Are we prepared for the challenges associated with the broad introduction of ethanol?

In many countries the use of ethanol has increased significantly as a means to fulfil climate goals by replacing fossil fuels with renewable fuels. However, although ethanol is a well known product, it poses new fire-related challenges to the oil/fuel industry and first responders. Even if the industry and first responders are aware of these problems there is a lack of experience or regulatory guidance, in particular with regard to ethanol tank fires. This article describes what we know today and gives some suggestions concerning necessary research project to ensure safe implementation of ethanol on a broad basis. Such a research project is best suited to an international effort, both due to the magnitude of the work needed and to ensure that different national safety issues are dealt with appropriately and challenges solved.

Background

In the past 5-10 years, the use of ethanol has increased significantly both in Europe and US. Ethanol is used both for low blending of 5% ethanol in gasoline and for flexi fuel cars running on E85, the interest for which has increased dramatically in recent years. As an example, the number of gas filling stations in Sweden providing E85 has increased from about 200 in 2004 to 1,600 in 2009. In 2008, 4.9 % of the vehicle fuels (mainly gasoline and diesel) were defined as renewable fuels in Sweden and 60% of these (2,8%) were based on ethanol. The goal for EU is that 20% of vehicle fuels should be replaced by renewable fuels in 2020 . As ethanol probably will continue to be one of the main alternatives to fossil fuels in the transport sector, the volumes of ethanol transported, handled and stored will increase dramatically in coming years. The diameter/volume of the storage tank volumes is also increasing making a fire and fire fighting operation a significant challenge. Based on this concern, the Swedish Petroleum Institute (SPI) and their subsidiary company SMC, which is an emergency organisation for large scale tank fire fighting, asked SP Technical Research Institute of Sweden (SP) to summarize knowledge and experience of ethanol fires and subsequently to identify gaps in knowledge, on which this article is based.

Research and experience related to tank firefighting

SP Fire Technology has been involved in testing and research on fire fighting foams since the 1970s. Much of the research to date has been of applied character to provide information concerning fire fighting tactics to fire brigades, to develop test methods and thereby support standardisation activities. In order to understand the differences between small scale tests fires and full scale pool and tank fires, fundamental research has also been conducted, the most comprehensive of which was the EC-project FOAMSPEX. In this project, the parameters influencing the spread of foam on a burning fuel (petroleum) surface were studied and an engineering model developed to provide guidance about foam application rates and maximum possible foam spread in full scale pool and tank fire situations.

In order to find validating data from real, large scale tank fires

Ethanol tank fire that occurred in Port Kembla (Australia) in 2004. The tank was about 32 m and contained about 4,000 m^3 of ethanol. Photo: NSW Fire Brigades.

for the model predictions, an extensive literature review was conducted identifying 480 tank fires occurring in the period between 1951 and 2003. Although a large number of fires were identified, only about 30 of these fires provided detailed information concerning the extinguishment design and execution, tactics and time to control and extinguishment. It could be noted that over-the-top application using mobile equipment seems to be the dominating foam application methodology. It could also be noted that no information concerning extinguishment using fixed or semi-fixed over-the-top foam pouring systems could be found.

Fire test data available on water miscible fuels

Most municipal fire brigades in Sweden use alcohol-resistant foam concentrates (AFFF-AR or FFFP-AR) for firefighting of class B fires. The need for alcohol-resistant foams first came up in the beginning of the 1980s when there were plans to introduce methanol (M15 and M85) as an alternative to gasoline in cars. At that time, these plans were triggered by the energy crisis in the middle of 1970s. A test series was then conducted which clearly showed the need for alcohol-resistant foam instead of the detergent foam concentrates that were commonly used at that time. In total about 80 tests were conducted, in a scale from $50m^2$ down to $0.25m^2$. In the large scale tests, 10,000l of fuel was used with a pre-burn time of 10 minutes. The tests in this project formed the basis for the test method NT FIRE 023 which later provided important input to the development of the ISO 7203 and EN 1568 standards for the testing of AR foams.

In 1990, further full scale tests were conducted with the aim to provide recommendations to the Swedish fire brigades about foam firefighting in various fuels and chemicals. Four tests were performed on a $200m^2$ pool fire simulating a scenario with a turned over, burning tanker truck, two tests with gasoline and two tests with a mixture of acetone/ethanol (70/30%). In the acetone/ethanol tests, 30,000l of fuel was used in each test, corresponding to an average fuel depth of 150mm and a pre-burn time of six minutes.

