

Residential high rise evacuation

May 2009



Residential high rise above shopping centre

Gas explosion takes out lifts

On 30 March 2009 a gas explosion occurred on level 29 in the plant room area of a residential high rise building in Spring Street, Bondi Junction, where two plumbers were working on a gas fired water heater.

There was no ongoing fire, but the blast wave travelled down a riser and blew in most of the doors on levels 23 and above, including the fire stair and lift doors. The blast made the lifts inoperable.

The building has a reinforced concrete frame with non-load bearing masonry walls. Walls were blown out on the top two levels. There were cracks in the stairwell at level 26, getting progressively worse further up.

During the incident, engineers assessed the building's framework as structurally sound, allowing search and evacuation operations to continue, but, because the lifts could not be used and utilities had to be shut off, the building was uninhabitable and all residents had to be evacuated.

This case study describes the evacuation operation and examines the issues an Incident Controller will face when dealing with a residential high rise evacuation where the lifts cannot be used.

The residents

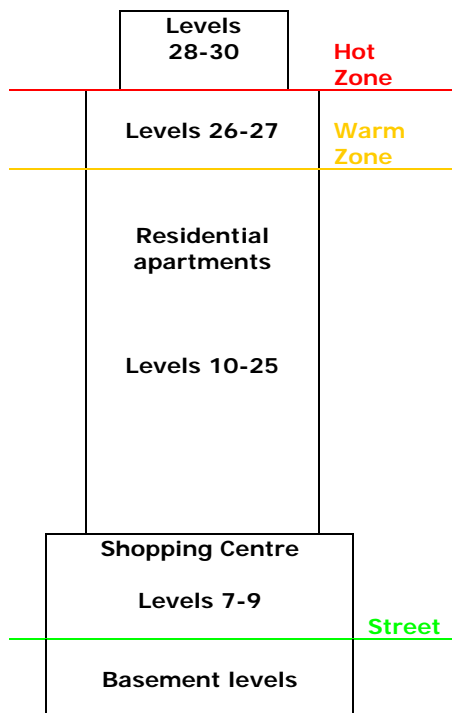
When the firefighters arrived, many residents, having felt the blast and hearing the alarms going off, were making their own way down the fire stairs.

However, many of the residents were elderly and a significant proportion of them were either physically unable to use the stairs, or uncertain if they would be able to manage them. Four residents were in wheelchairs and three had walking frames.

Many were simply unwilling to leave their homes and worried about their possessions, phone and medications. Their homes were where they felt secure, and they were understandably reluctant to leave.

The stairs

There were two sets of one metre wide fire stairs in the residential tower, and additional stairs in the shopping centre below. One set of stairs exited at street level, the other at level 9, on top of the shopping centre, where you then had to go to another stair to reach street level.



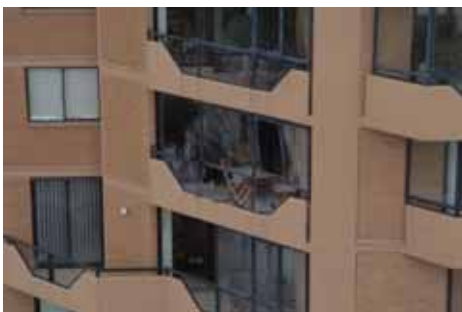
Building diagram



Damage to plant areas



Masonry walls blown out



Windows blown out of units



Lift doors blown out

The level 9 exit door had partially collapsed from the blast, and there was the danger of more debris falling from the upper levels onto the roof of the shopping centre. For this reason, the other set of stairs, which went directly to street level, was the main stair used for both operations and evacuations.

Initial operations

The NSW Fire Brigades was notified of the incident by the operation of the automatic fire alarm system at 1241 and the first fire appliance arrived at 1246. By that time, the Communication Centre had also received many Triple Zero calls and had upgraded the response to 3rd Alarm. This was upgraded to 4th Alarm by the first arriving senior officer.

Crews were initially informed by security guards that a large explosion had occurred on level 29 and there were casualties. Crews in breathing apparatus climbed the stairs to level 29. There was no fire, so they immediately began search and rescue operations on the damaged floors.

Search and rescue

Due to the amount of damage on the upper levels, levels 28 to 30 were declared the hot zone, and levels 26 and 27 the warm zone. A forward command post and staging area was established on level 26.

Search and rescue operations started on level 30 and worked down. Search operations were assisted by the fact that many of the doors had been blown in from level 23 up - those that had not were forcibly opened.

The only casualties were the two plumbers, who had been severely burned in the explosion. They had made their way down the fire stairs unaided and, as soon as they were located, they were treated by paramedics and taken to hospital by ambulance.

At one stage an occupant of one of the damaged upper units was reported missing. After on-scene crews had completed an initial search and found nothing, urban search and rescue resources were contacted to make collapsed areas safe. The resident was later found safe and well outside the building.

It was decided that the priority for evacuation was levels 20 and up, and that the whole building had to be evacuated because of the structural damage, inoperable lifts and lack of utilities. From level 20 up, force was used to gain entry to units to ensure that there were no residents remaining. Below that, firefighters doorknocked on all units.

Evacuation operations



Ambulance Service folding chair
- folded



Unfolded



Firefighters from 1 City of
Sydney B Platoon demonstrate
using the chair

All residents who were unable to self evacuate were assisted down the fire stairs by firefighters. This took about three hours to complete.

Wheelchairs

The four residents in wheelchairs were carried down in their wheelchairs. As the stairs were only one metre wide, it was difficult to get the heavy wheelchairs down. It took a minimum of four firefighters to carry a wheelchair, and a backup crew was required so that crews could be rotated every few floors.

