MW1 C STATION TRAINING AND INCIDENT CASE STUDIES

FILE NO. 2024 /07.

LEARNING FROM THE PAST: 14 PUMPERS AND 2 AERIALS CALLED TO SMITHFIELD PALLET FACTORY FIRE

"Learning from Excellence…

To Protect the Irreplaceable."

Cover Picture: Firefighters protected multiple exposures located in close proximity to the involved factory. Firefighters encountered ferocious fire activity.

Incident Video (**Control + Click** on YouTube symbols to watch)

Incident Summary:

Shortly after midnight on Thursday 18th September 2003, firefighters were called to reports of a "*rubbish fire*" at 165 Woodpark Road, Smithfield. When the first pumper arrived on scene, they discovered a well-developed fire burning inside a timber pallet manufacturing factory. The fire was rapidly increasing in size and intensity. As firefighters commenced initial firefighting operations attempting to cut the rapidly spreading fire off, large flames broke through the roof, the fire continued to increase in intensity and explosions began to occur. The factory yard contained stacks of timber used in the manufacturing process and a large stack of finished pallets. Exposures were located in close proximity at the sides and to the rear of the involved factory. Fire conditions continued to worsen. Fierce flames at least 20 metres high were extending above the roof of the factory. The fire was beginning to generate its own wind and extreme radiant heat, continuing explosions and deteriorating conditions were forcing attacking firefighters to withdraw.

A major firefighting operation commenced to contain the fire to the premises of origin. The large timber pallet stack and a number of timber stacks in the factory yard became fully involved in fire. Firefighters gained entry to exposures on all sides of the involved factory and commenced operations to try and save the heavily threatened exposures. Fire intensity was so extreme that venting flames were rolling across entire roofs of adjoining factories. Firefighters operating forklifts were moving large quantities of stock out of the fire's path. Firefighters operating 70 mm handlines were fighting a desperate battle to protect heavily threatened exposures. The intensity of the fire caused part of the wall of an exposure building to collapse into the fire. From within the threatened factory firefighters battled to stop fire from coming through the breached wall. Aerial appliances were operating, trying to stop the fire's advance and reduce the fire's intensity. Firefighters were attempting to cool a bulk LPG supply tank being impacted by intense radiant heat. Multiple water relays were in place to provide the large volumes of water necessary for firefighters to fight the fire. Operations were conducted on a large and complex fireground, necessitating establishment of an effective fireground command structure, enabling firefighting to be undertaken in a systematic and coordinated manner, in accordance with the Incident Controllers aims and objectives. The challenges facing firefighters at this fire were enormous, however the extremely positive incident outcomes achieved are a reflection of the exemplary and "textbook" fireground command and the determined and enormously professional operations carried out by firefighters. From such a challenging fire, there are many positive lessons to be shared.

Incident Type: Factory and Large Timber Pallet Stack Fire.

Abbreviations/Acronyms Used in this Report:

BA – Breathing Apparatus.
BLEVE – Boiling Liquid Expanding Vapour Explosion.
FRNSW – Fire and Rescue NSW.
LPG – Liquefied Petroleum Gas.
NSWFB – New South Wales Fire Brigades.
PPC – Personal Protective Clothing.
SCBA – Self Contained Breathing Apparatus.
SO – Station Officer.

Relevant Definitions Used in this Report:

Fire brigade booster assembly: Terminology used within AS 2419.1 to describe the booster fitting and installed equipment used by firefighters to increase pressure and flow within the installed fire main.

Special Note:

On the occasion of this fire some of the current FRNSW terminology was not in use. The terminology in use at the time has been retained, to maintain the highest level of incident authenticity as possible. Predominantly, the Alarm Response Protocol system had not been introduced. Also, changes to Incident Management terminology had not been introduced.

Time, Date and Place of Call:

0013 Hours on Thursday 18th September 2003 to 165 Woodpark Road Smithfield, to a report of "*rubbish alight*."

FRNSW Response:

Pumpers 41 (Smithfield), 72 (Merrylands), 57 (Wentworthville), 73 (Fairfield), 27 (Parramatta), 55 (Guildford), 43 (Seven Hills), 49 (Cabramatta), 85 (Chester Hill), 67 (Northmead), 101 (Bonnyrigg Heights), 65 (Rydalmere), 52 (Campsie) and 14 (Ashfield), Ladder Platforms 27 and 8 (Liverpool), Rescue 8, 9 Hazmat 1, 9 Hazmat 2, 9 Hazmat 3, 9 CO2 and Incident Control Vehicle 1.

Operational Commander West 1 Inspector Ian Drinkall, Operational Commander West 6 Inspector Peter Shapter, Zone Commander West 2 Superintendent Andrew McLeod, Regional Commander Assistant Commissioner Murray Kear, Commissioner Greg Mullins, Principal Instructor West Inspector Steve Lyons, State Operations Liaison Officer Superintendent Ian Krimmer, OIC Hazmat Inspector Glenn Launt, Community Risk Management Officer Station Officer Steve Woods, Fleet Operations Officer Station Officer Bill Ewing and Operations Photographer Senior Firefighter Kernin Lambert.

An additional 18 fire appliances and 12 specialist and senior officers attended the scene for fire duty purposes.

Additional Agencies/Services in Attendance:

NSW Police Force, NSW Ambulance, Electricity Authority, local council and site heavy machinery operators.

Fireground Description:

Main Fire Occupancy - 165 Woodpark Road, Smithfield, a premises known as "*Smithfield Pallets and Fences*", engaged in the manufacture of timber pallets and fences. The Mian Fire Occupancy was 60 m x 30 m, portal steel frame, brick clad, with a cement sheet roof. The building was not fitted with any form of fire detection or suppression systems.

Stacked timber was located in a 50 m x 20 m section of factory yard immediately to the north of the fire building. Stacked pallets (10 metres high) were located in a 20 m x 60 m section of factory yard, 3.0 metres to the east of the fire building. A narrow passageway 3.0 metres wide separated the fire building from the pallet stacks.

