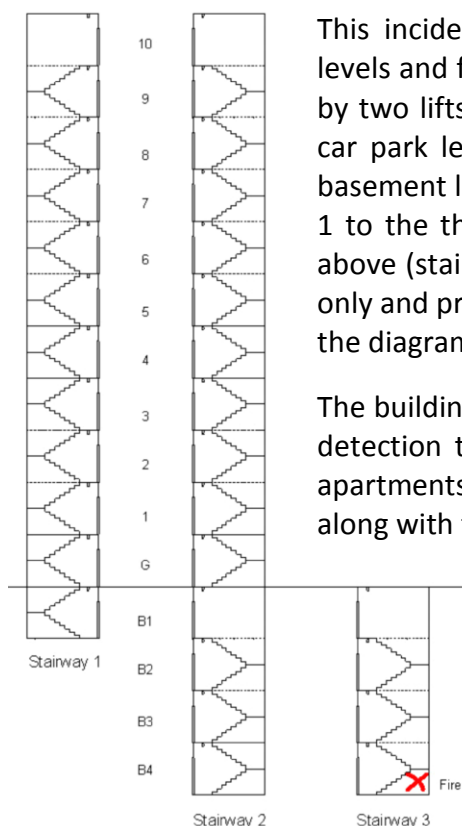


Fire Research & Investigation Unit

Heads Up



BACKGROUND



This incident was in an up market apartment building, with eleven residential levels and four basement car park levels. The eleven residential levels are serviced by two lifts, and two separate stairways. The lifts also service the four basement car park levels. In an unusual design configuration, one stairway terminates on basement level 1 (stairway 1), while the other provides access from basement level 1 to the three basement levels below, but not back up to the residential floors above (stairway 2). A third stairway (stairway 3) is dedicated to the car park levels only and provides access from basement level 1 through to basement level 4 as per the diagram to the left.

The building is sprinkler protected, and is fitted with manual call points and smoke detection throughout except for the car park firecells. Smoke detection in the apartments is local sounding only. The corridor and stairway smoke detection, along with the sprinkler system and manual call points, are brigade connected.

INCIDENT DETAILS

Exact details leading up to the incident in this building are not completely clear, however it is believed to have originated from a domestic dispute between a resident and a guest. Following the dispute, one of the parties descended to the basement car park, removed a foam mattress from a storage locker, and set it alight under the stair at the lowest level (basement level 4) of stairway 3.

FURTHER INFORMATION

The sprinkler coverage within stairway 3 did not extend to the under side of the concrete stairs. This is concerning on the lowest level of a stairway, because this area often gets used for storage. In this instance the sprinkler (located over the landing on each floor level) did not activate because it was positioned too far away from the fire. Even if it had operated it would have been ineffective in any event due to shielding by the stairs. The fire did cause the activation of the stairway smoke detection, which initiated a building wide evacuation.

The building had an on site manager who proceeded to investigate the cause of the alarm activation. He descended to basement level 2 using stairway 2, and observed smoke leaking out the bottom of the door to stairway 3. This was two levels above where the fire was located. Upon opening the stairway door the manager described the smoke in the stairway as being brown in colour, with a toxic odour. He estimated visibility within the stairway to be no more than 1.5 metres.

When the Fire Service arrived, the panel indicated that the sprinkler system had activated despite the fact that no sprinkler head had actually discharged.



LESSONS LEARNED/RECOMMENDATIONS

Despite security measures to protect a building from intrusion, arson for revenge presents a threat in any building, particularly where it contains residential occupancies. There have been various past examples of this. This has to be recognised in the design of the building as this sort of behavior in deliberate fire setting represents a reasonable worst case scenario.

Obviously appropriate fire detection in stairwell areas is critical, particularly in buildings with a single means of escape. The use of heat detection may not be appropriate as some fires may not have sufficient heat release rate to activate the heat detection as occurred with the sprinkler system in this building.

Ideally there should be smoke detection hooked to an Emergency Warning and Intercommunication System (EWIS). This would provide verbal warning that a specific stairwell should not be used regardless of if it was a single means of escape or one of multiple stairs available to occupants.

This incident also highlighted that correct sprinkler system design is critical to the safety of all buildings, and in particular multi-storey buildings with limited escape options.

Just because the stairway construction is non-combustible masonry, this does not prevent a significant fire developing in combustible items either stored beneath the stair, or placed there deliberately as fuel load.

The sprinkler layout in this building does not comply with the sprinkler standard NZS 4541:1996 (the current version called up by the acceptable solution), or with NZS 4541:2003 (the latest version of the sprinkler standard). Section 207 of NZS 4541:1996 includes the following statements:

207.1

The following are permitted exceptions to the requirement of 204 that a sprinkler protected building or sprinkler protected firecell be sprinklered throughout:

(e) Staircases forming a vertical safe path enclosed by fire separations having a FRR of -/60/60 in which:

(iv) There is a sprinkler at the head of the stair, over every floor landing, and beneath any flight which intersects with a floor and forms a semi-enclosed space in which material could be stored without blocking the stair.

As it happens, stairway 3 is not a vertical safe path because it opens on to the car park firecells on each level. In this case then no exception is permitted, and the underside of the stair should have been covered by sprinklers. However sprinklers were not included under the stairs in the other two stairways serving the residential levels either, and these would have to be safe paths. Had the fire been set in one of these stairs, this incident would have been significantly more serious.

While a sprinkler would not have prevented smoke from compromising the stairway, it would have limited both fire size and smoke production, and therefore the degree of risk to the occupants.

Despite improving technology, system faults in the electronic components of alarm panels are still common. In this case the alarm panel indicated sprinkler activation, which presents a potentially more serious scenario than just smoke detector activation, and may influence the incident commander's decision making process.

It is therefore important that the reliability of the hydraulically operated sprinkler gong be maintained, as this provides the only true indication to arriving Fire Service personnel that water is actually flowing somewhere in the sprinkler system.

INFORMATION SOURCE

New Zealand Fire Service Technical Report/Post Incident Audit, Auckland Local File Number 2.04



For more information, or to contribute to 'Heads Up'
e-mail fireinvestigation@fire.org.nz