

## Section 5: Ensuring Incident Ground Safety

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## Section 5: Ensuring Incident Ground Safety

**Introduction** This document is Section 5 of the New Zealand Fire Service (NZFS) Incident Management – Command and Control Technical Manual.

### Ensuring Incident Ground Safety

#### 5.1 Safety as an absolute priority

**5.1.1 Big picture thinking** It is important that the OIC at any given incident takes a holistic view of safety issues. It is not simply a matter of appointing somebody to ‘keep an eye on things’. In the operational setting, safety of personnel should condition all decision-making, from turn-out to return to station. It should also be linked to the process of information gathering (see Section 3.2.9 and 3.2.10).

**5.1.2 All personnel involvement** In keeping with the requirements of the Health and Safety in Employment Act 1992, all NZFS personnel must accept and exercise responsibility (within their limits of competence) for the health and safety of themselves and others. This applies to every environment that may be deemed (under the Act) a ‘place of work’.

However, given the nature of emergency response situations, it is the incident ground that presents the greatest area of risk to personnel. Consequently, all firefighters must maintain the highest level of alertness throughout the entire duration of an incident. This responsibility will be greatest for officers with command responsibilities, since the decisions they make might place personnel ‘in harm’s way’.

**5.1.3 ‘Rules of engagement’ – the safe person concept**

The assessment of risk associated with the selection of tactics has been discussed at length in the previous chapter. The three basic principles of the Safe Person Concept provide clear ‘rules of engagement’ for the Incident Controller which must be complied with.

However, while the benefits to be derived from selected tactics are usually easy to see, the risks may be less obvious. The judgements required are certainly more complex and demand high levels of professional competence. Competence can only be assured through appropriate training and qualification. Once a hazard is recognised, a control measure must be deployed to ‘eliminate, isolate or minimise’ its effects and the control communicated to those on the incident ground.

## 5.2 Incident ground safety: the big picture

### 5.2.1 Tiered approach

Incident ground safety cannot be effectively managed on a haphazard basis. The service takes a tiered approach by which all personnel contribute to the safety of the firefighter at the ‘sharp end’.

This approach is illustrated at Figure 5.1 below.

