The Emergency Services Show 2010
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24-25 November
Planning, response and recovery

The Emergency Services Show Conference 2010

A series of high value presentations with a keen focus on past experiences and future developments from some of the top thought leaders and operational experts in emergency planning response and recovery.

Who should attend:

Emergency Planners for Police, Fire & Rescue, Ambulance, Maritime and Coastguard, MOD, NGOs and the Voluntary Sector, LGAs, Local/Regional Resilience Teams, Utility Operators, Transport and Port Authorities, Government Agencies, Health Authorities, Primary Care Trusts, Commercial Businesses and Embassies

The conference programme will include interactive panel discussions. Submit questions online.

Day One: Wednesday 24th November

Opening Keynote Presentation: Christina Scott, Head of Civil Contingencies Secretariat

Overview from the Police, Fire & Ambulance on Multi Agency Collaboration in Challenging Times

- Presentations from West Midlands Fire & Rescue; West Midlands Ambulance Service; Police Service

Building Relationships Through Training and Interaction

- Project Orion - Testing the UK Response to Large Scale Disasters: Roy Wilsher, Chief Fire Officer, Hertfordshire Fire & Rescue
- Project Radiance - Steps Towards a Resilient, Integrated Approach to First Responder Communications and Interoperability: Dr Ben Weston, MOD in partnership wtih the CCS and NPIA
- Casualty Management - The Next Chapter: Derek Luff, Development Manager, Fire Service College & Dr Helen Higham, Consultant Anaesthetist, John Radcliffe Hospital

The National Challenge of the 2012 Olympics & Paralympics

- Organisations include Olympic Security Directorate; London Ambulance Service; London Fire Brigade; British Transport Police; British Red Cross

Day Two: Thursday 25th November

Opening Keynote Presentation: Perspectives on the International Security Landscape - The Enduring Threat from International Terrorism: Dr Dave Sloggett, Centre for Defence Studies, Kings College, London

Creating a Resilient Infrastructure

- Improving the Resilience of Critical Infrastructure: David Murphy, Assistant Director, Natural Hazards Team, Cabinet Office
- Integrated Agency Approach: Case Studies, Concepts & Developments: Mark Leigh, Course Director, Emergency Planning College
- Civil Contingencies on a Budget: Mike Granatt, Consultant to Community Resilience

Natural & Manmade Disaster Management

- Team Performance in Exceptional Environments: Phil Smith CRMI, Director of Critical Team Performance Programme, CTP
- Protecting the Public from Another Buncefield: Tony Owen, Head of Incident Management, Environment Agency & Director of Health Protection Agency

The organisers reserve the right to amend the programme without notice.

To register and for further information/updates visit www.ess2010.com/conference.html or call 01483 237230

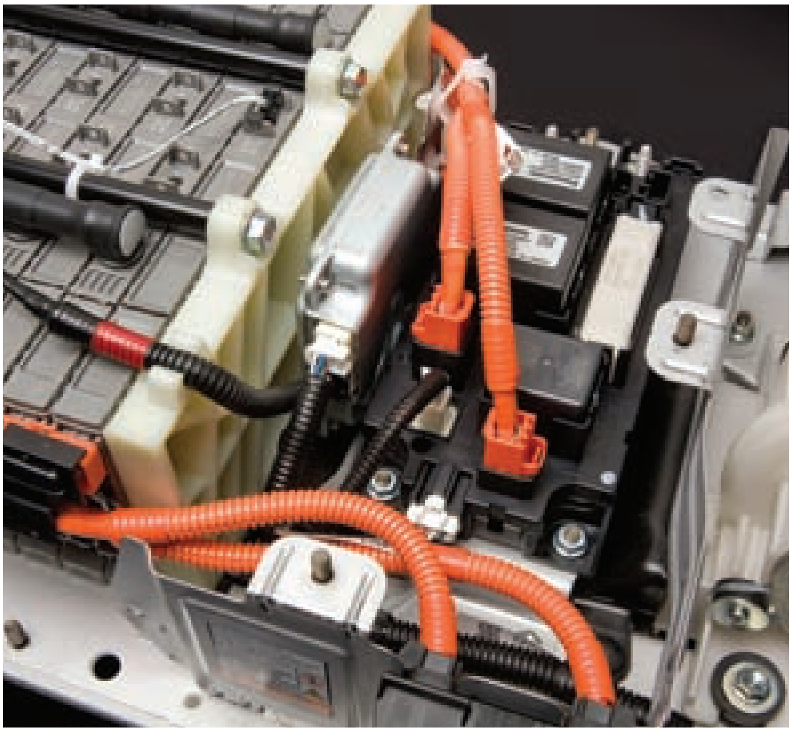
Emergency Services Times   Who's Who? DIRECTORY   Fire Times

The hidden side of vehicle safety

RoadwayRescue LLC & Education Chair David Dalrymple (TERC-US) writes on firefighting science (ie firematic) concerns regarding hybrid and electric vehicles.