Exposure B (Bravo) - 167 Woodpark Road, Smithfield, a premises known as "*Dats*", engaged in the warehousing of general merchandise goods. At the time of the fire, the building was completely full of stock, stacked in cardboard boxes on pallets, from floor to ceiling; This stock mainly consisted of plastic Christmas trees and decorations. The building was single level, 105 m x 40 m, concrete "Besser" block clad, iron frame with a metal saw-tooth roof. Exposure B was separated from the fire building by a gap of thirty centimetres.

Exposure C (Charlie) - A two level block of four factory units, 100m x 30m, brick clad, iron frame with a fitted metal clip-lock roof. Stacked timber from the fire building was stored against the Exposure C southern wall. All occupants of the factory units were engaged in timber/carpentry businesses.

Exposure D (Delta) - 163 Woodpark Road, Smithfield, a premises known as "Mater Bench Tops", engaged in the manufacture of timber kitchens. A two level building, 24m x 90m, concrete "Besser" block clad, iron frame, fitted metal roof. The building contained a large quantity of timber, paints, thinners, lacquers and glues. The building was fitted with an automatic sprinkler system.

Fireground Installed Firefighting Systems:

The Main Fire Occupancy contained no installed firefighting systems or fire detection systems.

Weather at Time of Call:

Temperature 19.1°C, relative humidity 46%, Winds northwest at 26 km/h (unknown gusts), nil rain, cloud 0/8 and mean sea level pressure 1006.6 hPa recorded at Bureau of Meteorology Sydney Airport automatic weather station (approximately 22.5 km from the fireground).

Situation Prior to FRNSW Arriving on Scene:

The business had ceased operations at about 1700 hours on Wednesday 17th September. The business was closed and locked.

Initial Call and Response:

At 0013 Hours on Thursday 18th September 2003, NSW Fire Brigades Alexandria communication centre received a single '000' call to a report of "*rubbish alight*", at 165 Woodpark Road, Smithfield. Pumper 41, under the command of S.O. Frank Rodighiero, was assigned to the call. As Pumper 41 travelled along Woodpark Road, firefighters could observe a slight smoke haze in the distance.

First Crews Arrive on Scene:

Pumper 41 arrived on scene. From the driveway at the front of the building, firefighters could see heavy fire activity coming from the property of the reported address, however they could not see exactly what was burning.

Firefighters located an entry gate to the site secured by a padlock and chain and after cutting the security chain were able to gain entry to the yard on the eastern side of the factory. After gaining entry to the site, S.O. Rodighiero observed a fire burning fiercely in the centre section of the factory building, spreading rapidly in a southerly direction towards the front of the building. The fire was continuing to increase in intensity as it increased in size. Heavy smoke and fire prevented firefighters from seeing if there had been any fire spread into the external timber or pallet stacks in the factory yard.

Response Increased to Six Stations:

S.O. Rodighiero observed that the fire was beginning to rapidly take hold of the factory and at 0027 hours transmitted the following **RED** message, requesting the response be increased to six stations (Equivalent to a Structure Fire 3rd Alarm):

"SYDNEY COMS, PUMPER 41 RED! RED! RED! FROM 165 WOODPARK ROAD, SMITHFIELD, WE HAVE A BUILDING 20 M X 60 M, BRICK AND IRON CONSTRUCTION, CEMENT SHEET ROOF, THE FIRE INVOLVES A PALLET FACTORY, CONTAINING A LARGE QUANTITY OF TIMBER, WELL ALIGHT AT THE REAR, MAKE STATIONS 6, OVER."

As a result of the above call for assistance, Pumpers 72, 57, 73, 27 and 55, as well as Ladder Platform 27, Incident Control Vehicle 1, 9 Hazmat 2, 9 CO2, Rescue 8, Operational Commander West 1, Operational Commander West 6, Zone Commander West 2, Principal Instructor West, State Operations Liaison Officer, Fleet Operations Officer and Community Risk Management Officer West were responded to the fire.

Initial Firefighting Operations:

Pumper 41 pump operator Firefighter Peter Tutty commenced to secure a water supply for the appliance. Pumper 41 Firefighters Hugh Strain and Joe Kaposi advanced a 38 mm attack line from Pumper 41 into the three-metre-wide pathway at the side of the factory and directed an attack stream onto the fire, attempting to cut the forward spread of the fire off. A short time after commencing firefighting, this line was changed to a 70 mm attack line to increase the flow of water going onto the fire. Despite the best efforts of the initial fire attack crew to try and stop the fire's progression, the fire was now burning with strong intensity and spreading forward rapidly. S.O. Rodighiero describes fire conditions:

"We were encountering heavy fire conditions and intense heat. There were a number of explosions occurring inside the factory. Intense flames were spiralling upwards. Fire conditions were ferocious. The heat was so intense it was extremely difficult for us to maintain our position."

Firefighters observed a delivery truck loaded with timber pallets, parked in the driveway, close to the external pallet stack. Firefighters were able to start and drive the truck from the premises, removing fuel-load from the fire's path.

LPG Danger Identified:

As the Pumper 41 crew continued to direct the handline stream into the involved factory, attempting to cut off the fire's spread, a number of explosions occurred within the factory. S.O. Rodighiero observed several LPG powered forklifts within the factory and a number of stored 15 kg LPG cylinders located close to the factory. Fire intensity was continuing to increase and the heat being produced by the fire was making the location firefighters were located in untenable. Realising there were now significant dangers of BLEVEs (Boiling Liquid Exploding Vapour Explosions) associated with the LPG cylinders occurring, the I.C. directed that firefighters begin to withdraw from their current positions and switch the handline attack to a ground monitor. The ground monitor was used to direct a protective master stream between the fully involved factory and the large pallet stack just three metres to the east of the factory. The I.C. established an exclusion zone for 25 metres in all directions around the LPG cylinders.

Fireground Command Structure:

Initial Incident Controller S.O. Rodighiero established a fireground command structure, as follows:

Incident Controller - Pumper 41 S.O. Rodighiero.
Sector A - Woodpark Road (at the front of the Main Fire Occupancy).
Sector D- Factory yard to the east of the Main Fire Occupancy.
Exposure B- Warehouse to the west of the Main Fire Occupancy.
Exposure D- Pallet stack to the east of the Main Fire Occupancy.

