National Operational Guidance Programme

Local Government Association | CFOA Chief Fire Officers Association | in partnership with LFB London Fire Brigade

Title:	Industry
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Synopsis:	This 'context guidance' has been developed to assist fire and rescue services in identifying hazards and implementing control measures at operational incidents in an industrial setting. Due to the wide range of contexts that fall under the term 'industry', this guidance provides details of common hazards. Other hazards found in specialist industries may need to be considered when fire and rescue services develop their local policies and procedures.
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National Operational Guidance Programme

Industry

Introduction

This context guidance provides details of common hazards found in industry. Other hazards found in specialist industries may need to be considered when fire and rescue services develop their local policies and procedures.

The guidance is supported by supplementary information, with additional background knowledge that may support training or pre-planning.

The guidance does not contain information for activities associated with operational incidents such as firefighting, performing rescues or dealing with environmental protection; these are covered by other pieces of National Operational Guidance.

Terminology in this guidance

Due to the wide range of contexts that fall under the term 'industry', various terms are used in this guidance to describe those contexts. This list shows examples of the types of industry that are covered by them.

Context	Examples of industry
Manufacturing, processing and engineering	Factories Production sites Processing sites Engineering workshops Mines and quarries Laboratories and research centres Abattoirs
Commercial and business	Offices Banks Wholesale and retail sites Warehouses Service industry
Places of assembly and entertainment	Restaurants, public houses, bars and clubs Cinemas and theatres Libraries, museums and art galleries Heritage buildings Theme parks and fairgrounds Places of worship Places of education Conference and exhibition centres

	Arenas and stadiums Festival sites Leisure facilities Zoos, wildlife parks, aquariums and circuses
Commercial accommodation	Accommodation for paying guests, typically on a temporary basis. Accommodation may be self-contained (with its own kitchen, bathroom and laundry facilities) or may include meals and a laundry service. Hotels, hostels and boarding houses Holiday villages, caravan and camping sites Residential schools University halls of residence
Medical facilities	Hospitals and clinics Care homes and nursing homes Morgues and funeral directors Blood banks and donor facilities
Animal facilities	Veterinary clinics Kennels and catteries Equine facilities Livestock farms Beehives Zoos, wildlife parks, aquariums and circuses Laboratories and research centres
Agricultural sites	Arable farms Forestry Crop storage Fishing (marine and freshwater) Hunting
Waste sites	Recycling sites Anaerobic digestion sites Landfill Public amenity sites
Construction sites	Construction sites Demolition sites Nuclear decommissioning sites

Military and defence establishments and shooting clubs	Military establishments Defence establishments Munitions storage Shooting clubs Firing ranges
Lawful detention facilities	Prisons Police cells Detention centres High security medical facilities Courts

Approach of this guidance

As most of the hazards are found in more than one of the contexts, where appropriate the hazard will be covered by:

a) Generic information for the hazard

b) Information for the hazard in a specific context

Risk management plan

Each fire and rescue authority must develop their strategic direction through their risk management plan. To determine the extent of their firefighting capability, strategic managers will consider their statutory duties and the foreseeable risk within their area.

Work to identify risk and prepare operational plans should consider all stakeholders, including local emergency planning groups and the fire and rescue service risk management plan.

Responsibility of fire and rescue services

Fire and rescue services are responsible, under legislation and regulations, for developing policies and procedures and to provide information, instruction, training and supervision to their personnel about foreseeable hazards and the control measures used to mitigate the risks arising from those hazards.

This guidance sets out to provide fire and rescue services with sufficient knowledge about the potential hazards their personnel could encounter when attending incidents in industrial contexts. Fire and rescue services should ensure their policies, procedures and training cover all of the hazards and control measures contained in this guidance.

Sharing this guidance

Fire and rescue services may wish to share this guidance with industries in their area, especially if they feel it would assist with pre-planning, on-site training or developing Site-Specific Risk Information (SSRI) or emergency response plans.

Hazard and control statement

Hazards	Control measures
Incidents in industry	Gather information about the site Identify and control hazard areas Refer to Site-Specific Risk Information (SSRI) and emergency response plans Seek specialist advice or assistance Support business continuity arrangements
Utilities and fuel	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Implement procedures for dealing with utilities and fuel
On-site machinery	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Restrict or prohibit movement of on-site machinery Consider isolating power supplies for on-site machinery Use competent people to operate on-site machinery Provide supervision
On-site vehicles	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Restrict, prohibit or manage movement of on-site vehicles Use competent people to operate on-site vehicles Provide supervision
Design, layout, fixtures and fittings	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify and maintain appropriate access and egress routes for industrial sites
Security features	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Gain and maintain access and egress for sites with security features
Temporary structures	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify the use and contents of temporary