Now while most incidents involving management of a motor vehicle involves an RTC or a medical emergency, a fire in a vehicle today is another story. All vehicles today – be they conventional or alternative fueled – carry a significant fire load. Plastics, combustible alloys and components such as gas struts are present in every vehicle. However hybrids and all electric vehicles carry even more combustible alloys, composites and a very large high voltage battery pack consisting of Nickel Metal Hydride, NiCad or even Lith-Ion battery cells. The combination of all these components creates a difficult problem for the firefighter. These changes involve not only tactical considerations on scene but even suppression agents to effectively mitigate such an incident. As time progresses, vehicles will continue to change thus emergency responders need to keep their collective fingers on the "pulse" of the technology on the street. Vehicle fires are a common type of emergency whatever the changes in vehicles have been over the past decade.

Power isolation is key to safe response to fires in electric and hybrid vehicles.



Motive power has made dramatic changes. While simple application of water is an acceptable methodology to extinguish such fires, hybrid and electric vehicles require copious amounts of water to fully extinguish a fire in such a vehicle. Many times, this simple application of water will exceed what is carried on the apparatus. One area we truly need to revisit is the usage of foam or wetting agents to enhance the suppression properties of water. And leaving these agents aside we need to explore some of the new technology out there.

Class A & B foam isn't always the best solution. Other media such as wetting agents Cold Fire, Fireaide 2000 & FireIce Gel actually work better on Class B & D fires especially if they are three-dimensional. All the above agents are biodegradable, leave no residue on the road surface and work well in pressurised water extinguishers as well as tanks in conventional apparatus.

Besides suppression, crews need to provide access to get a nozzle into areas to mitigate a three-dimensional fire. Since most vehicle fires begin in the engine compartment a crew will need to make access through the vehicle's hood (bonnet). However, the conventional tactics to force hoods open can place crews at risk as regards hybrid and electric vehicles. One of the tactics to gain some access is to drive the spike of a haligan tool into the corner of the hood, twist it around and fold it rearwards. This presents a problem as the potential for high voltage components of the vehicle's drive train being in or near those corners. Driving a spike into such a high voltage component might present a shock hazard.

Another popular tactic is to utilise a rotary or reciprocating saw and plunge-cut into the hood to create an "X" or some sort of space to insert the nozzle into the engine compartment. This tactic presents the greater hazard of cutting into high voltage components or even the electric drive train itself. One option that does present itself well is the use of a combi-tool to "tent" the hood on each side, basically in line with the vehicle's front suspension. This methodology allows the crews to "see" under the hood, potentially access the hood's hinges to be cut or even use the combi-tool tool to sever the vehicle's front latching mechanism.

One of the items that I have already mentioned is the amount of combustible alloys in modern vehicles, not just in hybrid and electrical vehicles. These materials are found in larger quantities in hybrid and electrical vehicles due the nature of the material. While in the past a Class D extinguisher or a large amount of water would be used, sometimes these tactics are not practical. Frequently these materials will be encountered while an offensive attack is in progress, which presents additional hazards to crews, possibly requiring additional resources to be brought to mitigate the fire.

A common location for this type of material is the crash box in the vehicle's steering column – however it is also used as structural pieces, various vehicle components and the like. It's not easily identifiable to casual observation in a non-emergency situation – let alone when the vehicle is fully engulfed in fire.