Pallet Stack Becomes Involved in Fire:

The involved factory was now producing intense radiant heat, large flames and significant embers and fire-brands from the burning timber.

N.B., stacked timber was located in a 50 m x 20 m section of factory yard immediately to the north of the fire building. Stacked pallets (10 metres high) were located in a 20 m x 60 m section of factory yard, 3.0 metres to the east of the fire building. A narrow passageway 3.0 metres wide separated the fire building from the pallet stacks.

A north westerly wind was pushing fire activity towards the pallet stacks, which quickly began to ignite. Intense fire activity, severe radiant heat and continuing explosions prevented firefighters from gaining access to the pallet stacks to commence extinguishment. The main considerations of the I.C. were as follows:

"The heat being produced by the fire was extremely intense. There was no way of getting further into the yard to try and attack the pallet stack fire. I had the benefit of experience of attending a number of large pallet stack fires in the 1980's and realised that it was extremely hard to extinguish these types of fires. The factory was now fully involved and could not be saved. Our priority now was to try and save the surrounding factories that were heavily under threat."

Protection of heavily threatened Exposure B:

Fire was now burning so fiercely within the fire building, the western wall of the factory had collapsed, allowing flames to directly impinge onto the Exposure B walls. Exposure B was a large warehouse, 100 m x 40 m, completely full of stock, stacked in cardboard boxes on pallets, from floor to ceiling; this stock mainly consisted of plastic Christmas trees and decorations. Exposure B was separated from the fire building by a gap of thirty centimetres. The vertical aspects of the sawtooth roof were formed from glass panels, which were now being heavily impacted by heavy flames and intense radiant heat.

Pumper 57 firefighters, under the command of S.O. Criag Davies, advanced a 70 mm attack line from pumper 73 and directed a protective steam between the fire building and exposure B. Firefighters also directed the attack stream onto the fire through the opening created by the wall collapse. S.O. Davies noted fierce flames were venting from this opening and impacting the wall and roof of Exposure B, placing the warehouse in significant danger.

In conjunction with the operations being carried out by the handline crew from Pumper 57, Pumper 27 firefighters, under the command of S.O. Tom Clarkstone, gained entry and advanced a 38 mm protection line from Pumper 73 into the Exposure B warehouse, which was utilised to extinguish spot fires caused by fire spread through the roof openings.

Transfer of Incident Control:

Operational Commander West 1 Inspector Drinkall arrived on scene. Following a handover briefing, Incident Control was transferred to Inspector Drinkall and S.O. Rodighiero appointed Sector Commander A.

Fire Behaviour Considerations

The following fire behaviour considerations are of note:

1. Timber pallets in Australia can be made from either softwood or hardwood, however most pallets are made from softwood (pine) because of lower costs. The standard dimensions of timber pallets in Australia are 1165 mm x 1165 mm x 150 mm and pallet weight is 35 kg.

2. The storage arrangement (vertical stacking) of timber pallets contributes to advanced fire behaviour. The open space between pallet stacks stored adjacent to each other acts as a channel, creating a drafting effect, drawing air vertically through the stacks and increasing the rate of vertical fire spread. Early fire growth, flame propagation and fire development is much more rapid for pallets stored in vertical stacks. The vertical stack storage arrangement of the pallets accelerated vertical fire spread, due to very rapid vertical fire spread/flame propagation, resulting increased rates of convective heat release, gas temperatures, gas velocities and flame heights. Fire growth and heat release rates increase exponentially in accordance with the height of the pallet stack.

3. The pine used in the construction of softwood pallets has a heat release rate of 45 kWm^2.

4. Pallet stacks are often located in open yards (as opposed to within a building surrounded by walls). In these situations, there is often minimal shielding from the large quantities of radiant heat produced from the burning pallet stacks. The large quantities of radiant heat produced from a burning pallet stack will be radiated in all directions.

5. Burning pallet stacks will produce large quantities of embers, carried aloft by the intense thermal updraft associated with a pallet stack fire.

6. Flame height at the Woodpark Road fire was quite high, approximately 20 metres above the pallet stacks.

Breathing Apparatus/Hazmat Operations:

Firefighters from Breathing Apparatus/Hazmat section established Main B.A. Control on Woodpark Road at the front of the fire building. A Stage II B.A. control board was in operation at Main B.A. Control. SCBA air cylinders were changed and air-sets were serviced. B.A. Hazmat firefighters monitored SCBA crews for signs of heat stress and provided drinking water for firefighter hydration.

Electricity Disconnected:

Electricity Authority operators attended the scene and disconnected power to the fire building and Exposures B and D. Overhead 33 kV lines were located in close proximity to the fireground. Electricity operators reported these lines had been de-energised.

Response Increased to 10 Stations:

Firefighters were now drawing the water supply to its limits. At 0053 hours, the Incident Controller sent a further **RED** message to make pumpers 10, for the provision of additional pumpers for relay pumping. Pumpers 43, 49, 67 and 85 and Ladder Platform 8, as well as Regional Commander West and the Commissioner were responded to the fire. At 0112 hours the Incident Controller sent the following situation report:

"SYDNEY COMS, OPERATIONAL COMMANDER WEST ONE BLUE. WE HAVE A FIRE INVOLVING A PALLET FACTORY, BRICK AND IRON CONSTRUCTION, 60 METRES X 30 METRES, TOTALLY INVOLVED. WE HAVE ONE LADDER PLATFORM AND 3 PUMPERS AT WORK. WE HAVE 6 HAND LINES AND ONE GROUND MONITOR IN OPERATION. EXPOSURE B IS A WAREHOUSE CURRENTLY BEING PROTECTED BY LADDER PLATFORM 27. EXPOSURE D IS A KITCHEN MANUFACTURER AND IS UNDER THREAT. FIRE HAS SPREAD INTO EXPOSURE D AND IS CURRENTLY BEING PROTECTED. WE ARE SETTING UP WATER RELAYS, OVER."

Fire Behaviour Considerations

The following fire behaviour considerations are of note:

1. As well as involving the large pallet stack, the fire also involved a number of timber stacks used to manufacture the pallets. Fires involving timber stacks have high heat release rates, resulting in the production of high levels of radiant heat.