Carrying residents down stairs

Firefighters used chairs to carry residents down the stairs. The Ambulance Service provided some folding chairs which were very useful. Stretchers were not used, as they would have been too difficult to manoeuvre on the narrow stairs.

Firefighters also used steel frame chairs taken from units. These were easier to hold and were considered safer than wooden chairs. Once the resident was down, the chair was returned to the unit it came from.

Generally, four firefighters were needed to carry someone down the stairs in a chair. It could be done with two, but the people being carried felt safer with four. However, in the narrow stairwell this meant firefighters had to exercise care not to scrape themselves on walls and corners.

Lighting

At one stage, all electrical power to the building was cut off as a safety precaution. This meant that the lights in the fire stairs went out, which caused considerable difficulties.

Firefighters used torches and considered setting up a lighting system, but this would have meant running cables up the fire stairs, which was impractical given the traffic on the stairs.

After about 30 minutes it was decided to turn the power back on because it was too difficult to operate in the stairways without it.

The shopping centre

The shopping centre at the base of the tower was also evacuated. As the explosion had set off the shopping centre's fire alarms, the evacuation was largely conducted by the centre's security guards in accordance with their emergency plans and was completed early in the operation.

After evacuation



Repair work will take some months to complete

As residents were evacuated from the building, they were taken to an assembly area where the Police took down their details. It was quite difficult to identify residents who had self-evacuated early, so the assembly area needs to be set up as soon as possible.

Paramedics were also there to assist any residents who needed medical attention. Many elderly residents had not been able to bring their medications with them. As the hours went by and their next dose became due, this became a source of considerable anxiety.

The Police made arrangements with the Leagues Club next door for residents to go there and be provided with refreshments while it was decided whether they could return to their homes. NSWFB Officers accompanied Police to give briefings to the residents on the progress of the incident.

Unfortunately for the residents, the building was declared uninhabitable. At the time of writing, it appears that they will not be able to return to their homes for some months until structural work on the building is completed and lifts and utilities restored.

The District Emergency Management Officer (DEMO) was contacted early and arrived in the early stages of the incident. He took responsibility for the logistics of finding alternate accommodation for the evacuees. Many residents were members of the Jewish community. The Jewish Emergency Response Plan was activated to assist with accommodation and support.

How many people need help to evacuate?

Approximately one-fifth of all households have at least one household member who would have difficulty evacuating without help in an emergency.

Source: Australian Bureau of Statistics, [Household preparedness for emergencies: NSW, Vic, Qld and ACT, Oct 2007](#), Cat No 4818.055.001

In 2001, 13% of people living in high rise units were aged 65 years and older.

Source: Australian Bureau of Statistics, Australian Social Trends 2004: [Housing and Lifestyle: High Rise Living](#), Cat No 4102.0

Crew management

Crew accountability

Crew accountability was a challenge, due to the size of the building. The Incident Crew Management System (ICMS) board was set up at the entrance to the building, but it was difficult to keep track of the location of crews within the building. This was complicated by difficulties with radio communications within the building.

If possible, crews should keep together in their teams of four. However, crews often split up to assist different residents or undertake other tasks. This meant that they were often going in and out in ones or twos, which ICMS is not set up to handle.

Crew welfare

In the initial stages of the incident, while there was the possibility of fire, hazardous atmospheres or further collapse, firefighters carried out operations in full structural firefighting uniform and breathing apparatus. Later, when the risk level was lowered, a lower level of





Luckily, the weather was mild

protective equipment could be used, which made evacuation operations easier, but helmets were worn at all times.

Luckily the incident occurred on a mild day. If it had occurred on a hot day, many more crew rotations would have been necessary. There was plenty of water available at all times and crews were rotated regularly.

There were several major incidents in Sydney that day, and some crews were responded to other incidents immediately on giving a Code 4. Incident Controllers should consider whether crews should be immediately available for response on leaving an incident, or whether they require further recovery time before reassignment.

Lessons learned

1. High rise apartment buildings are likely to have a proportion of elderly residents who may be unable to manage the stairs. If the lifts are not working, evacuating a high rise residential building will require considerable additional resources.
2. Carrying a person down stairs requires at least four people. Wheelchairs will require at least eight, so that carriers can be rotated.
3. The Ambulance Service carries folding chairs that can be used for carrying people down stairs. Ordinary steel frame chairs can also be used.
4. If possible, allow people to gather their medications, wallet and mobile phone before evacuating them.
5. Whenever possible, maintain lighting to the fire stairs. If the power has to be shut off, an alternate lighting system will be required.
6. If two sets of stairs are available, consider using one for operations and the other for evacuations.
7. Crew management is going to be an issue. Make sure sufficient resources are allocated to ICMS functions.
8. Set up an evacuee assembly area as soon as possible, to ensure that Police can record the names and unit numbers of evacuees and identify who is missing.
9. Call the District Emergency Management Officer (DEMO) early to assist with logistics and recovery operations.
10. Call for engineers to assess the structural integrity of the building. Engineers may be sourced from the local council or through the DEMO.
11. Consider whether crews leaving a major incident should be immediately available for reassignment or should be given additional time to recuperate.

Information sources

*Interview with Insp Wayne Buxton and SO James Murphie.
Debrief Report by Insp Buxton.
Minutes of Operational Debrief held 8 April 2009 for attending officers and crews.*

*NSW Department of Commerce, Engineering
Emergency Management
Incident Report, 30 March 2009.*

*Photos by Insp Bob Alexander
and SO Luke Unsworth.*