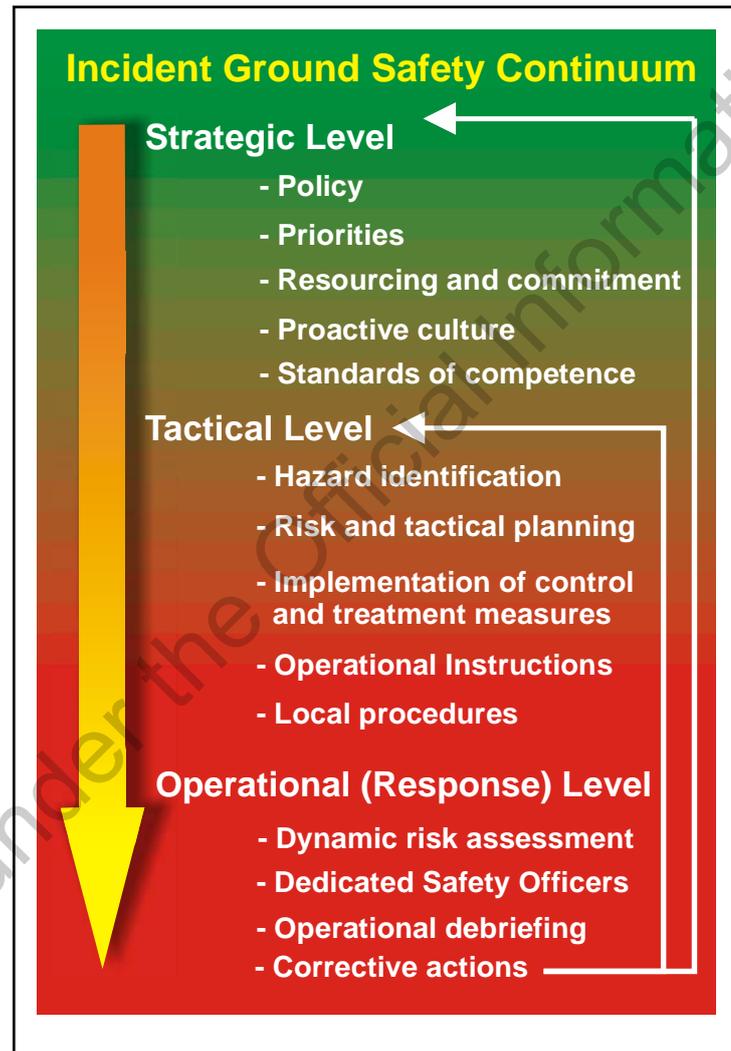


Figure 5.1: Tiered approach to incident ground safety

- 5.2.2 The strategic level** Senior management has a responsibility to formulate and promulgate the framework in which incident ground safety can be managed. This is the strategic level, and will provide for the following:
- Policy – describing the attitude and intent of the NZFS in regard to health and safety. These policies are available on FireNet
  - Generic Hazard Register – identifying common hazards associated with incident types and appropriate controls that have been applied
  - Priorities – identifying through ongoing monitoring and auditing safety issues of greatest concern and promulgating measures to address them
  - Resourcing and commitment – ensuring that appropriate resources are provided to meet the implications of policy and emerging priorities. This will include training, and dealing with urgent actions
  - Proactive culture – promoting the required level of awareness and value that should be attached to health and safety generally and on the incident ground specifically
  - Standards of competence – identifying the standards that define the required levels of operational competence at all ranks and enforcing them.

- 5.2.3 The tactical level** At the tactical level officers and firefighters must devise and utilise tools intended to enhance safety. These include:
- Hazard identification – working to maintain awareness of actual and potential hazards within the turnout area
  - Risk and tactical planning – documenting key operationally relevant data for identified risk locations and the optimum responses to likely emergency situations occurring at those locations
  - Implementation of control measures – working with identified risk locations to isolate, eliminate, or minimise potential hazards that might be encountered during emergency response. This is the primary aspect of Safety Officer duties. Adequate control measures, e.g. heightened supervision, signage, targeted briefings etc. will allow operations to continue in a safe manner
  - Operational Instructions – best practice regulations intended to maximise response effectiveness and safety of personnel
  - Local procedures – arrangements between fire Districts and local stakeholders intended to address peculiar or extraordinary local situations.

- 5.2.3.1 Example** BA crews report a large hole on the second floor of an industrial building. The hazard is reported to the Safety Officer and all crews assigned to the sector are briefed on the hazard and the controls put in place. Typical controls might be:
- A safety briefing or verbal warning on the need to take extra care when in the area
  - Physical barriers put in place when conditions allow.

#### 5.2.4 The operational level

On the incident ground itself, i.e. at the operational level, officers and firefighters are necessarily more reactive and must respond in a dynamic manner as the incident develops. The principal tools deployed here will be:

- Dynamic risk assessment – the Safe Person Concept (already covered in Section 3)
- The exercise of Safety Officer responsibilities – either directly as the IC of smaller scale incidents, or through the appointment of a dedicated person or persons and specific control measures.

### 5.3 Role and responsibilities of the Safety Officer

#### 5.3.1 General responsibilities

Under CIMS, the Safety Adviser is responsible for monitoring safety conditions and developing measures for ensuring the safety of all assigned personnel (Blue Book page 18). He/she reports directly to the IC. Despite the presence of a dedicated Safety Officer, all personnel are charged with the responsibility for assessing and managing the risk they encounter directly on the incident ground. To this end, Operational Instruction *IS 1 – Operational Safety* requires Region Commanders to ensure that all operational personnel are adequately trained in the Safe Person Concept.

Any firefighter or officer encountering a previously unidentified hazard on the incident ground must immediately notify the IC or (in the case of larger scale incidents) their immediate commander.

Officers acting as IC have additional levels of responsibility. Whether or not a Safety Officer is appointed, the incident controller must ensure that:

- All firefighters act in crews under the control of a crew OIC – who may be a Senior Firefighter
- Operational instructions are correctly adhered to
- The identity and location of all personnel present on the incident ground is known at all times
- BA entry control procedures are correctly adhered to
- An appropriate incident management structure is established
- The incident is evaluated for priorities
- Hazards are identified, control measures developed and communicated to all personnel on the incident ground
- Adequate direction is given for the safe conduct of operations
- Effective control is maintained at all times
- Progress is monitored against selected strategy and tactics.