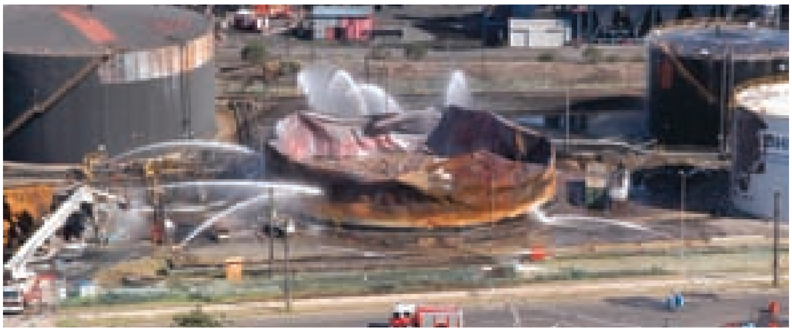
In 2006, a series of small scale tests ($0.6m^2$) was conducted to investigate the influence of low blending of ethanol in gasoline on existing fire fighting capabilities. Only alcohol-resistant foams (AFFF-AR and FFFP-AR) were used, but the main question was the need for an increased application rate and/or increased proportioning rate. Approximately 30 tests were conducted with between 2.5-10% addition of ethanol, using both gentle and forceful foam application. The tests showed that at concentrations as low as 2.5% ethanol gave a significant difference in firefighting applicability, particularly in terms of the time to obtain complete extinguishment. One important conclusion was also that the use of gentle application became more important the higher the content of ethanol.

The problems related to firefighting of ethanol fires has also been an important issue in US and a series of fire tests were conducted in 2007 according to UL 162 ($4.5m^2$) by the Ethanol Emergency Response Coalition (EERC) . Tests were conducted both on E95 (denaturised ethanol) and E10 gasohol using several types of foam concentrates, a wetting agent and an emulsifier. The tests on E95 showed that the requirements according to UL 162 were only fulfilled when using an AFFF-AR and Type II (gentle) application.

AR foam concentrates and gentle application is crucial

All test data reported above, both in large scale and small scale, show very clearly that the use of high-quality alcohol-resistant

One of the extinguishing tests on acetone/ ethanol where the foam is bounced on the ground in front of the fire to obtain a gentle foam application. (Photo Birger Markusson SRV.)



Attempts to extinguish the fire at Port Kembla were made within about 30 minutes from the start of the fire using a 6% AFFF-AR foam concentrate, two platform monitors and one ground monitor. The fire was extinguished after about 20 hours and at that time, the ethanol concentration was estimated to be only about 10% due to the dilution of water. Photo: NSW Fire Brigades.

foam in combination with gentle application are crucial factors to obtain successful extinguishment of water miscible fuels. Note, however, that all the fire tests (including various standard tests, eg ISO 7203, EN1568, UL 162) could also be defined as "spill fires" with relatively short pre-burn time and a limited depth of fuel. Typical conditions for large tank fires would be expected to be significantly more challenging from a firefighting point of view.

Tank firefighting

The conditions for tank fires are more challenging that the "spill fire" tests previously conducted in that they represent longer pre-burn times, there are significant practical difficulties associated with gentle foam application, the fuel depth is greater which reduces the extinguishing effect by water dilution. Further, larger surface areas of fuels involved in the fire can both impact on the thermal degradation of the foam during extinguishing activities and make approach difficult thereby further complicating the situation.

These observations are also supported by experience from real incidents. In the literature review of tank fires[3], eight fires involving some kind of water miscible products could be identified. The information from these fires is very limited but it is clear that, except for a fire in MTBE which is only very slightly water miscible, all fires resulted in a burn-out although attempts were made to extinguish them.

The most detailed information is available from an ethanol tank fire that occurred in Port Kembla in Australia in 2004. The tank was about 32m and contained about 4,000m^3 of ethanol. Attempts to extinguish the fire were made within about 30 minutes from the start of the fire using a 6% AFFF-AR foam concentrate, two platform monitors and one ground monitor. In a later stage, extinguishing attempts were also made using "foam bombing" with a helicopter, however none of the methods used were successful. It was therefore decided to allow a burn-out under controlled conditions by applying foam to the burning tank to reduce the fire intensity and to cool adjacent tanks to prevent escalation. The fire was extinguished after about 20 hours and at that time, the ethanol concentration was estimated to be only about 10% due to the dilution of water. There are unfortunately no figures on the actual foam application rate but the total flow rate used during the incident was 37,500l/min, both for the foam firefighting and for the cooling of adjacent tanks. In total 45,000m^3 of water and 50,000l foam concentrate were used.

