

Clean extinguishing agents used in modern fire protection systems are more environmentally responsible than those in use a decade or so ago, but some are still causing concern. Kurt Werner, Environmental Affairs Manager at 3M Company, examines their limitations and introduces a new agent that represents an environmentally sustainable technology.

## BP Chooses Novec 1230 Fluid for Fire Protection

BP, one of the world's biggest energy companies and a committed champion of environmental protection, has selected 3M™ Novec™ 1230 Fire Protection Fluid for use in its prestigious new commodities trading building in Houston, Texas. The selection of this environmentally responsible fire protection product complements the building's achievement of Platinum Certification in the LEED (Leadership in Energy and Environmental Design) scheme operated by the US Green Building Council.

"To protect the valuable assets within the building, we needed an extinguishing agent that was clean, efficient and safe, yet would have minimal environmental impact," said Kevin Westwood, Worldwide Group Fire Advisor for BP. "We looked at many options, including HFCs and even CO<sub>2</sub> but, in the final analysis, Novec 1230 fluid was by far the best match for our selection criteria."

Important issues for BP were the ozone depletion and global warming potentials for the extinguishing agents under consideration. Like the widely used HFCs, Novec 1230 fluid has an ozone depletion potential of zero, but when it comes to a consideration of global warming potentials, the contrast between HFCs and Novec 1230 fluid could hardly be more clear.

The global warming potential of the HFC most widely used in fire protection is 3,220 times that of the most common greenhouse gas, which is CO<sub>2</sub> (2007 IPCC assessment for HFC-227ea). The environmental footprint of HFCs is, therefore, substantial and not in concert with BP's exacting requirements.

In fact, the high global warming potential and atmospheric persistence of HFCs are already leading to concerns about whether their use will continue to be permitted. It is entirely possible that HFCs may follow the halon extinguishing agents that were so popular until the 1980s, by being restricted or even banned.

The first steps toward this can already be seen in the F-Gas Regulations that have recently been introduced in Europe. While these regulations stop short of banning the use of HFCs, they do impose requirements specific to HFCs for technician training, inspections, testing, and reporting.

Measures addressing the use of HFCs are also being drafted in the USA. An early action identified under the California Global Warming Solutions Act of 2006

includes a consideration that, from 2012, all new fire protections systems in California must use an agent with a global warming potential below a minimum threshold level.

The California Air Resources Board (CARB) proposal reflects the regulators' concern that, while emissions from this sector are currently low, emissions are growing quickly and the emission potential of an ever growing installed base represents a significant future liability. The only meaningful way to limit this future liability is to reduce the use of HFCs.

These issues were an important concern for BP since, if restrictions on the use of HFCs were introduced in the future, these would almost certainly mean that a fire protection system based on their use would either have to be replaced in its entirety, or at least very substantially modified. This would involve considerable expense, and a high risk of disrupting the critical operations carried out within the trading building.

The BP team therefore set about comparing the environmental characteristics of HFCs with those of 3M™ Novec™ 1230 Fire Protection Fluid. As already mentioned, Novec 1230 fluid's ozone depletion potential is zero, and its global warming potential is just one – a huge reduction compared with the typical figure of 3,220 for the most common HFC. In addition, the Novec 1230 fluid has an atmospheric lifetime of only five days, compared with about 30 years for HFCs.

The BP team also took into account the toxicity of the agents, as it was possible – although not planned – that an automatically initiated discharge could take place in an area while staff were present. This immediately ruled out the use of CO<sub>2</sub>, which is noted for its high toxicity. Once again, Novec 1230 fluid was well clear of the other contenders on this issue.

It has a very wide margin of safety for use in occupied areas, which makes it entirely suitable for areas frequented by staff. "Margin of safety" reflects the difference between the design concentrations necessary to put out a fire and the threshold concentration recognized by approval bodies as suitable for use in occupied spaces. In the BP application, it is used at a concentration of 4.2%, but it is acceptable for use up to 10%. Therefore, its safety margin for this application is 138% - the largest margin for safety for any halon replacement. From the

environmental and life safety standpoints, Novec 1230 fluid met or exceeded all of BP's requirements. These were not the only factors, however, which favored its adoption for this high-profile project.

Unlike most other extinguishing agents, Novec 1230 fluid is stored in bulk as a liquid in non-pressure rated containers, which results in unique benefits in storage and handling; Novec 1230 fluid can safely be stored over a wider range in temperatures and can easily be transported in bulk – even by air. Yet, Novec 1230 fluid is delivered as a gas from a properly designed system, similar to halon systems in the past or other halocarbon systems today.

Further, refilling a system after discharge is much simpler than working with bulk pressurized gas supplies as well as being faster and much more convenient than sending the cylinders off site. Finally,

the number of cylinders required for Novec 1230 fluid is fewer, and therefore they occupy significantly less space than cylinders of CO<sub>2</sub> or inert gas.

Novec 1230 fluid is electrically non-conducting, an important consideration for the BP project, where the installation was required to protect electrical and electronic equipment. It is also a clean agent that leaves no residue after a discharge, minimizing the amount of clean up work needed and thereby reducing the time needed to return equipment to service.

Kevin Westwood concludes: “Novec 1230 fluid meets our needs so well that we’re already using it in other applications, such as the protection of utility modules in the Alaska North Slope oil field, and to protect cables in our drilling installations in the Caspian Sea. In short, it’s an excellent product.” ■

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