2. Fuel loads in timber yards are normally quite high.

3. Although not immediately obvious, sections of the stacked timber are located on strips of wood creating vertical air gaps between the stacks, increasing aeration and increasing the surface area to mass ratio of the fuel load. This can result in increased fire spread and fire intensity.

4. Some of the timber was loosely stacked, increasing aeration and increasing the surface area to mass ratio of the fuel load. This can result in increased fire spread and fire intensity.

5. Burning timber stacks can be extremely slow and difficult to extinguish. When heat penetrates below the surface to the inner core of the timber, firefighting water will cool the surface of the timber, however heat will continue to be released from within the timber, causing re-ignition to occur (At temperatures exceeding 250°C, wood pyrolysis occurs, releasing combustible gases including carbon monoxide, methane and methanol. The presence of oxygen in the air causes combustion to occur).

Protection of heavily threatened Exposure D:

The large timber pallet stack located against the Exposure D wall was rapidly becoming totally involved and presenting a serious threat to Exposure D, a kitchen manufacturer containing large quantities of timbers, adhesives and other combustible products. The pallet stack was 20 metres x 60 metres in size and 10 metres in height. Fire activity through the pallet stack was ferocious. Enormous flames were extending at least 20 metres into the air, producing extreme levels of radiant heat, resulting in the Alsynite skylight panels above the Exposure D factory melting. The burning pallet stack was producing large quantities of embers. The openings in the roof of the exposure D factory created by the melting skylights allowed embers to enter the factory, placing the stored materials inside the factory at risk of ignition.

Pumper 72 firefighters, under the command of Captain Glenn Fitzhenry, were tasked by the I.C. to commence protection of Exposure D. Pumper 72 firefighters wearing SCBA positioned a 70 mm line on the western side of Exposure D and directed a protective stream between the burning pallet stack and the heavily threatened Exposure D.

Pumper 55 firefighters wearing SCBA, under the command of S.O. Dave Tai, gained entry to exposure D and advanced a 38 mm line into the factory office to investigate for fire spread. Firefighters wearing SCBA advanced a further two 38 mm lines into the Exposure D factory. While firefighters were inside the factory, extreme fire and large flames from the fully involved pallet stack began rolling across the roof of the Exposure D factory, directing intense levels of radiant heat downwards into the factory. The radiant heat was also impacting the structural steel of the Exposure D factory. Firefighters were directing the 38 mm hose streams onto the exposed upper steel frame and Alsynite panels, attempting to cool the structural steel and reduce the intensity of heat entering the factory. As fire intensity continued to increase firefighters removed a truck out of danger from inside the factory.

The intensity of fire from the burning pallet stack was so severe, a 10-metre section of “Besser” block wall along the western side of the Exposure D wall collapsed into the fire, allowing the fire to directly impact the interior contents of the factory. Pumper 67 firefighters Peter Watson and John Lewis positioned a ground monitor inside the factory and directed the monitor stream onto the opening created by the wall collapse, stopping fire from entering the factory through the breached wall. Two 70 mm lines from Pumper 72 supplied water to the ground monitor. Pumper 72 Captain Fitzhenry was operating a forklift inside the factory, moving timber stacks away from the wall breach out of danger.

Bulk LPG Tank Under Threat Protected:

A bulk LPG welded steel tank was located at the rear of the Exposure D factory and being impacted by intense radiant heat from the pallet stack fire. Firefighters positioned a 70 mm line from Pumper 72 at the rear of Exposure D and directed a cooling stream onto the threatened bulk LPG tank, preventing a catastrophic BLEVE (Boiling Liquid Exploding Vapour Explosion) of the tank from occurring. Pumper 72 pump operator Retained Firefighter Phil Dowling was extremely busy, ensuring supply was maintained to the two 38 mm attack lines and two 70 mm lines connected to Pumper 72.

Operations Continue to Protect Exposure B:

Intense flames and fierce fire activity continued to explode through the roof of the involved factory, placing Exposure B under worsening threat. Ladder Platform 27 was positioned in front of Exposure B. The 70 mm handline being used by Pumper 57 firefighters was shut down and reconnected to Ladder Platform 27. Water supply to Ladder Platform 27 was provided by Pumper 27. From the aerial cage of Ladder Platform 27, operator Firefighter Grant Creighton utilised the aerial stream to sweep along the eastern wall of Exposure B, cooling the unprotected wall and preventing fire from entering the exposure. The aerial stream was also alternately directed into the fully involved factory.

Embers were entering the Exposure B warehouse through openings in the breached vertical glass panels of the sawtooth roof along the eastern side of the warehouse and landing on cardboard boxes stacked to roof level, beginning to ignite new fires. Pumper 49 firefighters, under the command of S.O. Steve Moran, were located within the Exposure B warehouse, operating forklifts to remove threatened stock from along the eastern wall of the warehouse. Firefighters moved over 60 pallets of stock out of danger. Within the warehouse firefighters were encountering extreme levels of heat. A 38 mm protection line operated by Pumper 27 firefighters was in place during these operations.

Water Relays Established:

A water relay was established from a 200 mm diameter water main located to the west of the fireground to supply water to Ladder Platform 27. The relay consisted of Pumper 55 (base pumper) and Pumpers 73 and 27, supplying water to Ladder Platform 27.

A second water relay was established from a 200 mm diameter water main located to the east of the fireground. Base pumping appliance Pumper 85 obtained water from mains via two 70 mm lines. Water was relayed from Pumper 85 to Pumper 57 and from Pumper 57 to Pumper 67.

Further Transfer of Incident Control:

Zone Commander Superintendent Andrew McLeod arrived on scene. Following a handover briefing, incident control was transferred to Superintendent McLeod and Inspector Drinkall appointed Operations Officer. Superintendent McLeod describes firefighting priorities and challenges:

“Exposures B and D were being heavily impacted by fire and were under heavy threat. The fire was spreading towards Exposure C, which was also under threat. Our priority was to protect these exposures. Exposures B and D were being protected, however we were having trouble locating access to Exposure C. We were also experiencing significant water supply problems, which we were attempting to overcome through the establishment of water relays.”

