Ambulance Services, Country Fire Services, State Emergency Services, Police special tactics and response group and Aviation rescue and firefighting division participated in the demonstrations.

Also at the meeting in Adelaide, ISO TC 94 SC 14 progressed its work on the draft standards for PPE ensembles for Firefighters engaged in internal Firefighting in buildings and structures and in Wildland Firefighting. Currently 2 draft standards from WG 4 of SC 14, the Working Group that deals with PPE for Firefighters involved in hazardous materials incidents, are out for vote, a draft standard on Gastight Vapour protective ensembles for Emergency Response Teams and a draft standard on Spray tight liquid splash protective ensembles.

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Based on an article published in ISO Focus Volume 1 No 7 July-August 2004, written by JOIFF Member Mick Smith, Chairman of ISO/TC 94/SC 14, and currently Deputy Chief Officer of the South Australian Metropolitan Fire Service.

Ten Cate welcomes Tony Stocks

JOIFF Associate Member Ten Cate, based in The Netherlands, are excited to announce that Tony Stocks has joined Ten Cate Protect as consultant for their high performance flame retardant speciality fabrics business. Tony has a wealth of expertise and experience and as a qualified textile engineer he has spent most of his working life in marketing and development of synthetic fibres.

In 1979, Tony became Marketing and Technical Manager of DuPont's Industrial Textile Fibres activities in Europe. Since then he specialised in personal fire protection, of which at the time, very little was known. Tony made considerable contributions to the fire protection industry amongst which was his introducion into Euopre of the Thermal Protective Performance (TPP) test system developed by Du Pont USA. In later years he was heavily involved in the development of the system of flame engulfment testing of garments on an instrumented Manikin.

Also Tony was responsible for the development of new fibres and fabrics at Du Pont in Europe, such as Delta T, Delta C, Delta A and pigmented fibre as well as the development of Du Pont's aramid fibre plant in Asturias.

As consultant to Ten Cate, Tony will help to further develop and market their ranges of fire protective products and to explore and address the needs of customers and end-users. In combination with the joint technical skills of Southern Mills and Ten Cate Protect, Tony will undoubtedly help to bring innovative and valuable product solutions to their many customers Worldwide.

First African Williams Advanced fire fighting foam technology workshop

For months the southern African fire fighting industry waited with anticipation for the Williams advanced fire fighting foam technology workshop, and when it arrived, there was no disappointment. This workshop was jointly presented by Williams Fire & Hazard Control Inc, E-One, EFA Sales (Pty) Ltd, Fire Fighting Foam and Sasol Synfuels (Pty) Ltd. For the 3 day duration, delegates were treated to interesting presentations, workshops and demonstrations, where they were introduced to new principles and learned new techniques.

Every morning, the buses left the hotel for the Sasol Synfuels training facilities, before the mist even had a chance to rise. All participants were ready to start another day and eager to expand their knowledge. The opening presentation was given by Dwight Williams, President of Williams Fire & Hazard Control Inc., he spoke on "Tank fire fighting - the success story". Other presentations over the next 2 days included "Foam chemistry & foam, and what is it about" by Mitch Hubert from Ansul Michigan. Eric Lavergne, from Williams Fire & Hazard Control Texas discussed dry chemical & hydro-chem flammable liquid fire fighting as well as tank fire logistics

Trevor Fiford, EFA Sales, South Africa, gave a presentation on Industrial Fire Apparatus. The delegates learned about Emergency response pre-planning for that "event" from Kelvin Hardingham, Williams Fire & Hazard Control, UK, and Hannes du Toit of SASOL explained about SASOL's approach to emergency response. All practical demonstrations were given by Dwight Williams himself who never tires of demonstrating his product and its capabilities, and never delegates this part of the workshop to anyone else. The highlight of the few days was undoubtedly the opportunity delegates had to extinguish fires with the new Ansul ThunderStormTM fire fighting foam.

After the busy days, delegates were treated to enjoyable evening functions, such as an Italian evening, a braai, and the closing award function. As with any fire fighting event, delegates enjoyed getting re-acquainted with old friends, and making new contacts with people in the same industry who have the same interests. Delegates came from all over South Africa, from both the industrial and metropolitan fire departments, then there were participants from Swaziland, Nigeria and from as far afield as Czechoslovakia and Russia.

Left to Right:: Trevor Fiford, Kelvin Hardingham, Dwight Williams, Eric Lavergne

The week culminated in the opening of the foam manufacturing facility in Boksburg by Dwight Williams. The overseas presenters were impressed with both the knowledge and standard of fire fighting in South Africa, and have all said they look forward to hosting another such event in southern Africa.