It is also clear that existing standards for tank fire protection, eg NFPA 11 and EN 13565-2, provide no guidance or very limited guidance, partly due to the fact that there is no information from real fires that can be used to verify a certain system design. The main recommendations available are that AR-foams should be used, the use of foam monitors (Type III-application) is not applicable and that the foam application rate needs to be increased compared to petroleum (water immiscible) products.

The conclusion is that there is no reported tank fire containing ethanol or other water miscible fuels that has been successfully extinguished, despite the very large consumption of foam reported from most of these fires. Clearly we need a better understanding of design criteria for fighting such fires as it does not seem unreasonable to assume that the frequency of such fires will increase as the use of ethanol increases.

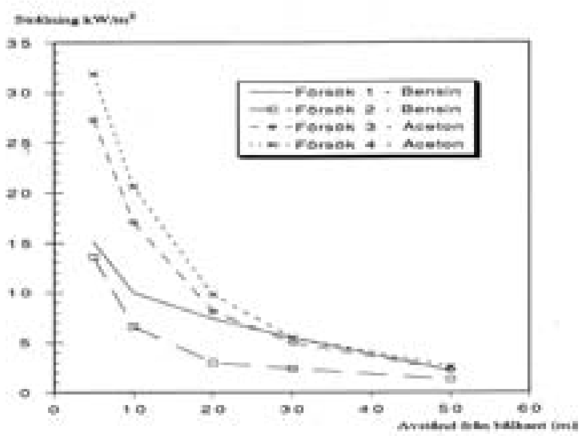


Diagram showing the measured heat radiation ("Strålning kW/m^2) at various distances from the pool ("Avstånd från bålkant (m)") during the four tests with gasoline ("Bensin") compared to acetone/ethanol ("Aceton")[5].

Flammability properties and burning behaviour of ethanol fuels

It is not only the water-miscibility of ethanol fuels that constitute an important difference compared to eg gasoline. In a closed vessel, pure ethanol forms flammable fuel vapors at a temperature range of about +12 °C (*LEP) to about +40 °C (*UEP), ie at what could be considered as "normal" ambient temperature conditions in many countries. Gasoline, which is a more volatile fuel and thereby is causing a greater risk than ethanol during eg spill conditions, will in closed conditions form too rich fuel vapors already at a temperature exceeding about -20 °C (UEP) and thereby ignition risk is reduced at most ambient temperatures. Ethanol fuels (eg E85) have a flammability range in between pure ethanol and gasoline and the exact range depends on composition, eg summer or winter quality. As an example, the flammability range for E85 of summer quality was determined to about -18 °C (LEP) up to about +2°C to +5 °C (UEP)10.

The conclusion is that the possibility for flammable conditions in a storage tank containing ethanol or ethanol fuels, and thereby the risk for escalation, is greater for ethanol compared to eg gasoline. During the 200 m^2 fire tests described above[5], it was observed that the heat flux from the acetone/ethanol fire was about twice that of gasoline. The gasoline fire generated large amounts of smoke which tended to block the visible parts of the flames and thereby reduce the heat flux. The acetone/ethanol fire was almost free from smoke, and the heat flux was thereby not dissipated by smoke. The same observation was made during the Port Kembla fire[9]. The flames were about 50m high and there was not much smoke but there was a tremendous amount of radiant heat. The building and vehicles across the road some 60 meters away were seriously affected, and partly ignited, by radiant heat when the brigade arrived, about 20 minutes after the fire broke out. This increased heat radiation also contributes to an increased risk for escalation of the fire by ignition of adjacent objects and make the fire fighting operations more complicated due to higher heat exposure of personnel and equipment.