Response Increased to 14 Stations:

Firefighters were fully committed protecting heavily threatened Exposures B and D. The fire was continuing to expand in a northerly direction through the timber stacks towards Exposure C, necessitating the deployment of firefighters to Sector C to protect the Exposure C factory complex that was in the fire's path. At 0225 hours, the I.C. transmitted a message requesting the attendance of four additional stations, resulting in Pumpers 101, 14, 65 and 52 being responded to the incident.

Operations to Protect Exposure C:

Stacked timber from the fire building was stored against the southern wall of Exposure C. Heavy fire was burning through the pallet stacks in the rear yard of the fire building, spreading towards the timber stacks against the Exposure C wall, potentially placing the Exposure C factory complex under threat.

Firefighters laid a 70 mm line from Pumper 57 to the north western corner of Exposure D and directed an attack stream onto the advancing fire within the timber and pallet stacks in the factory yard of the fire building. Firefighters were attempting to stop the northerly spread of the fire through the timber stacks towards Exposure C.

Ladder Platform 8 was positioned on the concourse of the Exposure C factory complex. A water relay from the Percival Street main was established to supply water to Ladder Platform 8. The relay consisted of Pumpers 65 (base pumper) and 101 (intermediate pumper). The Ladder Platform 8 aerial stream worked in conjunction with firefighters operating the 70 mm handline to stop the fire spreading towards the timber stack against the Exposure C wall. The aerial stream was also used to attack the fire burning in the involved factory and the burning pallet stack. The combined operations from Ladder Platform 8 and handline crews on the ground successfully stopped the fire from reaching the timber stacks located against Exposure C.

Fireground Command Structure Expanded:

With the arrival of additional senior and specialist officers at the fire, the following expansion of the fireground command structure occurred:

Incident Controller- Superintendent Andrew McLeod
Operations Officer- Inspector Ian Drinkall
Safety Officer- Inspector Steve Lyons
Safety Officer- S.O. Steve Woods
Sector A Commander- Pumper 41 S.O. Frank Rodighiero
Sector B Commander- Pumper 27 S.O. Tom Clarkstone
Sector C Commander- Pumper 55 S.O. Dave Tai
Sector D Commander- Pumper 67 S.O. Craig Easy

Fireground Communications:

Incident communications were initially carried out on Channel 510. With the arrival of Incident Control Vehicle 1, tactical incident communications involving members of the fireground command team were switched to GRN talk-group 601.

Further Transfer of Incident Control:

Assistant Commissioner Murray Kear arrived at the incident and a handover briefing was held with Superintendent McLeod, followed by a formal transfer of incident control to Assistant Commissioner Kear.

Commissioner Attends Fireground:

At the height of firefighting operations, Commissioner Mullins attended the incident. The Commissioner received a briefing from Incident Controller Assistant Commissioner Kear, however did not to take control of the incident.

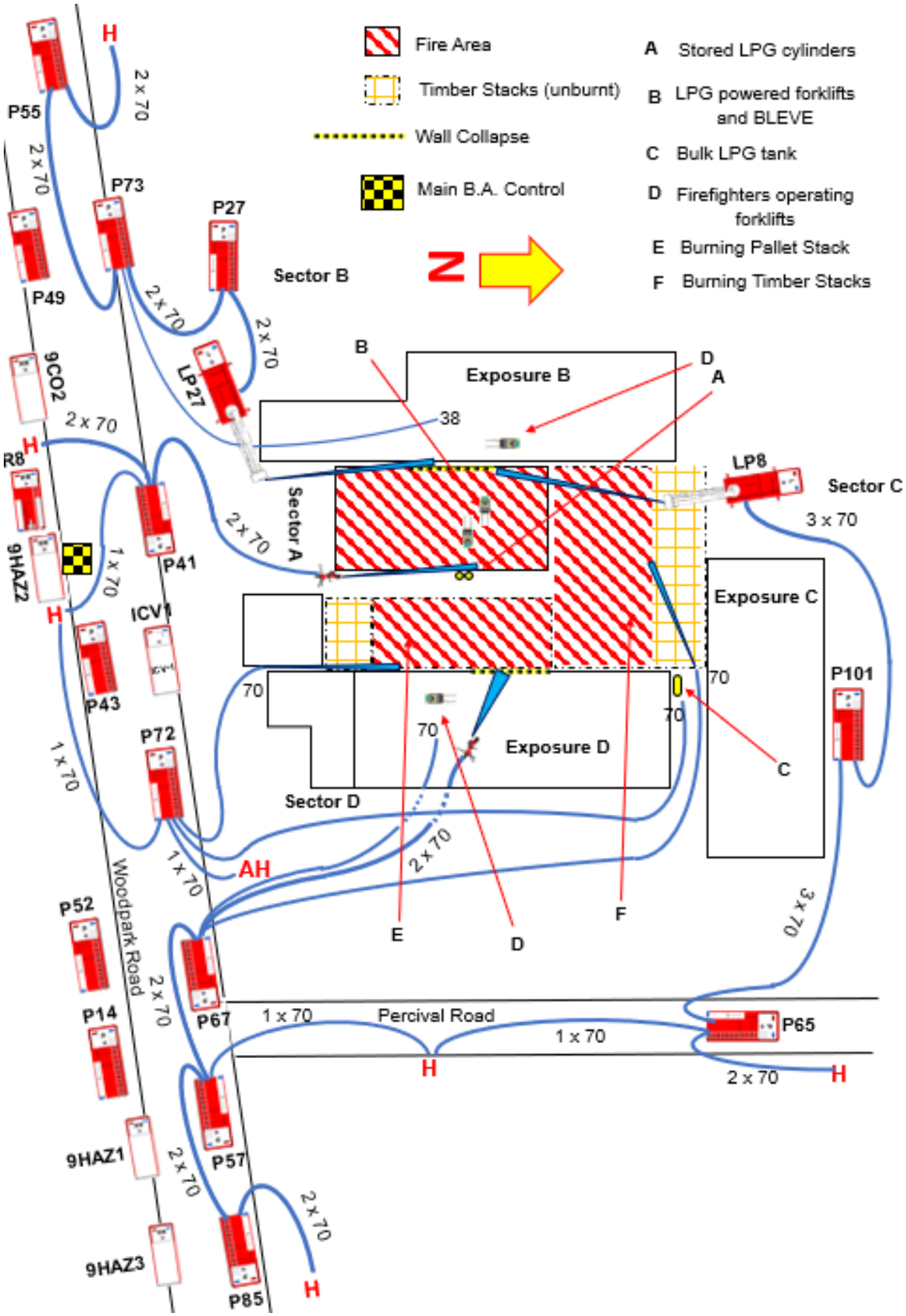
Fireground Command Structure Expanded:

