

Fire Research & Investigation Unit

Heads Up



BACKGROUND

The oil in an overheated deep fat fryer of a commercial Kitchen ignited. The lack of combustible materials in the vicinity prevented fire spread so the fire was contained to the fryer. Café staff promptly turned off the fryer and isolated the power source, but attempts to attack the fire with a fire extinguisher were unsuccessful as the type of extinguisher used was not suitable for an oil fire. Eventually, the automatic sprinkler system activated and extinguished the fire.

An investigation of the fire established that a sprinkler head located behind the filters in the kitchen exhaust system had been taped over using duct tape, rendering it entirely ineffective



Figure 1 - Fire contained to the oil surface

INCIDENT DETAILS

The fire occurred on the 4 January 2019. The fire alarm activated 7.38am and as it was brigade connected, the system immediately notified Fire and Emergency NZ. The sprinkler system activated at 7.43am and the first arriving fire appliance arrived on scene about that time. With witnesses confirming a fire and a sprinkler system operating, the officer in charge escalated the incident to second alarm. Firefighters entered the building and found the fire to be out. They then carried out salvage operations ventilating smoke and removing water; and called for a fire investigator who arrived on scene at 9.00am.

The incident was captured by a security camera, images from which feature in this *Heads Up*.

The actions of the kitchen staff contributed greatly to the relatively low consequences of this fire. On discovering the fire, a member of staff calmly turned off the fryer and isolated the appliance at the wall switch before exiting the kitchen to seek help and raise the alarm. Although the surface of the oil continued to self-heat due to the fire, without a power supply the mass of the liquid was no longer being heated.

As the fire developed, a security guard entered the kitchen to retrieve a fire extinguisher located there. He used it to attack the fire with a short burst which initially extinguished the flames but the flames re-ignited immediately. A second, longer burst of the extinguisher produced the same result and the security guard was forced to retreat. During the investigation, the fire extinguisher was found to be a dry powder type. Approximately half of the contents had been discharged.



Figure 2 - Security guard discharging dry powder extinguisher, followed by immediate re-ignition

Whilst the dry powder was effective at extinguishing the flames, the residual heat in the oil was sufficient to re-ignite the oil surface immediately. This is because the powder stops the combustion reaction but does not form a stable layer on the oil surface to isolate the hot oil from the air. As the discharge of powder stops, the oil, already above its ignition temperature, encounters oxygen in the air again and the fire re-ignites.

FURTHER INFORMATION

The building was fully sprinklered. The sprinkler coverage in the kitchen included two standard heads over the circulation / preparation area, one high temperature head directly above the cooking area and one standard head in the exhaust system (obscured by tape). The high temperature head above the fire activated eight minutes after ignition, discharging water directly onto the fire. The initial discharge caused additional flaming due to the boil-over phenomenon. This resulted in the activation of a second sprinkler head and the fire being extinguished. This demonstrates that standard sprinkler systems can deal with fires involving deep frying oil although there may be additional damage due to flaming oil expansion.



Figure 3- Sprinkler above fryer

In the course of the investigation, it was discovered that the sprinkler head located within the kitchen exhaust hood, between the filters and the connection to the exhaust duct was covered in duct tape. It is believed that the sprinkler head may have been taped over to prevent damage during duct cleaning operations and the tape not removed afterwards. This sprinkler head did not activate during the incident. Given its location, it may not have impacted on the fire even if it had activated. Nonetheless, the sprinkler head should not have been covered. The duct tape acted as an insulating layer and may have prevented the activation. Further, the obstruction formed by the tape may have prevented the formation of an effective water pattern.

LESSONS LEARNED/RECOMMENDATIONS

- Where it is possible to do it safely, any appliance involved in a fire should be isolated from gas and/or power supply.
- Portable fire extinguishers of the appropriate type should be provided in commercial kitchens. Not all types of extinguishers are suitable for these spaces. Refer to the Fire and Emergency position on fire extinguishers (<https://fireandemergency.nz/business-and-landlords/commercial-use-of-fire-extinguishers/>).
- Sprinkler heads should never be left covered or altered in any way (this includes painting or attaching objects).
- When works must be carried out which present a risk of damage to sprinkler heads, appropriate process should be followed, which may include using an approved capping device for the duration of the works only, or isolating (part of) the system. Refer to the relevant standard for more information and isolation procedures (NZS 4515, NZS 4541).
- Where sprinkler heads are positioned in locations that are likely to expose them to accidental damage, approved protective features such as metal cages should be permanently fixed.



INFORMATION SOURCE F2683642 Commercial kitchen fire



For more information, or to contribute to 'Heads Up'
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