Another concern to consider are the gas struts. While many responders are accustomed to dealing with these in hatchbacks during extrication evolutions, most hoods are held up today by gas struts. As a pressurised vessel, when heat is applied the gas inside expands to the point where the strut cylinder fails, thus releasing the hardened steel rod. This rod can easily punch through the vehicle bodywork and travel quite a distance, upwards of over 80 feet. This places responders in hazard's way when they approach the frontal or rear arc of the vehicle. While many times these devices will be spent harmlessly there have been examples of blunt force trauma strikes and even impalements from the strut rod itself. Even struts from the rear of the vehicle can cause these same concerns and one thing to remember: people carriers (minivans) or sport utility vehicles can have upwards of four struts in the rear hatch area.

The bottom line however (whenever possible) is this: the best weapon the emergency responder can wield today – following good current information on vehicles – is power isolation. This is a two-step process: first step being to shut the vehicle off and securing the ignition key and placing it in the apparatus. The second step is locating the primary 12v battery and disconnecting both the positive and negative cables. While difficult if not downright near impossible during a fully involved vehicle fire, this power isolation should be attempted whenever at possible.

Vehicle power is not a responder's friend today. In all reality this power isolation is important for any vehicle-related emergency, be it a motor vehicle crash, vehicle fire or even a medical emergency involving an occupant of the vehicle.

Think for a moment fellow rescuer – hybrids and electrical vehicles can and will be "silent" during operation when the vehicle is stopped (and even some "conventional" drive train vehicles now shut down when stopped) and in the past we used our ears and eyes to determine if the vehicle was shut off. Now it is critical to ensure the vehicle is indeed shut down by at least turning the vehicle off and removing the key back to the apparatus due to the ever increasing use of proximity (wireless) ignition keys. And if there is a family in the vehicle there could be more than one key within the vehicle's range – something to consider that a short time ago we would never have had to think about.

Next, try and find the primary 12v battery and disconnect both positive and negative. In over 40% of today's vehicles the battery is outside the engine compartment, and sometimes due to vehicle damage the battery won't be accessible – plus some vehicles have more than one battery.

All these factors increase the risk for responders. Vehicle fires are a common, everyday emergency but now we need to act with a greater amount of caution and truly "think and work smart". Complacency can injure crews today. While much has been discussed about extrication concerns and – while I would not make light of those issues – firematic concerns with modern vehicles need to be brought into focus as well.

Fires on trains

From the 2nd Avenue subway line in New York, Crossrail in London and Cityringen in Copenhagen to the high-speed rail tunnel in Hong Kong and the Sydney metro in Australia, the design considerations for fires on trains have been the subject of many discussions by design teams in recent years. With interest in developing metros through to high-speed rail networks worldwide continuing unabated, firefighters need to develop situational awareness for the response to rail carriage fires, writes Nicole Hoffmann, Technical Director, Kingfell, and RIFA (Rail Industry Fire Association) Committee Member.

Dr Nicole Hoffmann Technical Director of Kingfell and a Committee Member of RIFA. Dr Hoffmann has more than 25 years' experience in the fire safety industry, where she has specialised in the transport sector, and in particular the railway and tunnel sectors.

Generally, the design parameter for a fire on a train has focused on a peak heat release rate for a fully involved fire on a single conventional individual carriage. A range of these values have been developed using full-scale fire tests as well as assessments of the fire properties of materials. Using these values, the designs for the infrastructure have been developed along with supporting fire safety and emergency procedures.

While the severity of a fire on a train and its peak are an important consideration for the design of the tunnel and its mechanical ventilation system, and the establishment of fire engineering principles applied to rail infrastructure, this parameter has over the years been often questioned.

From a fire engineering point of view there are gaps in the insight and application of a fire between its start and its peak heat release rate. Considering a fire within the passenger compartment, how quickly does a fire develop? What fuels the fire's growth? How quickly do the materials spread fire within the passenger compartment?

Another consideration is that several schemes in the UK are also considering the provision of open-gangway trains – which have already been in use in many other countries. For this configuration, in the event of a fire within a carriage, the compartmentation and separation provided by the individual carriage design is not realised. Instead, the open connectivity of a single open train configuration allows for smoke and fire to spread between the carriages, and also allows people to move away more swiftly. This would potentially result in more of the fire products to be spread along the length of the train, and so affect the passengers along the whole train instead of a single carriage. This would therefore also affect the existing procedures involved with the evacuation of the passengers and strategies for operating a train through to the nearest station.

Kingfell has been instrumental in the fire safety design of the Docklands Light Railway in London.