With the arrival of additional senior and specialist officers at the fire, the following expansion of the fireground command structure occurred:

Incident Controller- Assistant Commissioner Murray Kear
Operations Officer- Superintendent Andrew McLeod
Safety Officer- Inspector Steve Lyons
Safety Officer- S.O. Steve Woods
Divisional Commander Sectors A and B- Inspector Peter Shapter
Divisional Commander Sectors C and D- Inspector Ian Drinkall
Sector A Commander- Pumper 41 S.O. Frank Rodighiero
Sector B Commander- Pumper 27 S.O. Tom Clarkstone
Sector C Commander- Pumper 55 S.O. Dave Tai
Sector D Commander- Pumper 67 S.O. Craig Easy
Relay Group Commander- Fleet Officer S.O. Bill Ewing.

Fire Control Established:

The fire had been burning with fierce intensity. Firefighters had successfully established protection of all exposures and master streams were being directed onto the burning factory and the burning pallet and timber stacks, slowly reducing fire intensity. As fire conditions began to diminish, firefighters wearing SCBA were able to make determined pushes, advancing 70 mm attack lines into the factory yard between the involved factory and the pallet stacks, directing attack streams onto areas of fire. Fire continued to burn intensely within the large timber stacks and firefighters pressed home a determined attack, reducing fire intensity. At this time, there were two (dual 70 mm inlet) ground monitors, two Ladder Platforms, six 70 mm attack lines and one 38 mm protection line in operation. Three water relays formed by ten pumpers were in operation. At 0422 hours Incident Controller Assistant Commissioner Murray Kear declared the fire under control and the fire contained.



Fireground Drawing
(not to scale)

Post Fire Operations:

All firefighting resources remained in attendance for a further two hours, continuing to direct attack streams onto the fire. At 0620 hours the Incident Controller began to release resources from the fireground and a fire duty, consisting of five pumpers, one aerial-pumper and one Operational Commander was put in place. Over the next two days a further 18 appliances attended the fireground, carrying out overhaul operations. Deep-seated fire involving timber stacks was extremely resistant to extinguishment attempts, particularly the application of water. Eventually, after heavy machinery was used to open the timber stacks and provide access to pockets of fire smouldering and burning deeply within the timber, final extinguishment was achieved.

Incident Outcomes

The following incident outcomes were achieved:

1. Multiple exposures located in close proximity and under direct threat from the fire were protected and saved.

2. Delivery trucks and large quantities of stock were removed from the fire's path.

3. Numerous businesses were saved, ensuring business continuity in the local economy was maintained with minimal impact.

4. Very hazardous conditions involving LPG cylinder BLEVEs (Boiling Liquid Expanding Vapour Explosions) were prevented due to the actions of firefighters.

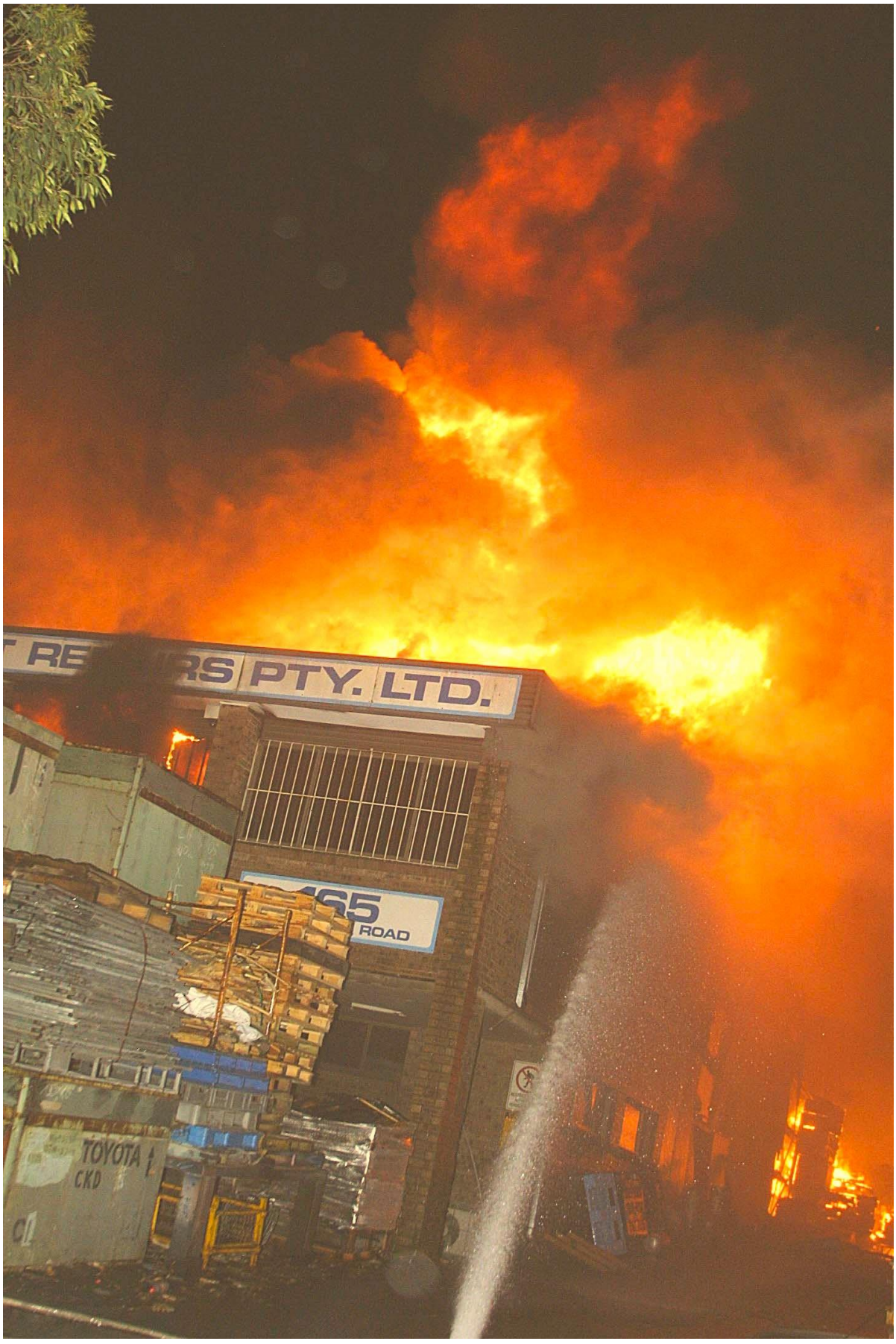
5. The fire was contained, controlled and extinguished.