- 5.3.2 Appointment of a dedicated NZFS Incident Safety Officer (ISO) The complexity or scale of an incident may escalate risk or place the monitoring of risk beyond the capacity of the Incident Controller. In these circumstances he/she should appoint a dedicated NZFS Incident Safety Officer (ISO). This is a role that differs from that described in Section 2.4.6 above, in that the NZFS ISO reports directly to the OIC Fire and is responsible for the safety of NZFS operations. They have an indirect link to the CIMS Safety Officer. At a small incident that may have other agencies in attendance, the NZFS ISO will have an oversight role for them as well if they have not appointed their own agency Safety Officer.
- 5.3.2.1 Officers must recognise that their ability to process and evaluate information has natural limits. A refusal to delegate responsibilities through a subordinate command structure can only increase risk.
- 5.3.2.2 Where it is necessary to appoint a NZFS ISO, the OIC Fire must give consideration to someone who has the necessary levels of skill and experience. These skills should include:
- Building construction
  - Hazard assessment
  - Fire behaviour
  - Incident types
  - Fire attack or incident management tactics
  - Command and control.
- 5.3.2.3 At times the OIC will be faced with the need to appoint an ISO from a less experienced pool of firefighters. On these occasions, the ISO will need to work closely with Sector Commanders and the OIC Fire until he/she can be relieved by a more experienced person.
- 5.3.3 Mandatory appointment of a dedicated NZFS Incident Safety Officer (ISO) Operational Instruction *IS 1 – Operational Safety* sets out conditions under which the appointment of a dedicated NZFS Safety Officer is mandatory. A Safety Officer must be appointed when:
- More than 16 personnel are committed to operations at an incident (from all agencies present)
  - Hazardous substances are involved and a hot zone cordon is established
  - Live fire training is being undertaken
  - Operating in unusual/unfamiliar circumstances e.g. silo rescue, cave rescue, cliff rescue, white water rescue, trench collapse etc.
  - The NZFS is not the lead agency (CIMS incident) and a Safety Officer is required specifically for NZFS operations. This person then becomes the NZFS Incident Safety Officer and adviser to the appointed Incident Safety Officer on safety issues related to Fire operations
  - The incident involves high rise operations.
- N.B. On appointment, the dedicated Safety Officer must don the appropriate identification jerkin (see Section 4.3.5).

**5.3.4 Safety Officer –  
Primary responsibility**

The Incident Controller will task the Safety Officer to monitor operations on the incident ground (or part of the incident ground) to ensure that the tactics employed are not exposing firefighters, or others, to unacceptable levels of risk.

If unacceptable risk is encountered, the Safety Officer has a responsibility to recommend appropriate actions to OIC Fire to eliminate, isolate or minimise observed risks.

**5.3.4.1**

If the risk is deemed unacceptable (and imminent), he/she may order the immediate withdrawal of firefighters to a place of safety, bearing in mind any potential to increase the risk to other crews by so doing. In these circumstances the OIC Fire must be informed as soon as possible of actions taken. Usually, however, the NZFS Safety Officer should advise the Fire Operations Commander, who will decide what action should be taken.

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**5.3.4.2 Primary functions** In order to discharge this responsibility successfully, the Safety Officer should:

- Be aware of specific objectives to be achieved, and the overall plan
- Be able to identify the hazards which may lead to injury or illness
- Maintain direct communications with the OIC Fire and make appropriate recommendations regarding actions to eliminate, isolate or minimise hazards, thereby reducing the risks
- Monitor hydration levels, the use of protective clothing and safety equipment to ensure that the best available protection is utilised
- Make appropriate recommendations to the OIC Fire on any matter affecting the safety or welfare of NZFS personnel or members of the public
- Maintain a hazard register (showing hazard controls) and a safety activity log for the incident. He/she should also ensure that all relevant Significant Hazard Exposure Protocols (SHEPS) forms are completed as required
- Ensure the need for post-incident monitoring of those attending an incident is notified to the Region Health and Safety Manager – when the nature of the potential exposure warrants it
- Ensure that the nature of any potential exposure is notified to any treatment provider at the time of the incident
- Advise the Region Health and Safety Manager of any actions taken in respect of potential exposures
- Inform the OIC Fire of any ongoing reporting matters post-incident.

