At the heart of it

V Frank Bateman examines the possible outcomes of dealing with flammable liquid fires without aqueous film-forming foams.

The definition of the end goal plays a prominent role in any discussion about foam. While many have long believed that extinguishment is the end goal, it never is.

Consequently I found it necessary to define the end goal as: ''The timely and effective restoration of normal conditions within the limits of acceptable risk''. Notice the absence of the word extinguishment – it doesn't apply here. In fact, when using RECEO (Rescue, Exposure, Confine, Extinguish, Overhaul and Ventilate, Salvage) as an incident prioritisation matrix, extinguishment is fourth out five priorities. As an example, if extinguishment was the end goal, responders would consider their work done after prematurely extinguishing an LPG spraying fire before first isolating the source.

Along with many other reasons, we have been able to achieve the end goal (restore normal conditions) with high-quality AFFFs because of their ability to be affective from greater distances, thus increasing safety for the firefighter. The accepted shorter life of foam blankets are greatly offset by ability to accomplish fire extinguishment while using less foam concentrate. Post-extinguishment reapplication periods could be extended by the changing over to aspirating delivery devices that produce higher-quality and longer-lasting blankets.

Entering a pooled fuel is considered within the limits of acceptable risk by many response agencies. The primary reason for this is the safety provided through the use of high quality AFFF/AR-AFFF products. Without it, entry into this type of hazard should not be considered.

If memory serves, the final acceptance test for AFFF for use by the US Navy was conducted at what was then Miramar Naval Base in San Diego. I still use the video produced to show that appropriately attired ARFF crews and attack lines could be advanced during application for fire fighting/simulated rescue efforts into the fully involved test fire. The fuel load was the equivalent of a full load of JP4 for the largest military aircraft in service at the time. Within seconds of the simulated arrival at the scene, firefighters had advanced hand-lines well into the liquid fire and were nearing the fuselage of the mock up training prop.

All of the above has been possible since the 1970s with AFFF and AR-AFFF. At present, there's simply no alternative with anything approaching the performance or safety for the users. I am at the end of a very long career in the profession I love and I'm no longer responding to fires in anger; however, I cannot remain silent while we let this happen. For me it's personal. My son is the fire

Entering a pooled liquid spill or fire without a high-quality AFFF would not be an acceptable risk.

chief of a major US oil refinery. One of my grandsons is presently considering following in the family tradition of joining the fire service; and yet another is in training to become a Damage Controlman in the US Navy.

If science can produce a suitable replacement for the high-quality fluorine-based concentrates in use today, I'm all for it as long as performance is not sacrificed in the process. If we are forced into using one of the presently available F3 fluorine-free foams (and my company makes one), a lot of how the fire service handles the threat of flammable and combustible liquids must change, which I will now touch upon.

Without a high quality AFFF product, entering a pooled liquid spill or fire to carry out a victim rescue or close flowing/spraying valves should be considered beyond the limits of 'acceptable risk'. This alone would require a complete overhaul of how we train. Without the performance of a foam the equal of high-quality AFFFs, the old term of 'surround and drown' and the newer term of 'hard from the yard' will be left to guide the development of new tactics. What we don't want is to return to the requirement of using aspirating equipment for foam delivery. This would mean more energy consumption (due to water-pressure drop); shorter reach; different tactics; and additional manpower requirements.

Any replacement for AFFF would to be at least as efficient as the AFFFs now is use by most in the flammable liquid response arena. Poor performance of a successor to AFFF could cause foam inventories to skyrocket along with all the related logistical requirements. AFFFs were considered to be up to the task of protecting storage tanks while they and other hazards continued to increase in size.

As tank diameters have continued to increase, and the NFPA and others in the opinion of the response community have failed to keep pace, fire responders have developed their own application minimums. Without AFFFs, rates will have to be increased again but this time by some yet-to-be determined exponential. This, of course, assumes that with greatly increased delivery capacity and sufficient inventories, success (the end goal) is possible.

Last is the development of 'compatibility criteria' for dealing with greatly varying concentrate viscosities; will the hardware required be available to all those who might be forced to use the concentrate? If not truly compatible, will the result be the loss of performance and its impact on firefighter safety? We have been spoiled with AFFF's nearly indefinite shelf-life, and we are presently comfortable with their ease of handling and wide temperature range for accurate proportioning.

Approval of any AFFF replacement must include discussion of the impact the new concentrate will have on the environment. Most fluorine-free foams are many times higher in aquatic toxicity than C6 AFFF's that contain the nasty stuff that doesn't easily break down. The new C6 AFFF family, the chemical experts say, are much safer to use – but I'll stick to fire fighting.

V Frank Bateman is class B foam marketing and business development specialist at ICL Group. He has over 30 years' experience in the field of fire protection, starting his career as a US Coast Guard Reserve Commissioned Officer assigned to Marine Safety Office, San Francisco. He has been a firefighter; fire inspector and arson investigator as well as worked as a special hazards representative for the design of fire protection systems. His qualifications include NFPA 1041 & 1081 Pro Board Advanced Exterior Fire Brigade and NFPA Pro Board Fire Instructor II. He serves as adjunct instructor at New Jersey State Fire College; Texas A&M Oil fire Training School; and UNR Fire Training Academy. A past president of San Bernadino County Fire Prevention Officers Association, he has also served on NFPA committees formulating foam-related standards and co-authored standards including NFPA Standard #1405 - Land-based firefighters who respond to marine vessel fires; NFPA Standard #1925 - Marine firefighting vessels; and API's Guide for fighting fires in and around petroleum storage tanks.

South Australia to ban PFOS and PFOA

Ian Hunter, Environment Minister for South Australia

Environment Minister for South Australia Ian Hunter has announced that the Environment Protection Authority is to begin working with industry to determine how to ban PFOA and PFOS.

The ban will apply to the use of fire-fighting foams containing PFOS or PFOA or any other chemicals that degrade to PFOS or PFOA.

While the use of fire-fighting foams containing PFOS and PFOA have been largely phased out in South Australia, some stockpiles of these foams still exist.

This measure aims to eliminate uncertainty about their future use and potential contamination risks to waterways and groundwater.

"By permanently banning foams containing these chemicals we are sending a clear message that chemical usage that poses a threat to waterways and groundwater will no longer be tolerated in this State," said Minister Ian Hunter, who added: "I want to reduce any harmful impact on the environment, and any potential harm to South Australians."

South Australia is following in the steps of the State of Queensland. In July last year, Queensland published a new operational policy for fire-fighting foam with highly restrictive management requirements. Queensland, home to the Great Barrier Reef, also requires any existing stocks of foam containing PFOS and PFOA are withdrawn from service and replaced with alternatives.

Perfluorinated alkylated substances (PFAS), also known as perfluorinated compounds, are manufactured chemicals that do not occur naturally.

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are specific types of PFAS that are of emerging concern in Australia and internationally.

In 2010, PFOS was among nine new chemicals added to the Stockholm Convention on the Persistent Organic Pollutants list. These chemicals had historically been used for a range of industrial applications since the 1950s, mainly in firefighting foams for liquid fires at airports and major hazardous facilities including oil refineries.

PFOS and PFOA in fire fighting foams in South Australia have been largely phased out and replaced by other chemicals that break down faster.

The South Australian Metropolitan Fire Service has stopped using fire-fighting foams containing PFOS and PFOA and has replaced them with alternatives.