Conclusion:

The fire situation at Woodpark Road contained many challenges, operational difficulties and hazardous conditions for firefighters. The fire situation consisted of a fully involved factory and large pallet stack. Fire also involved stacked timber in the factory yard. Fire conditions were extreme, consisting of a rapidly spreading fire, high heat release rates, large flames and explosions. The burning pallet stack was producing extreme levels of radiant and large quantities of embers. Several BLEVEs occurred involving LPG cylinders inside the factory. Other LPG cylinders stored in the factory yard and a bulk LPG storage tank were being impacted intense levels of radiant heat. Heavily stocked exposures were located in close proximity on three sides of the fire. Radiant heat from the fire caused roof mounted skylight panels fitted to exposures to fail, allowing the entry of embers and potential for fire spread. The intensity of the fire caused several wall collapses to occur, allowing fire to impact and enter exposures. Water supply in the area was limited.

When firefighters arrived on scene at Woodpark Road, they were facing an uphill battle, as the fire continued to increase in size and intensity, threatening to develop into an industrial urban conflagration. Despite the worsening and deteriorating situation, firefighters commenced to implement operations that would stop the fire spreading, protect exposures being heavily threatened, bring the fire under control and ultimately complete extinguishment. Operations were conducted in a systematic and coordinated manner. The fireground command structure was established by the first arriving stations and continually built out as the incident progressed. Firefighters employed a wide array of tactical operations to meet specific incident requirements, including the operation of forklifts to move pallet loads of stock out of the fire's path, aerial operations, establishment of water relays, SCBA operations, forcible entry into threatened exposures, protection of bulk LPG supply storage with cooling streams, fire attack with 70 mm lines, positioning of ground monitors and numerous other tactical operations. These operations were conducted with determination, skill and professionalism, in the face of intense and extreme fire conditions. The establishment of an effective command structure enabled operations to be conducted safely and effectively, in accordance with the Incident Controller's aims and objectives. This incident represents a textbook example of effective fireground command. There are many positive lessons to be shared from firefighting operations at this fire.

(left) Heavy fire activity vents from the fully involved pallet manufacturing factory. (right) Ladder Platform 27 provides a protective stream along the side of Exposure B. Despite the intensity of the fire, firefighters protected all exposures under threat.



Fierce flames vent from the fully involved factory.

Flames at least 20 metres in height from the burning pallet stack vent into the night sky. Large flames roll across the roof of Exposure D factory, melting the roof skylights, allowing embers to enter. The factory wall has collapsed and firefighters are setting up a ground monitor to stop fire entering the factory.

Large flames produced by the burning pallet stack fire roll across the roof of the Exposure D kitchen manufacturing factory. The intensity of the fire has caused the Exposure D wall to collapse (indicated by arrow). Firefighters Peter Watson and John Lewis (top right) are positioning a ground monitor inside the factory, to stop fire from entering. Operations are being carried under the direction of Sector Commander Pumper 67 S.O. Craig Easy.

Firefighters battled ferocious fire conditions as large flames and explosions erupt from the involved factory. Ladder Platform 27 operates from Sector B, directing an aerial stream along the wall of the Exposure B warehouse, stopping fire from entering the warehouse. The aerial steam was alternated between fire attack and exposure protection. A ground monitor stream is directed into the involved factory.

Firefighter Grant Creighton works from the Ladder Platform 27 aerial cage, directing an aerial master stream along the upper wall of the Exposure B warehouse which is being heavily impacted by fierce flames. Explosions continue to erupt from the factory. Despite these extreme fire conditions, firefighters successfully saved the exposure.

Ladder Platform 27 directs a protective steam along the wall of the Exposure B warehouse. Fire activity from the involved factory was ferocious.

Ferocious fire conditions erupt from the fully involved factory. Ladder platforms 8 and 27 protecting heavily threatened Exposures B and C. Firefighters operating inside Exposure D direct cooling streams onto the breached roof skylights where burning embers are entering.

Exposures on all sides of the factory came under significant threat. Ladder Platform 27 directs a protective steam along the eastern wall of Exposure B. Firefighters have gained entry into Exposure D, where fire is beginning to enter the factory through a collapse wall.

Fierce flames erupt from the fully involved factory. Fire activity was ferocious. Tope left: a ground monitor in operations. Top right and lower left: Ladder Platform 27 attacks the fire and protects heavily threatened Exposure B. Lower right: Firefighters direct a protection stream between the burning pallet stack and heavily threatened Exposure D.

Firefighters begin to push in towards the fire with 70 mm attack lines. Working from the driveway of the factory, firefighters are fighting fire on all sides, involving the fully involved factory, timber stacks and the large pallet stack. Heat from the fire was extreme. All crews are wearing SCBA.