Typically there are many more questions than answers; which is not surprising considering that this is such a complex scenario. Complex due to the worldwide number of diverse types of rolling stock currently operating and proposed for new systems; their different specifications regarding seating and comfort to be provided; along with the overall considerations for passenger capacity and their safety. However, underlying this is the knowledge that the design and manufacture of rolling stock is controlled by international fire safety standards and code of practices.

In the UK, rolling stock has been designed in compliance to BS 6853 (1999); the British standard code of practice for fire precautions in the design and construction of railway passenger carrying trains. Similarly, the US NFPA 130 provides standards for the fire safety design of the vehicles. Following extensive development, the draft Euronorm DD CEN TS 45545 series will in future have an impact on European railways and the provision of a harmonised and consistent approach to rolling stock fire safety across a large number of rail systems.

Fundamentally, the objectives of these codes are to minimise the probability of a fire starting; control the rate and extent of fire development and through this; to minimise the impact of the products of fire on the occupants.

Moreover, for trains built to the highest materials standards eg BS 6853 Cat 1a, there is no experience of how long it takes to get to the state of a "fully developed fire". In addition, it raises the query as to the potential source of a fire and the view that to achieve this within a carriage would not be possible without the addition of significant amounts of fuel carried on by the passengers themselves.

So knowing that there are strict guidelines for the design and construction of carriages and, from the rail operator's experience, that the risk and frequency of a fire growing to involve a carriage is low; yet we also know that if there is a fire that it could potentially be quite severe; how do we fill this gap?

Z6 – New Airport Crash Tender of the proven Z-Series for Brussels Airport

ZIEGLER has extended the successful 8x8 airport crash tenders of the Z-series by an efficient 6x6 conception. Both the proven ALPAS-GRP-conception and the ZIEGLER pump technology of high efficiency have been applied. From the 8x8-series the well-known CAN-BUS control with large-sized, coloured TFT-displays in the driver's cab and at the pump control panels have been adopted. Thanks to this conception the users of both series have been provided with uniform operating interfaces for effective and efficient service of these vehicles.

Brussels Airport is the first European airport to put this ZIEGLER truck in service with its water capacity of 12.500 l and foaming agent capacity 1.500l, driven by a Volvo-R-6-cylinder-Diesel engine D16G EURO 5 with an output of 515 kW/700 HP, equipped with a TWIN-DISC 6-speed automatic gearbox.

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Since opening in 1987, well over half a billion journeys have been made on the Docklands Light Railway.

Filling this gap has over recent years become more of an issue, with the increasing number of rail projects at various design stages worldwide. Some of the reasons for this are that each design team is trying to resolve this issue within their team in numerous meetings and discussions; design to perhaps what has been used previously or err on the side of caution and introduce a safety factor. Collectively this will have an impact on project time and associated costs accrued by the project teams and stakeholders discussing similar issues, with potential design and infrastructure costs. In addition, the question arises, is the investment of developing the design standards for rolling stock fully reflected in the fire engineering?

With the increasing UK portfolio of rail projects, the Rail Industry Fire Association has initiated a study to address this issue. Research is to be performed to identify the materials, components and assemblies that currently comply with the current standards; source the fire performance data, including by testing if necessary, for collation into a materials database; and to perform computer simulations to assess fire and smoke spreads within the vehicles using the different materials.

The potential outcome of the research is for design standards and guidance documents on rolling stock to be revised and updated with respect to fire and evacuation strategies, as well as issue a good industry practice guide to be read in conjunction with the revised standards.

In the long term, the benefits that such a collective approach should realise include efficiency in procuring rolling stock, efficiency during the approval process (as both designers and approvers have the benefit of a single body of research); cost reduction for the government; reduction in project risk as approved increased knowledge base; and an increased safety confidence (due to the consistency and regular adoption of approach), to achieve acceptance criteria for fire safety. This could be realised not only in the UK but also if adopted internationally.

Correct use of CAFS at car fires

According to statistics from the Arson Prevention Bureau every year in the UK around 93,000 road vehicles (or about 250 every day) go up in flames and about 75 people die as a result. They also state that approximately 80% of car fires are started deliberately to cover criminal activity or as an act of vandalism, and 1 in 12 reported stolen vehicles are set on fire. Chris Large, Former Deputy Chief Fire Officer of East Sussex, England, and head of the newly formed International Compressed Air Foam Association, reports.

Chris Large, head of ICAFA.