Possible options for ethanol tank firefighting

The conclusion is that there is a significant lack of knowledge and practical experience of fighting fires in ethanol fuels, in particular in a tank fire scenario in Europe. According to White, the situation is similar in the US. In order to guarantee that a fire incident in an ethanol storage tank can be controlled and extinguished, an R&D

**LEP=Lower Explosion Point, UEP=Upper Explosion Point* fomtec

Fire Fighting Foams & Equipment

Foam Concentrates and Foam Systems

for all applications

SS-EN ISO 9001

DAFO FOMTEC AB P.O Box 683 SE-135 26 Tyresö Sweden
Phone: +46 8 506 405 66 Fax: +46 8 506 405 29
E-mail: info@fomtec.com Web: www.fomtec.com

fomtec
Fire Fighting Foams & Equipment

Henry Persson from the SP Technical Research Institute of Sweden has over 30 years of experience, mainly with testing and research in fire extinguishing media, systems, and industrial firefighting. As project leader at SP for the EC foam research project FOAMSPEX, he was responsible for the work at SP providing the basis for theoretical modelling of foam spread on burning fuel surfaces. In 2008 he was awarded the BIV (the Swedish Chapter of SFPE) Annual Award for outstanding contributions to fire research.

project is needed with the following goals:

- Develop firefighting tactics that ensure gentle foam application (eg using fixed foam system, medium expansion foam, CAFS, FoamFatale).
- Determine design parameters, eg application rate, foam stock recommendations, etc.
- Verify these findings on a (reasonably) large scale, ie sufficiently large to provide guidance concerning typical large modern tanks.

Although firefighting foam should be main focus of such a project, an evaluation of non-conventional fire fighting techniques should also be considered for the sake of completeness and to ensure that no stone is unturned due to prejudices based on minimal experience, eg using liquefied nitrogen or expanded glass, perhaps in combination with foam application.

The test programme should involve a series of screening tests to evaluate the potential of various tactics but finish with large scale validation tests representing full scale tank fire conditions with fuel in depth, a long pre-burn time, etc. It is only through the performance of such large scale tests that methodologies can truly be tested under real world conditions. Firefighting systems for large tank fires represent significant investments and in the future it is important that these are based on sound (large scale) scientific data.

The ultimate goal of the project should be to provide well documented technical results and recommendations which could be implemented and used by industry, authorities, insurance companies, standardisation organisations, nationally and internationally.

Clearly, the firefighting of large ethanol tank fires is a problem of international character as is the issue of climate change. The cost for an R&D programme of the scale suggested above will be significant. While Sweden can take the lead due to our broad introduction of E85, there is a need for participation and funding on an international basis. This article summarises our thoughts for a valid path towards safe use of renewable fuels in the future.

If you recognise the issues raised as being similar to what is presently being discussed in your country or company and would like more information or are interested in participating, please contact the author: henry.persson@sp.se.
A consortium is presently being put together with the aim of starting the project late 2010.

Notes

1 Statistics from the Swedish Petroleum Institute, www.spi.se
2 Persson, B., et.al, "FOAMSPEX Large Scale Foam Application-Modelling of Foam Spread and Extinguishment", SP Report 2001:13
3 Persson, H., Lönnermark, A., "Tank Fires-Review of fire incidents 1951-2003", SP Report 2004:14
4 Holmstedt, G., et al. "Foam extinguishing tests-80 with methanol-gasoline", SP rapport 1981:20 (in Swedish)
5 Persson, H., "Fundamental equipment for foam fire fighting – Experimental results and recommendations as a basis for design and performance", SP-Rapport 1990:36 (in Swedish)
6 Recommendations from Räddningsverket, " Fundamental equipment for foam fire fighting in pool fires from accidents in tank trucks or railway tanks", Aktuellt från Räddningsverket Nr 2, Mars 2003 (update of SRV Circ. 1/92) (in Swedish)
7 Foam fire fighting on gasoline with low-blending of ethanol", SRV FoU-rapport P21-417/03 (in Swedish)
8 Ethanol Fire Test Results by Ethanol Emergency Response Coalition", April 3, 2007
9 Personal communication with Chief Superintendent Hans Bootsma
10 Persson , H. et al, "Fuel vapour composition and flammability properties of E85", SP Report 2008:15
11 White, D., "Challenges of the green world", Industrial Fire World, vol 25, no 1, Jan-Febr. 2010.

AR-AFFF improvements enhance storage tank fire protection

The preferred foam concentrate in many industrial firefighting scenarios – AR-AFFF – is found in challenging applications worldwide, such as protecting lives and property at flammable liquid storage facilities. Also, the huge increase in the production of blended fuels in recent years has dramatically increased the demand for AR-AFFF concentrates.