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Report provided by Herman Human, EFA Sales (Pty.) Ltd., South Africa, joint Organisers of the Workshop and JOIFF Associate Member

JOIFF / IFJ Conference
"Planning Today to Safeguard Tomorrow".
March 15th-16th, 2005

In conjunction with the Industrial Fire Journal magazine, JOIFF is organising the first Worldwide Firefighters' Conference to take place in Manchester on 15th and 16th March 2005. The Conference, which will be entitled "Planning Today to Safeguard Tomorrow" will be aimed at Emergency Responders from Municipal and Industrial (including Aviation) Organisations and other Fire and Emergency Response Specialists.

Eminent persons, experts in their fields who have accepted JOIFF's invitation to present papers are:

*Sir Graham Meldrum Chief Inspector, Her Majesty's Inspectorate of Fire Services, UK who will present the opening Paper of the Conference;

* Richard Coates, Global Group Fire Advisor BP - and founder Member of JOIFF;

* John Judd, ACFO Greater Manchester Fire Service;

* Dwight Williams, President

Williams Fire & Hazard Control U.S.A.;
* Trevor Kletz, Chemical Engineer. Expert on Loss Prevention and Process Safety;
* Roger Klein, Professor at Bonn University, Germany;
* Pine Pienaar, Chief Fire Officer Sasol Synfuels South Africa
* Randy Lawson & Nelson Bryner, National Institute of Standards and Technology, USA.
* Peter Bowyer, Chief Verifier for Management, Edexcel, UK Awarding Body for academic and vocational qualifications;
*Gene Allen, Senior Account Engineer, specialising in large losses from refining and related industries Allianz Global Risk Insurance, USA.
* Mark Scoggins, A leading Barrister and expert on Corporate responsibility including Corporate Manslaughter;
* Dr. Bob Docherty, Fire Safety and Educational Consultant.

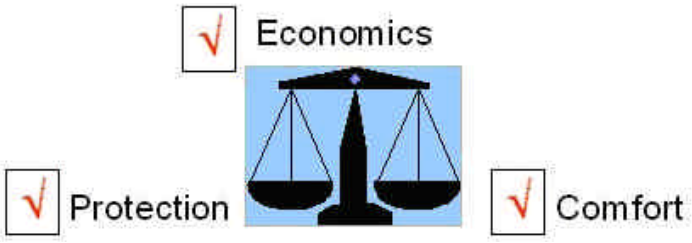
The full conference programme will be available in October. To ensure that you receive your copy contact: Stacy Watts, Brintex UK; telephone + 44 (0)20 7973 4633 Email s.watts@hgluk.com

In the Fire Brigades: Protection needs for fighting fires

by Dupont Personal Protection

Fire fighters depend on their Personal Protective Equipment (PPE) for protection against various external hazards. As operating conditions and scope of duty for fire fighters differ from region to region, it is possible that the requirements for PPE performance are also different. Therefore a risk assessment, as described in the EC Directive 89/686 on PPE, needs to be carried out to define the exact requirements and performance levels. In the European Union, PPE for fire fighting must meet a minimum set of requirements and performance levels (umbrella norm EN469).

In addition to the conventional hazards, new hazards are constantly emerging as a result of both change in scope of the work of the fire service and the changing needs of communities and our society.



Three decision-making factors to balance in the selection of PPE

See table 1at end of article: Hazards

For the procurement of PPE a list of requirements and specifications needs to be developed. This list will be based on the individual risk assessment. Three main requirements need to be taken into account.

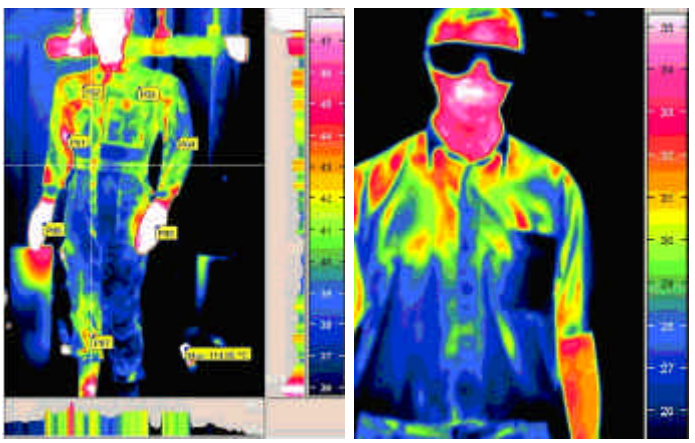
These three main requirements for fire-fighting PPE need to be evaluated and prioritized since each is influenced by the requirements and performance criteria in the categories of:

- Appropriate protection
- Material properties
- Garment design and manufacturing
- Economics

See Table 2: example of check-list of requirements

- *Jacket / TOC (Turn Out Coat)*
- *Trousers*
- *Station uniform*
- *Underwear*
- *Poloshirt*
- *Balaclava*
- *Gloves*
- *Shoes*

Table 3 - Parts of PPE System



Advanced Thermographic imaging Thermo-Man® / Firefighter

No single garment likely meets all the above requirements, so a set of (layered) clothing and accessories is needed to give the protection and functions required. (*Table 3 above*)

Conventional Hazards	New Hazards
• Heat and flame radiant heat risk of flashover/explosion • Water/Chemicals during extinguishing floods chemical accidents • High Visibility day and night vis during traffic accidents • Heat stress due to overprotection (garments) due to heavy weight	• Contamination blood (HIV) bacteriologic substances • Life Protection stones bullets knives

Table 1 - Hazards

Special attention is needed to ensure the compatibility of all the required clothing and accessories. No design or material feature should compromise the protection or the ergonomics of the whole system.