This certainly fits in with my own experience. In the early 1980s when I was riding fire appliances as a young keen firefighter, it seemed that every other callout was to a car fire. They were certainly not considered dangerous fires and we dealt with them accordingly. As we pulled up at the scene whether we used our high pressure water hose reel or a 45mm hose line depended on how much flame we saw. The next step was then to empty the 1,800 litres of water we had on the vehicle onto the fire from as close to the vehicle as possible, and appear out of the massive steam cloud we created as some kind of super brave hero to the on-looking public, covered in black debris and soaked to the skin. Eventually we learned that it was wise to wear our breathing apparatus, due to the toxic outputs coming from such fires.

Then manufacturers started to put things on cars such as hydraulic struts and other things that could launch dangerous projectiles at us. We gained an understanding that the public never considered our safety when loading their vehicles and therefore might have propane camping bottles in the boot, so we started to treat car fires with a little more respect. In those days there was no thought of the environmental impact of such fires and so all the products of the fire that floated out of the car were swilled down the road side drains.

Fortunately, attitudes soon changed and our health and safety

Detecting and suppressing vehicle fires

Passenger-carrying vehicle fires can put lives at risk, cost the vehicle owner a great deal of money, and jeopardise a company's ability to continue to provide the service to which it may be contractually committed. Nick Grant of Firetrace International – a Gold Sponsor of the FIVE (Fires in Vehicles) conference, held in Gothenburg, Sweden, 29-30 September – examines the role that targeted, risk-specific fire detection and suppression systems can play in improving vehicle fire safety.

The dynamics of airflow in and around an engine compartment when a vehicle is in motion can seriously limit the performance and reliability of traditional detection and suppression systems when heat and flame – that typically rise from the source of a fire – are likely to be propelled elsewhere. The inevitable build-up of dirt in and around engines, intense temperature variations and vibration are also factors that are known to cause traditional detection and suppression systems to fail to provide the essential fast and accurate fire detection and suppression.

One proven resolution to these challenges is Firetrace International's Firetrace, an automatic intrinsically safe fire detection and suppression system that does not require manual activation or monitoring, and no electricity or external power source.

It comprises an extinguishing agent cylinder attached to detection tubing via a custom-engineered valve. This polymer tubing is a linear pneumatic heat and flame detector that is immune to the vibration, shocks and temperature extremes found in vehicle engine and generator compartments.

This leak-resistant tubing is routed throughout the engine compartment. Immediately when a fire is detected, the tubing ruptures and automatically releases the suppression agent, extinguishing the fire precisely where it starts and before it can take hold. The tubing is placed both above and behind the potential source of fire to ensure that the airflow actually helps by directing the heat and flames towards the tubing, providing faster and more reliable detection and suppression. Depending on the particular system that is chosen – either direct release or indirect release – the suppression agent also flows through the delivery tubing to the front of the engine, again working with the airflow to flood the entire compartment.

The direct release system utilises the Firetrace tube as both the detection device and the suppressant delivery system. The indirect release system uses the tube as a detection and system activation device, but not for the agent discharge. The rupturing of the tube results in a drop of pressure causing the indirect valve to activate. This diverts flow from the detection tube and the agent is discharged from the cylinder through diffuser nozzles, flooding the entire enclosure.

The extinguishing agent cylinder is usually mounted inside the engine compartment and, for vehicle engine applications, ABC dry chemical powder is the appropriate choice, as it is suitable for the suppression of ordinary combustible, electrical, and flammable liquid fires that involve petrol, diesel, solvents, lubricants and spirits.

However, ABC dry chemical powder is not necessarily the most appropriate choice for other vehicle fire risks, in particular enclosures and "micro-environments" that house energised equipment.

Any energised equipment – both low voltage and high voltage – can catch fire. Typically, fires in electrical cabinets are caused by loose connections and faulty cables that, when power is running through them, the electricity can arc. This arced electricity is extremely hot and can cause the cable sheathing to burn and fire to spread to other components. It is therefore essential for the fire detection and suppression to be targeted on the connections and components, such as switches and transformers.

In these instances, the most appropriate choice is a clean agent such as DuPont FM-200 or the more recently introduced 3M Novec1230 Fire Protection Fluid.

FM-200 and Novec 1230 discharge at much higher temperatures than CO_2 systems and have proven to provide fast and reliable suppression without detrimental side effects.