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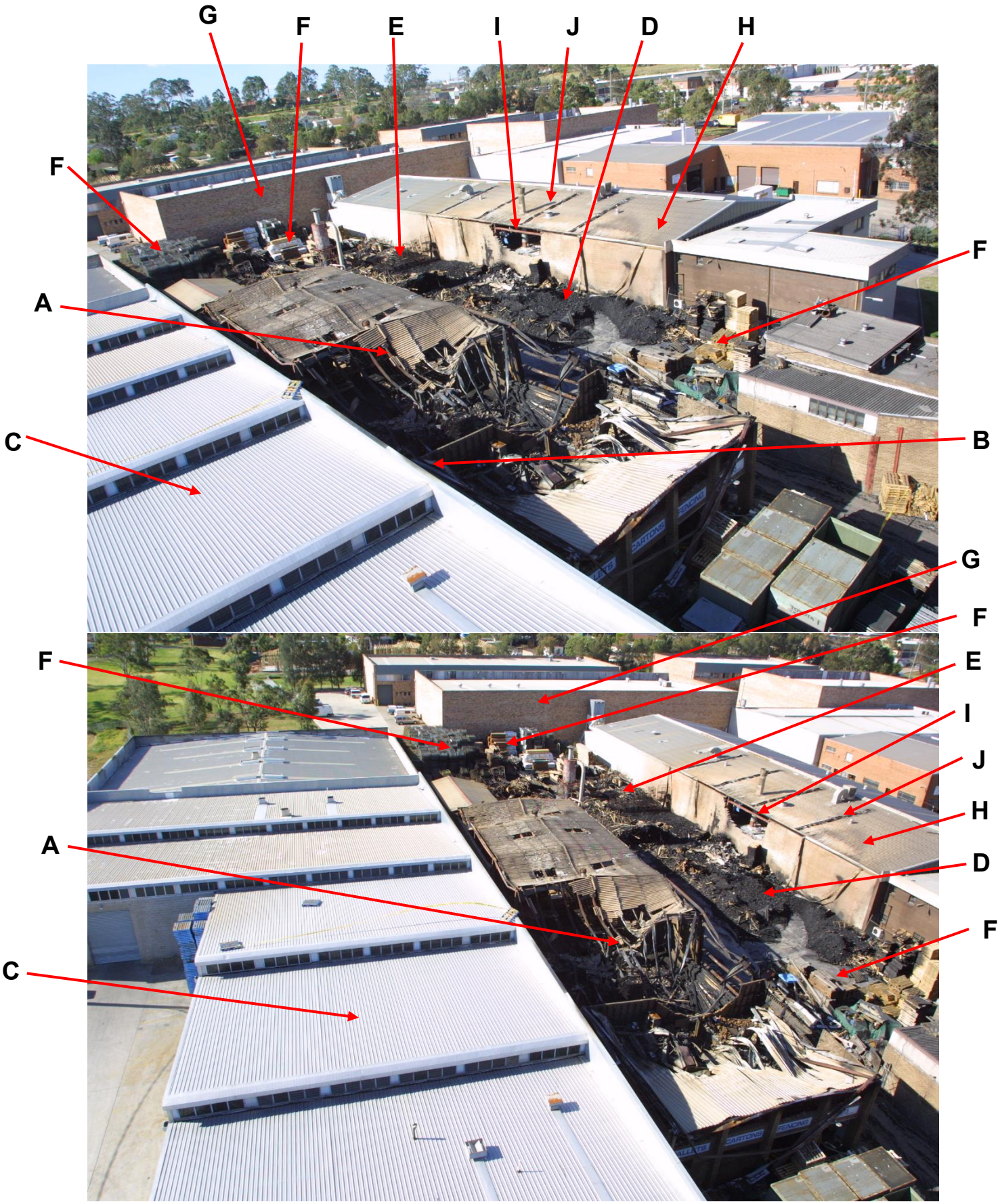
Establishment of an effective water supply was absolutely critical to containing the fire and achieving fire control. Firefighters established multiple water relays. Top: Pumper 27 supplies water to Ladder Platform 27. Lower: Pumpers 67 and 57 relay water to the fireground. Successful relay pumping is a critical requirement at major structure fires. Firefighting can only be effective if there are adequate water supplies.

Commissioner Greg Mullins visits the fireground. The Commissioner receives a briefing from the Incident Controller and Safety Officer aboard the Incident Control Vehicle and talks to crews at the fireground. Firefighters pull attack lines deeper into the factory yard (Middle left).

Fireground Command: Inside the Incident Control Vehicle fireground commanders, including Inspector Steve Lyons (Safety Officer), Superintendent Andy McLeod (Operations Officer), Inspector Peter Shapter (Divisional Commander) and Assistant Commissioner Murray Kear (Incident Controller). The Police Duty Officer was also present as determinations are made concerning the size of the evacuation area.



Aerial view of the fireground, indicating the intensity of the fire and the close proximity of exposures. **A** - Involved factory. **B**- Collapse wall of fire building allowing fire to impact Exposure B. **C** – Exposure B warehouse. **D** - Remains of pallet stack. **E** – Timber stacks involved in fire. **F** - Timber stacks saved. **G**- exposure C. **H** - Exposure D. **I** - Breach in Exposure D wall. **J** – Burnt out roof skylight panels above Exposure D.

Top left: 15 kg LPG cylinders located in the factory yard. Top right: Two LPG powered forklifts inside the factory Both LPG cylinders were involved in BLEVEs. Middle: Interior view of factory. Structural steel has been destroyed. Lower left: View of the driveway into the factory yard. Lower right: Post fire view of the timber stacks in the factory yard.

Exposure D: Fire intensity caused (**A**) a large section of the western wall to collapse, allowing fire to enter factory. Firefighters fought a determined battle to stop the fire spreading into the exposure, which contained (**B**) large quantities of combustible materials. Intense radiant heat also caused the (**C**) roof skylights to melt, creating large openings that allowed embers to enter the factory. Due to the efforts of firefighters, the factory was saved.

Exposure B: Exposure D was under severe attack for a number of hours. The wall of the involved factory collapsed, allowing flames to impact the eastern wall of the Exposure B warehouse. Ladder Platform 27 protected the eastern wall of the warehouse. Firefighters located inside the warehouse operating forklifts moved approximately 60 pallets of stock away from the wall closest to the heavily involved factory. The warehouse and all stock were saved.