Foam manufacturer Chemguard recently developed an alcohol-resistant, aqueous film-forming foam (AR-AFFF) concentrate for Williams Fire & Hazard Control. According to John Vieweger (VP Sales & Marketing, Chemguard Fire Suppression Division), ThunderStorm F-601B 1x3 and F-603B 3x3 concentrates exceed the highest performance standards in the industry.

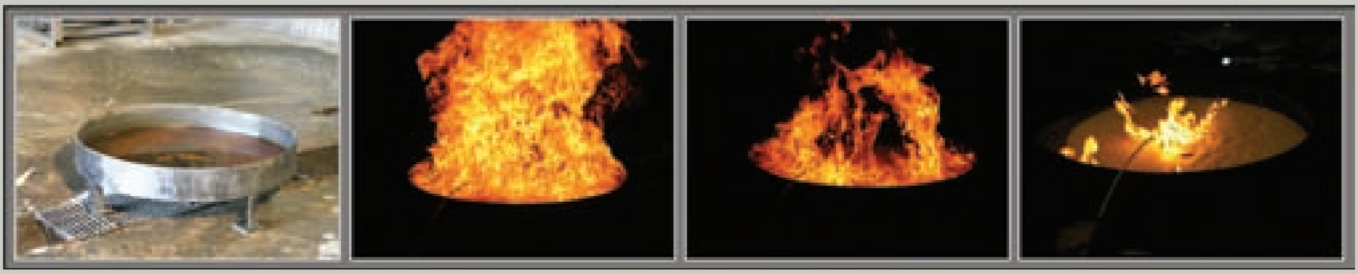
Designed to meet the stringent requirements of storage tank fire fighting, F-601B and F-603B received high marks on a challenging live fire test created by Williams. Characteristics include improved burnback resistance and rapid extinguishment – even on high-octane gasoline – but interestingly the new formulations have a lower viscosity than most conventional AR-AFFFs. This means that the foam will perform well in all types of foam proportioning equipment. And according to Vieweger the new concentrates exhibit significant improvements in effectiveness and efficiency in both fresh and salt water.

In addition, the F-601B and F-603B foam concentrates exhibit improved foam stability, increased water retention in the foam, enhanced vapour seal capability against hot steel surfaces, and increased resistance to fuel reignition.

And because they have extended foam life and positive rim seal characteristics, the foam concentrates are said to excel on large hydrocarbon fires, especially large flammable storage tank fires.

Most AR-AFFF foam concentrates consist of a combination of fluorosurfactants, hydrocarbon surfactants, inorganic salts, corrosion inhibitors, water, and solvents. Fluorosurfactants – which affect film formation, fire control effectiveness, and extinguishment speed – are the key components of the new concentrates. "AR-AFFF foam concentrates cannot meet – let alone exceed – today's fire standards without highly effective and efficient fluorochemicals. Chemguard's advanced fluorochemicals give F-601B and F-603B an edge in film formation properties and rim sealing characteristics," concluded Vieweger.

F-601B and F-603B achieved significantly better extinguishment times than other agents on the tough Williams "plunge" test. These new, high-performance AR-AFFF formulations exhibit a lower viscosity than most conventional AR-AFFFs and offer improved rim sealing for storage tank applications.



CHINA FIRE

2010

The Fourteenth International Fire Protection Equipment, Technology Conference & Exposition

Organizer: China Fire Protection Association (CFPA)

October 13-15, 2010
Beijing,China

Tel:+86-10-87789262/87789261
Fax:+86-10-87789785
Email:chinafireexpo@126.com

www.fireexpo.cn
www.china-fire.com

The primary weapon

Ethanol tank fires are notoriously difficult to tackle and require a highly targeted and knowledgeable approach. Jose Maria Sanchez de Muniain talks to Dr Chang Jho and Mitch Hubert of Dynax (a leading manufacturer of specialty fluorochemicals for the firefighting foam industry) about some of the challenges posed by ethanol tank fires, and the technology behind the primary arsenal against them – alcohol-resistant (AR) foam.

"Foam bombing" attempts at the ethanol incident in Port Kembla (Australia) with a helicopter were unsuccessful. Photo: NSW Fire Brigades.

"What works in favour of responders is that at large storage facilities it is the large tanks that contain the traditional hydrocarbons whilst the smaller volume ones are the ones that contain polar liquids – the alcohols, acetones, methyl ethyl ketones etc. What works against responders is that traditional over-the-top applications of foam don't work against alcohols," explains Hubert.