As materials and garment design advances and protection levels of PPE meet and surpass standards, more and more attention is paid to ergonomics, especially to heat stress.

Checklist of requirements (example)

Appropriate Protection against:
- liquids (rain/fire fighting water)
- heat (conduction, convection, radiation)
- flame (flying sparks, flash, flash-over)
- hot steam, hot gases
- wind, weather, cold
- dirt, contamination(from flames & dust)
- electrostatic loading & electrical current
- trapped or hooked from moving parts

Garment design and manufacturing
- low weight & good balance
- fast donning & doffing
- good air circulation & heat & cold insulation
- good ergonomics & freedom of movement
- appropriate number & location of pockets
- reliable closure systems
- compatible to all other parts of the PPE system

Material Properties
- permanent flame resistant
- permanent liquid tight
- permanent water v apor permeable
- not melting, flame dripping
- high chemical resistance
- high mechanical resistance (tensile, tear, abrasion)
- low heat conductivity
- high light & washfastness
- non-allergenic

Economics
- low full lifecycle cost
- easy soil release
- ease of care & maintenance, fast drying
- low shrinkage
- low repair rate & easy repair access
- availability of accessories (zippers, buttons, etc)
- good aging behaviour
- ease of safe disposal

Table 2 - Checklist of requirements

Heat stress - defined as an increase in the body core temperature (1.5 to 2.5°C) due to physical labour without appropriate means of cooling - may lead to lack of concentration and could have fatal consequences if not recognized.

For this reason DuPont Personal Protection has become a pioneer in research on, and development of, garment systems for increased comfort and better ergonomics, supporting industry and fire fighters with expert knowledge and state of the art testing. *Article contributed by DuPont Personal Protection - Contact elaina.harvey@gbr.dupont.com*

Diary of Events

2004

Oct:	3 - 6	IFE Malaysia International Conference, Kuala Lumpur.
	19 - 20	FIREX North, Harrogate, England.
	3 - 6	IFE Malaysia International Conference, Kuala Lumpur.
	6 - 8	Aviation Fire International, Schipol, Amsterdam, The Netherlands.
	8	Respiratory Protective Equipment - the facts about fit testing. London.
	19 - 20	FIREX North, Harrogate, England.

2005

Jan	15 - 17	Intersec 2005 Security and Safety exhibition. Dubai World Trade Centre.
March	15 - 16	JOIFF/Industrial Fire Journal Conference Manchester England
	19 - 21	Foam Conference BASF Ludwigshafen, Germany.
May	16 - 19	International Fire Expo Birmingham, England.
June:	6 - 11	Interschutz. Hanover Germany.

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

The following bookings for JOIFF accredited Training Courses have been made and places are available. If you have Training needs which are not covered in this list, please contact the Secretariat.

Course Name	Dates	Venue
3 day Occupational Firefighter (Part Time)	4th - 6th October	IFTC Teesside
	8th - 10th November	Washington Hall
	13th - 15th December	IFTC Teesside
2 day Practical Firefighting	23rd - 24th October	IFTC Teesside
	25th - 26th October	Washington Hall
	29th - 30th November	Washington Hall
5 day Team Leader	25th - 29th October	IFTC Teesside
	15th - 19th November	Washington Hall
	6th - 10th December	IFTC Teesside
5 day BA Wearer Course	11th - 15th October	IFTC Teesside
Breathing Apparatus Instructor (BAI) Course	18th - 29th October	IFTC Teesside
	20th - 31st October	Washington Hall
	28th February	IFTC Teesside
	4th July	IFTC Teesside
	17th October 2005	IFTC Teesside
Breathing Apparatus Instructor Refresher Course	4th - 8th October	IFTC Teesside
	27th - 31st October.	Washington Hall
	28th March	IFTC Teesside
	27th June	IFTC Teesside
Certificate in Management Course- Level 2 Team Leading	9th May	IFTC Teesside
Certificate in Management Course- Level 3 Management	28th February	IFTC Teesside

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JOIFF Secretariat:

Fulcrum Consultants
GD House, Tallaght Business Park
Dublin 24, Ireland
Telephone: + 353-1-4137300; Fax: +353-1-4137301
Website: www.joiff.com Email: info@gdgroup.ie

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FULCRUM CONSULTANTS