	structures Monitor for signs of collapse or instability of temporary structures
Scaffolding	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Monitor for signs of collapse or instability of scaffolding Consider the appropriate use of scaffolding
Unstable structures in industry	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Look for signs of disrepair, collapse or instability
Stacked materials	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Exercise caution when working near or on stacked materials
Unstable ground in industry	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Monitor ground conditions at industrial sites
Presence of people	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Evacuate people Evacuate people from medical facilities Rescue people Implement joint working at lawful detention facilities
Extreme heat	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies to control extreme heat Wear appropriate personal protective equipment (PPE)
Extreme cold	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies to control extreme cold Wear appropriate personal protective equipment (PPE)
Noise	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Assess and manage the impact of on-site alarms

	on operations
Lasers	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating laser equipment Consider wearing appropriate personal protective equipment (PPE)
X-ray machines	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies for the X-ray machine
MRI scanners	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider implementing an emergency shutdown of the MRI scanner Do not enter the magnetic field with metal objects Consider isolating power supplies for the MRI scanner Consider using alternative communication methods
CT scanners	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies for the CT scanner
Magnetic equipment	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating magnetic equipment
Electromagnetic fields (EMFs)	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider avoiding or isolating the source of electromagnetic fields (EMFs)
Presence of hazardous substances	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Implement hazardous materials procedures
Pressure systems and equipment	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies for pressure systems and equipment Consider depressurising the system
Silos and storage tanks	Apply generic control measures [as detailed for the hazard of 'Incidents in industry']

	Isolate silo or storage tank equipment Carry out atmospheric monitoring Implement confined space procedures Implement working at height procedures Access a silo or storage tank
Slurry pits and lagoons	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify and control the hazard area around a slurry pit or lagoon Carry out atmospheric monitoring Implement hazardous materials procedures Implement confined space procedures Decontaminate fire and rescue service personnel and equipment
Respirable dust, fibres and fumes	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Wear appropriate respiratory protective equipment (RPE)
Combustible dust	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Prevent formation and ignition of combustible dust clouds Wear appropriate respiratory protective equipment (RPE)
Presence of captive animals	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Contain or avoid animals Implement joint working at animal facilities
Munitions	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify and control the hazard area around munitions Implement hazardous materials procedures
Explosives (including fireworks)	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Implement hazardous materials procedures

Incidents in industry

Hazard	Control measures
Incidents in industry	Gather information about the site Identify and control hazard areas Refer to Site-Specific Risk Information (SSRI) and emergency response plans Seek specialist advice or assistance Support business continuity arrangements

Hazard knowledge

This section contains generic control measures that should be applied when dealing with any incident in an industrial site, whatever the context, size or complexity.

There are many types of working environments in industry, some of which will present the hazards associated with working at height or in enclosed spaces. A variety of different physical, health and environmental hazards may pose significant risks to fire and rescue service personnel, other responders and members of the public, regardless of the incident type.

The guidance presumes that businesses and organisations are complying with relevant regulations. Breaches in health and safety legislation or regulations at an industrial site may make fire and rescue service attendance more hazardous.

Illegal activities can present significant hazards to fire and rescue service personnel. Such activities include:

- Setting malicious (booby) traps
- Cultivating and producing illegal drugs
- Illegal activity involving electricity (see National Operational Guidance: Utilities and fuel)
- Illegal storage of hazardous materials, such as fireworks or fuel
- Unregulated building alterations affecting layout, stability and fire protection
- Unapproved change of use

Business continuity

There may be business interruption as a result of some incidents, resulting in significant impact (including financial losses) to businesses, or disruption to infrastructure and communities.

In such an event, the incident commander may be put under pressure by businesses or the wider community. It may be necessary to assist with business resumption to minimise the impact of the incident.

There is the potential for litigation and for the reputation of the fire and rescue service to be damaged, if they do not consider business continuity plans.

Control measure – Gather information about the site

Control measure knowledge

It may be difficult for fire and rescue service personnel to appreciate the wide range of working environments and hazards that they may be exposed to in different types of industry and to understand how they are managed and controlled. Pre-planning visits, especially for complex or hazardous sites, will enhance operational intelligence.

Liaison with on-site staff should be a priority, to assist in information gathering, assessing the situation and making informed decisions. If on-site staff are not available, warning signs, site information or instructions may assist with information gathering.