As soon as a foam stream hits the surface of the tank it breaks the protective blanket of foam stabilisers with its impact velocity, which results in the foam bubbles being immediately destroyed by polar fuel. "This means that foam pourers and any type of gentle application – such as directing a foam stream against the tank wall – is the way to go."

Mitch Hubert, VP Marketing, Dynax.

Foam stabilisers are the crucial ingredient of AR foam in the fight against ethanol tank fires. It is the foam stabiliser that provides the protective membrane that ensures the alcohol does not destroy the foam. And Dynax, explains Dr Jho, happens to be the company that not only invented the term "foam stabiliser" to describe this protective characteristic, it is also the company that supplies the vast majority of foam manufacturers with that very ingredient.

"In olden days people would use polysaccharide gums to make this membrane possible. In 1991 Dynax invented the first of what is now a DX5000 series of foam stabilizers, and today we use a third generation version – DX5022 – which makes possible 3x3 and 1x1 foam concentrates with relatively low viscosity, because formulators need less or none at all of polysaccharide gums, " explains Dr Jho.

Dr Chang Jho, VP, Dynax.

The majority of Dynax's products are made from six fluorinated carbon chain molecules (often referred to as "C6"), rather than the C8 and higher carbon chains that can degrade into PFOA and result in long-term environmental consequences. Currently the US Environmental Protection Agency's global 2010/2015 PFOA Stewardship Program is aiming to achieve a 95% reduction in PFOA and its precursors, such as C8 and higher homologs and related chemicals, from facilities' emissions and in product content by the end of 2010, and complete elimination by 2015.

"The momentum to move to C6 is big, especially in Europe, where there is pressure from end users and we are pleasantly surprised because we have been pushing this for a long time. Our customers are now being encouraged to change over by governments in Nordic countries who are demanding the safer C6-based foam," explains Dr Jho.

The one problem is that while 100% C6 foam stabilisers create an effective protective layer, other ingredients are necessary to create a foam that extinguishes the fire quickly.

Fluorosurfactants are vital to creating a fast acting aqueous layer on hydrocarbon fuel, resulting in a fast knock down of a fire. "From the fast knock-down and extinguishment point of view, C6-based fluorosurfactants perform better than longer-chain molecules. But they suffer on the burn-back side, which means there has always been a trade off between faster extinguishment and burn back resistance. In fact some of our fluorosurfactants products are therefore a blend of C6 and C8.

"But the challenge today is to get a good burn-back resistance with an all-C6 foam stabilizers and fluorosurfactants. And all our R&D efforts are going into helping our customers go through the conversion to C6-based foam in timely manner," says Jho.

It doesn't help either that on the practical side the research into tackling large ethanol tank fires is rather thin on the ground. In fact, large scale testing using ethanol has simply not happened. "Part of the problem with large-scale testing is that unlike testing with hydrocarbons, you cannot reuse the same fuel for multiple tests. As soon as you put a water-based foam on a water-miscible fuel the fuel is diluted. This means you are almost stuck with a one shot deal for each large scale fire test," concludes Hubert.

The foam decision

Making the right decision on the choice of foam concentrate a fire department or facility uses can cost a lot of time, money and effort so it has to be the right one. When considering the different parameters into making a long term selection, it appears they are continually changing, but are they really? Steve Smith, of Solberg, addresses a tricky issue.

What are the parameters for consideration? In most cases the first priority is cost, closely followed by performance, then environmental impact and somewhere along the line, application systems and equipment. Like most things we buy, cost is relative to quality, although this isn't always the case, but it is an important consideration. Working on the adage "if it looks too good to be true it probably is", buying "cheap" foam concentrates could be a costly mistake when it is actually needed.

This problem is easily resolved by using approvals and standards to confirm a foam concentrate will do what it is supposed to do. Of course just relying on a standalone certification will not necessarily mean every batch manufactured afterwards will be the same. Better to use a system whereby every batch is tested, for example using Lastfire, because that is the only way it is possible to be certain that the foam concentrate you have in stock will always extinguish to the required fire performance standard. Another very important parameter and one that sometimes comes first in the decision-making process, is the environmental impact. There are only two considerations here and that depends on who you listen to.