**5.3.4.3 Appropriate persons**

Any member of the NZFS may be appointed as a Safety Officer at the direction of the OIC Fire. Personnel appointed as a dedicated Safety Officer are to be relieved of all crew responsibilities in order to carry out their role.

It is important that persons appointed as a Safety Officer both:

- Are able to identify unsafe conditions and practices as well as hazards (refer to NZFS training module Hazard Management), and
- Have a current working knowledge of the Safe Person Concept and Operational Instructions.

## 5.4 Principal hazards for firefighters on the incident ground

### 5.4.1 The incident ground hazardscape

The Safety Officer must be prepared to recognise and deal with a wide-ranging catalogue of potential hazards on the incident ground. When these are encountered he/she must apply the principles of the Safe Person Concept through dynamic risk assessment. Most hazards, if identified and managed properly, will not pose sufficient threat to call a halt to operations or a change of tactical mode. However, Safety Officers must be competent to recognise those that do represent a significant threat, and then to act quickly to prevent firefighters coming to harm.

#### 5.4.1.1

The incident ground hazardscape is complex but can be more easily understood if potential hazards are clustered into groups that can be reasonably expected to occur in association with different types of incident, e.g. structure fires, chemical spills, vegetation fires etc. In the stressful context of the incident ground, Safety Officers may struggle to apply this analysis and be proactive against hazards without some assistance.

#### 5.4.1.2 Accidents

These refer to those apparently unpredictable events that result in injury and might occur in any workplace.

#### 5.4.1.3 Common incident ground hazards

These refer to hazards commonly presented by the incident environment itself. These are largely predictable and can usually be managed through adherence to controls listed in the Generic Hazard Register (when published). Effective management nevertheless requires constant vigilance.

#### 5.4.1.4 Chemical hazards

These refer to the common safety issues arising from the presence of hazardous chemicals. They represent a high level of unpredictability and early identification is essential for safe management.

5.4.1.5 Biological hazards	These refer to pathogens and organisms that pose significant dangers to the health of firefighters exposed to them.
5.4.1.6 Radiological hazards	These are hazards notified to the Comcen and Regions by the National Radiological Laboratory.
5.4.1.7 Physiological hazards	These refer to injuries sustained through incorrect physical techniques or by exceeding individual capacity.
5.4.2 Constant physiological risk	<p>All officers must be aware that the physical capacity of firefighters is not a constant – not only does it vary from individual to individual, it will vary according to environmental conditions and duration of work. The ever-present threats to health and well being are:</p> <ul style="list-style-type: none"> <li>• Heat stress</li> <li>• Cardiac arrest (particularly in older firefighters).</li> </ul> <p>It is essential that firefighters are tasked appropriately and monitored carefully for signs of physical distress. If signs of significant fatigue are detected the Safety Officer, should report this to the Sector Commander/OIC Fire, requesting withdrawal of the whole crew for rehabilitation.</p>

## 5.5 Safety: key tactical principles

- 5.5.1 Clearly, the potential for injury increases as the number of personnel deployed increases. Risks increase further relative to the complexity of the incident.
- The OIC Fire and the dedicated Safety Officer (if appointed) must ensure that:
- No NZFS personnel move beyond the Forward Control Point to the incident ground unless they are actually tasked to do so
  - All personnel move on to the incident ground via the designated entry point and the ICP, unless directed otherwise by the OIC Fire
  - All personnel on the incident ground are identified to and tasked by the ICP
  - All personnel being rested or re-equipped are held in staging or a designated recommissioning/rehabilitation sector while this occurs
  - No personnel are allowed to ‘freelance’
  - All personnel operate with appropriate PPE.

### 5.5.2 Monitored tactical positioning

Once the risks associated with selected tactics have been deemed acceptable, the Safety Officer must focus on observing how firefighters are deployed to put those tactics into action. Experience shows that considerable caution must be exercised if firefighters are, for example:

- Working in large, complex structures in which disorientation is possible
- In a position where fire can move in behind them (a common occurrence in vegetation fires)
- In structures with only one means of entry/exit
- In areas where retreat may be difficult
- Working above the fire – either the floor above or on the roof
- Working beneath involved roof structures
- Fighting basement fires
- In areas where there is a potential for flashover or backdraft to occur
- In areas where hazardous substances may be stored
- Using an aggressive exterior attack from opposing positions
- Working in the vicinity of aerial appliances.