The Firetrace system installed in a bus. It acts as a detection and a supression device.

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Wastage of the foam is unprofessional and negates the environmental benefits of CAFS usage.

became paramount and our techniques also developed as we grew to understand the technicalities of modern vehicle construction. However, the incidence of car fires has continued to grow and I believe that no matter where in the world a firefighter serves, car fires are probably the most common incidents they attend. In 2002 I had the good fortune to ride with crews in Los Angeles County and Phoenix Fire Departments. The very first fire call I went to on this trip was to a car fire and at least a quarter of all the actual fires I dealt with during my stay were similar incidents.

So what is the best way to use CAFS at a vehicle fire? I would recommend a smooth bore 26mm nozzle as being ideal for such fires. With such a nozzle a reach of around 15 metres can be achieved. As already stated vehicle fires can create explosions and launch projectiles, including bumper struts, hatchback struts and air bags. Thus, you should make your attack from a side angle to the vehicle, as this location is most protected from launched projectiles.

The attack should begin at a distance of approximately 15 metres, where the stream just reaches the vehicle. Give a 15 second blast of the CAFS directly onto the seat of the fire and it will quickly knock it down. Wait and let the foam do its job. Try not to waste product and create an ineffective application by bouncing foam off surfaces such as the bonnet and roof, as seen in the picture above. (Such wastage of the foam is unprofessional and negates the environmental benefits of CAFS usage.) Instead, direct the foam stream into the vehicle's windows or other openings, toward the seat of the fire. When you see a change in the smoke from black to white this is a good indicator that the CAFS is working.

A change in the smoke from black to white is a good indicator that the CAFS is working.

Close down your branch and move forward, this avoids the hose kinking. When a CAFS nozzle is left open, not only are you wasting product, but the pressure inside the line is reduced (approx 2 bars compared to 8 bars when shut) and it is therefore easy for the hose to kink. Initial training in hose management techniques is a key feature of training with CAFS, but surely all professional firefighters should regard this as a basic skill for their own safety no matter what extinguishing medium they are using.

The picture below shows no run off from the car and is a good example of the correct usage of CAFS.

For those hard-to-reach fires within the engine compartment some services have developed a lance for applying CAFS, which is put through the headlights and avoids the dangers of getting burned trying to force the bonnet open.

Further pulses as required should be applied, but remember each 15-second pulse is only putting 30 litres of water into the vehicle yet you are only introducing less than 0.1 litres of foam concentrate whilst producing over 240 litres of extinguishing agent. Good practice seems to indicate that whatever you put onto the fire if you put nearly the same amount on again this should subdue the fire and keep down any hotspots.

Around the world many fire departments are recognising that CAFS are ideal for fighting these types of fire. In fact some have even introduced purpose-built small fires units equipped with CAFS, designed specifically to tackle the many nuisance fires that tie up major rescue pumps at small rubbish, bonfires or car fires.

The increased reach of a CAFS jet makes it safer for firefighters to use. CAFS will also give further benefits, including using upto 80% less water and reducing knock-down times. The foam can vary from wet to dry and uses the principle "stay where you spray", with the foam blanket remaining intact for hours, preventing re-ignition. So the vehicle can be recovered with most of the products of combustion remaining within the vehicle and transported to a compound for safe disposal and thereby reducing the possibility of further damage to the environment.

About ICAFA

Whilst undertaking a research project into the use of Compressed Air Foam Systems (CAFS) in 2002, Chris Large (Former Deputy Chief Fire Officer of East Sussex, England) travelled to Germany and the USA. He rode with crews and witnessed the systems being used at first hand. He was instrumental in starting a User Group of CAFS users within the UK under the banner of the Chief Fire Officers Association. He has spoken at numerous conferences around the world and identified the need to move thinking forward not just within the UK, but globally. He has been instrumental in forming the International Compressed Air Foam Association (ICAFA) to promote the innovative use of compressed air foam technology through political lobbying, public education and media promotion. *Industrial Fire Journal* and *Fire and Rescue* magazine will be promoting the correct use of CAFS (Compressed Air Foam Systems) by supporting ICAFA. From now on readers will see regular updates and features on this organisation and new developments in CAFS technology on our website and in the print versions.

To become a member of ICAFA simply contact Chris by e-mail (chrislarge@icafa.org) and he will be pleased to forward an application form to you.