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Fire has been both a bane and a boon to humankind since before the dawn of recorded history. Before the advent of electronics, putting a fire out was done through water suppression. However, electronics are easily damaged by water, and as such, new chemicals were developed to stop fires without damaging important systems, or the environment. Two such chemical systems to consider are Novec 1230 Fire Protection Fluid and DuPont FM-200 waterless fire suppression system.

**1: Novec 1230 Fire Protection Fluid**

*Environmental impact*

Novec 1230 “does not contribute to ozone depletion; it has an atmospheric lifetime of approximately 5 days and a Global Warming Potential (GWP) of 1 (IPCC 2001 Method)” (3M, 2011). PPI can be assured that their use of Novec will in no way harm the environment in the present or future. 3M also offer a Blue Sky warranty for Novec 1230 in the case of environmental regulatory bans or restrictions (3M, NA). This warranty ensures that PPI will not be held responsible in instances where 1230 is no longer allowed.

*Architecture of the technology*

The Novec 1230 system includes the following: a sprinkler system, aspirating smoke detector/s, fire detection/control device, automatic fire detector/s, manual release device/s, and siren/s with flashing light/s. Novec 1230 has no lasting effects on electronic equipment, so much so, that running electronics can be fully submerged in Novec 1230’s liquid state with no influence on the operations of the device (3MUKPLC, 2013). In essence PPI can be assured that exposure to Novec 1230 will cause no harm to critical systems.

*Monitoring capabilities of the technology*

Once smoke is detected, the smoke detector switches off the air conditioning, the fire detectors signal the doors to the area in question to be closed, and any kind of ventilation to the affected area is also shut. At this time the siren and lights go off, as well. Employees are still able to open and close doors; the system merely closes any open doors to keep any Novec 1230 from escaping, thereby reducing extinguishing capabilities.

*Costs for refill of the suppression agent*

Refill costs for Novec 1230 are on a quote by quote basis, but are in line with other fire suppression chemicals. That is, there are no immediate gains or losses from using Novec 1230 in terms of agent refill. It is recommended that PPI request quotes from local and national sources as cost savings can be found through shopping around.

*Time to extinguish a fire*

Novec 1230 can extinguish a fire between 10 and 40 seconds (3MUKPLC, 2013). This time does not include any lead up times from system controls of doors closing and alarm wait periods for staff to leave the area. In essence, from the time Novec 1230 leaves the nozzles on the ceiling to the time the fire is put out is approximately 10 to 40 seconds.

*Human interaction hazards*

There are no foreseen toxicological or physical hazards from direct contact of Novec 1230, and no long lasting effects from inhalation (3M, 2011). This being said, staff should seek medical advice after exposure to Novec 1230 in the case of any breathing or eye irritation.

*The amount of data center space that the infrastructure will consume*

The extinguishing infrastructure for Novec 1230 will take no more room than a traditional water extinguishing system. The 1230 canisters are slightly larger than a fire extinguisher canister and can be stored in an out of the way cabinet or corner.

*Testing Procedures, Effects, and Considerations*

Fire detection testing should be coordinated with the local fire department and scheduled based on local state and federal regulations. This should include: smoke detection, fire detection, fire alarms, lock out procedures, and agent release. Things to consider when testing are: alarm locations, visibility of lights, agent release time, and exit procedures from affected areas. PPI can be assured of the system’s operation through the fire detection/control device which offers a read out of system’s operation.

**2: DuPont FM-200**

*Environmental impact*

FM-200 has a global warming impact of 3500 with an atmospheric lifetime of 31 to 42 years. However, it has 0 ozone depletion properties (Thorn Security, 1998). Note that in some principalities, FM-200 is no longer allowed and this is not a viable option. Additionally, PPI should consider FM-200’s environmental impact of its direct competitor, Novec 1230, as a prime consideration.

*Architecture of the technology*

The architecture of FM-200 is very similar to Novec 1230. It consists of: a sprinkler system with aspirating smoke detector, fire detection/control device, automatic fire detectors, manual release device, and siren/s with flashing light/s. FM 200 has no lasting effects on electronics that are not directly on fire. However, heat decomposition can leave behind a residue which may cause electronics to become unusable.

*Monitoring capabilities of the technology*

Once again, monitoring is similar to Novec 1230. Once smoke is detected, the smoke detector switches off the air conditioning, the fire detectors signal the doors to the area in question to be closed, and any kind of ventilation to the affected area is also shut. At this time the siren and lights go off, as well. Staff members are still able to escape the affected area. The system just closes the doors so FM-200 cannot escape.

*Costs for refill of the suppression agent*

FM 200 raw materials have seen a shortage, as such, the price of FM 200 is likely to be higher than that of Novec 1230 (Concept Fire Suppression LTD., 2010). However, cost should be analyzed based on a quote by quote basis. Additionally, local, state, and federal regulations should be considered as FM200 may be phased out in certain locals.

*Time to extinguish a fire*

FM200 has a comparable extinguishing time to Novec 1230 of 10 to 40 seconds (North Carolina Fire Marshals, 2008). This time does not include any lead up times from system controls of doors closing and alarm wait periods for staff to leave the area. In essence, from the time FM-200 leaves the nozzles on the ceiling to the time the fire is put out is approximately 10 to 40 seconds.

*Human interaction hazards*

There are no foreseen toxicological or physical hazards from direct contact of FM 200, and no long lasting effects from inhalation (Dupont, 2011). This being said, staff should seek medical advice after exposure to FM-200 in the case of any breathing or eye irritation.

*The amount of data center space that the infrastructure will consume*

The extinguishing infrastructure for FM-200 will take no more room than a traditional water extinguishing system. The FM-200 canisters are larger than Novec 1230 canisters and may require a specialized storage cabinet to be built. PPI are recommended to consult the installations organization for consideration on this matter.

*Testing Procedures, Effects, and Considerations*

Fire detection testing should be coordinated with the local fire department and scheduled based on local state and federal regulations. This should include: smoke detection, fire detection, fire alarms, lock out procedures, and agent release. Things to consider when testing are: alarm locations, visibility of lights, agent release time, and exit procedures from affected areas. PPI can be assured of the system’s operation through the fire detection/control device which offers a read out of system’s operation.

**Conclusions**

Both FM-200 and Novec 1230 are viable solutions to fire suppression systems. However, Novec 1230 is the system of today and likely into the future. It is environmentally friendly, non-toxic to humans, and operates in a manner easily recognizable (water suppression). Additionally, its cost and upkeep are no more than any other system, and in the case of FM 200, slightly less based on raw material supply.

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