#### 5.5.2.1

When performing exceptionally hazardous tasks (e.g. snap rescue, hot zone work, making safe LPG tanks) only the absolute minimum number of personnel should be used, and they should be withdrawn as quickly as possible.

The situation in any of the above scenarios can degenerate rapidly. Consequently, Safety Officers must be prepared to act quickly and decisively to withdraw firefighters or improve their positions if the risk becomes unacceptable. Any such decision must be immediately reported to the Incident Controller.

### 5.5.3 Monitored structural status

Structural collapse is an increasing risk to firefighter safety. This is largely due to the increasing use of lightweight materials and changes in construction methods and standards. OICs/Safety Officers therefore need sufficient understanding of building design and the likely effects of fire upon structural members to be able to recognise impending collapse. The following are examples of clear indicators of potential building collapse:

- Sagging roof ridge lines
- Cracks or bulging exterior walls
- Water or smoke leaking out through exterior walls
- Creaking or snapping sounds
- Excessive flexing of floors or roof areas
- Twisting or flexing of interior walls
- Large scale signage attached to walls.

**5.5.4 Structural collapse – the likely construction types**

When making tactical decisions or monitoring tactical positioning, Incident Controllers/Safety Officers need to look for the structural features that are known to contribute significantly to structural collapse. Among the most common are:

- Large, roofed, unsupported spaces e.g. supermarkets, warehouses, sports halls etc.
- Cantilevered decks or canopies
- Secondary ornamental walls
- Roofs supported by lightweight or bowstring trusses
- Unprotected metal columns/support systems
- Large integrated sandwich panels (LISPS)/foam sandwich panels
- Tilt slab construction.

If structural collapse seems imminent, Safety Officers must ensure that the OIC Fire is advised that all personnel are to be immediately withdrawn to a safe position well beyond the collapse zone, and then accounted for.

**5.5.5 Roof operations**

Roof operations may place firefighters at extreme risk and should only commence with great caution. Officers should assess roof structures carefully before committing firefighters. Firefighters should either not be committed or be immediately withdrawn if any sign of structural compromise is encountered.

**5.5.6 High-rise operations**

All fires in high rise buildings should be regarded as high risk, and a Safety Officer should therefore always be appointed. Safety considerations revolve mainly around:

- Accessing the various levels via stairways and lifts
- The risk of injury caused by falling debris.

Officers should be fully conversant with Operational Instructions - *SI Multi Story Buildings*.

**5.5.7 General evacuation**

Safety Officers have the authority to order evacuations if it is necessary for a general evacuation from the building in the event of imminent danger. It would in practice be carried out through the OIC. Any decision taken by the Safety Officer that might impact on incident management must be notified as soon as possible to the OIC Fire.

**5.5.7.1**

The recognised general evacuation signal is the simultaneous sounding of all appliance sirens and the use of the evacuation command over all incident ground radio channels.

#### 5.5.7.2

In the event of a general evacuation, the Safety Officer must work with the OIC Fire and subordinate commanders to ensure that:

- Firefighters shut down deliveries at the branch
- All personnel withdraw to a place of safety and report to Entry Control and uplift tallies
- All personnel return to their appliance
- Crews uplift nominal roll tallies/T cards
- All personnel are accounted for
- The OIC Fire/ICP are advised that all personnel are accounted for (or who remains unaccounted for).

#### 5.5.8 Follow-up responsibilities

The person appointed to the role of NZFS ISO reports to the Incident Controller, who in turn must ensure that:

- Any accidents, injuries and near misses to NZFS personnel or members of the public are reported (see NZFS Health & Safety Manual October 2004 edition section 1.13, 5.1-5.3)
- They brief the Regional Health and Safety Adviser of any assessment or action that may have an ongoing impact on those who attended the incident, e.g. exposure to hazardous materials
- The building owner or agent is briefed on hazards that remain, subsequent to the cessation of NZFS operations. The owner should subsequently be notified of these hazards in writing.

Safety Officers should be prepared to attend the OIC's incident debrief to assist with the clarification of health and safety issues that may have arisen.