Foam manufacturers will tell you that the ingredients in their products are safe and that the change of molecules from C8 to C6 will make them safer. Some will also tell you that it is better to extinguish a fire quickly than be concerned about the small environmental impact that using their foam concentrate may have. If, as a foam user, you agree with this philosophy, the range of choice is vast; there are many good quality foams that contain fluorine/organohalogens available on the market today. On the other hand the environmental regulators are putting forward very effective arguments that disclaim the apparent "safe" qualities of AFFF, FFFP and FP and as they are the regulators it might be wise to heed their comments. Buying a foam concentrate that contains substances that may be of concern could be a costly mistake if regulators decide to restrict the use of foams containing these substances; you could be "buying tomorrow's waste".

If it is considered that using a foam that contains substances that may be of concern, is too risky, what are the alternatives? Reputable foam manufacturers have been working hard to find "safe alternatives" and there are now a number of foam concentrates that do not contain compounds that are known to harm our environment (for example Solberg RF).

Generally, fluorine-free foams – at this stage of their development – tend to be a little less effective than AFFF, FFFP and FP but this can be remedied by a change in foam application protocol. The end result however is the same – using a fluorine-free foam in the correct application will extinguish Class B fires effectively and without damaging our environment or putting firefighters at risk either because of poor performance or from prosecution for contravening any environmental legislation currently in place.

The choice is simple, continue using AFFF, FFFP and FP in the belief that it will not damage the environment, or use a fluorine-free foam by adapting application methods and working closely with foam manufacturers to further improve the technology.

The choice for foam purchasers, believes Steve Smith of Solberg, is as follows: continue using AFFF, FFFP and FP in the belief that it will not damage the environment, or use a fluorine-free foam by adapting application methods and working closely with foam manufacturers to further improve the technology.

Big flow for large events

National Foam (part of Kidde Fire Fighting) highlighted at Interschutz 2010 the Big Flow – a high capacity mobile firefighting solution capable of pumping up to 40,000 litres of water or foam per minute.
These state-of-the-art systems allow unprecedented flexibility to pump high volumes of water for multiple emergency response operations, and offer a viable and mobile alternative to that of traditional fixed water or foam firefighting systems.
Kidde Fire Fighting recently supplied several major systems to Japan. When combined, the multiple systems in Japan have a water or foam flow capable of 230,000 litres per minute through a 26-kilometer 12-inch hose network. These mobile systems are among the largest in the world in terms of capacity and pumping distance.
The systems, which had to meet rigorous Japanese standards, included Neptune large capacity mobile pumps, Super Aquaduct 12-inch hose with Twinstar quick connect couplings, foam-injection systems, and Iron Man mobile monitors – the high-powered delivery devices that shoot heavy volumes of foam and water to a range of 150 meters.
This equipment, referred to in the industry as Type III "over the top" firefighting apparatus, is used during large-scale emergencies, in particular for petro-chemical storage and refinery complexes.
"When other equipment falls short, you come in with the heavy artillery," said Ashley Price, global sales lead for Kidde Fire Fighting engineered systems. "We are the only company that makes every aspect of the equipment package. Customers have purchased these systems for applications beyond fire fighting, including emergency drinking water provision, flood relief and even as back-up cooling for nuclear power plants."

Protein-based foam compounds

Located near the port of Genoa and Milan airport, Profoam has been developing foam concentrates for over 60 years and today the company offers over 20 unique products for a wide range of international firefighting requirements.

For the oil industry in general and storage tank fire protection in particular, Profoam recommends the use of protein-based foam compounds (FP, FFFP, AR-FP), because it believes that they provide superior burn-back resistance, as well as being kinder to the environment. "Additionally, in places where sea water is used for firefighting, such as offshore platforms and certain refineries, protein foam compounds work more effectively with sea water than synthetic foams," believes Morgane Bertin of Profoam.

Having a substantial production facility (200 m^3 daily production capacity), means the company can provide a reliable supply of foam concentrate – for example during major emergencies – as well as having the capability to formulate specific products for specific applications.

Profoam is also aware of its environmental responsibilities, adds Bertin. "We formulate our foam concentrates with surfactants that do not contain either PFOS (PerFluoro-Octanoic-Sulfonate) or PFOA (PerFluoro Octanoic Acid). Our R&D department makes a concerted effort to utilise chemical products that have no environmental impact. "For a cleaner environment, we promote the use of protein-based foam concentrates. Derived from natural products, proteins are more quickly biodegradable and due to their inherent properties, do not require the use of environmentally harmful glycol additives, which are necessary in synthetic based foams designed for low-temperature use."