Strategic actions

Fire and rescue services should:

- Carry out pre-planning site visits and inspections to gain risk information regarding industrial sites which can be made available to responding personnel

Tactical actions

Incident commanders should:

- Confirm the size, type and use of the site
- Confirm site occupancy and involvement of people within the hazard area
- Obtain information from fixed systems such as closed circuit television (CCTV) or monitoring systems

Control measure – Identify and control hazard areas

Control measure knowledge

Potential hazard areas should be identified as soon as possible and appropriate control measures considered, even before entering the site. Hazards may be encountered when accessing the scene of operations, such as moving vehicles or machinery.

Warning signs and site safety instructions may assist in identifying hazards and associated risks. However, it should be a priority to liaise with on-site staff for information regarding hazards to select the appropriate control measures.

Appropriate cordon distances should be carefully considered, as requirements may vary considerably depending on the incident type and nature of hazards. See National Operational Guidance: Incident command for generic information about cordons.

Some sites may be very large and therefore it may only be practical to control hazards that will immediately affect fire and rescue service operations. Most large industries should have approved and effective control measures in place.

Strategic actions

Fire and rescue services should:

- Ensure relevant information captured in Site-Specific Risk Information (SSRI) is made available to responding personnel

Tactical actions

Incident commanders should:

- Consider the size, type and use of the site and the associated hazards that may be encountered
- Establish appropriate cordons
- Consider site warning signs, alarms and safety instructions
- Obtain hazard information from all possible sources, including the responsible person (or appointed competent person) to assist with selecting and implementing appropriate control measures

Control measure – Refer to Site-Specific Risk Information (SSRI) and emergency response plans

Control measure knowledge

The management of the incident and the safety of personnel can be improved by referring to Site-Specific Risk Information (SSRI) and emergency response plans, including those for COMAH on-site and off-site plans. Close and ongoing liaison with site staff will greatly contribute to joint understanding of the hazards to be managed and the business needs of the industrial site.

For further information on pre-planning see National Operational Guidance: Operations – Information gathering.

For further information on COMAH refer to http://www.hse.gov.uk/comah/guidance.htm

Strategic actions

Fire and rescue services should:

- Develop Site-Specific Risk Information (SSRI) and emergency response plans for appropriate industrial sites within their area
- Provide operational personnel with risk information about identified industrial sites
- Regularly exercise to ensure response plans are up to date and fit for purpose

Tactical actions

Incident commanders should:

- Refer to Site-Specific Risk Information (SSRI) and emergency response plans at the earliest opportunity
- Confirm the currency of site information with on-site staff to ensure is it up to date

Control measure – Seek specialist advice or assistance

Control measure knowledge

It is unlikely fire and rescue service personnel will have an in-depth knowledge of all types of industry they could encounter. Therefore, to deal with an incident safely and effectively, it may be necessary to seek specialist advice from the responsible person (or their representative) or on-site staff, about the site and any process in operation. If no site representative is available, their attendance should be requested as soon as possible.

To make a judgment on the effective deployment of resources, fire and rescue services should be aware of the capabilities of the resources at the scene, specialist knowledge available and specialist equipment on-site and off-site.

Other sources of specialist advice include tactical advisers (TacAds), subject matter experts (SMEs) or other external agencies.

The extent and urgency of specialist advice or assistance required will be dictated by the size, complexity and type of the incident.

Strategic actions

Fire and rescue services should:

- Develop arrangements and protocols with identified responsible persons and other sources of specialist advice or assistance
- Maintain details of tactical advisers (TacAds), subject matter experts (SMEs) or other external agencies for specific industries and know how to request their attendance

Tactical actions

Incident commanders should:

- Request specialist advice or assistance based on the extent and urgency of the incident

Control measure – Consider business continuity arrangements

Control measure knowledge

Industries, organisations and businesses may have business continuity plans to ensure the safety of their staff and that 'business as usual' is maintained whenever possible.

These plans may include information and guidance regarding damage control and recovery following an incident or event. It is important that such plans are discussed with the responsible person (or

their representative) and, wherever possible, fire and rescue services should aim to support those arrangements.

Strategic actions

Fire and rescue services should:

- Understand the significance of the industry within their area and support business continuity arrangements during incidents and into the recovery phase where appropriate

Tactical actions

Incident commanders should:

- Ensure the safety of emergency services personnel and members of the public is maintained when considering business continuity arrangements
- Liaise with the responsible person (or nominated competent person) to understand their business continuity arrangements
- Consider developing a joint plan, which will assist in supporting business continuity arrangements

Utilities and fuel

Hazard	Control measures
Utilities and fuel	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Implement procedures for dealing with utilities and fuel

Hazard knowledge

Industrial sites will have a variety of utilities and fuel present. Fire and rescue service personnel should be aware of their existence and of the hazards that may need to be controlled.

Control measure – Implement procedures for dealing with utilities and fuel

Throughout this guidance, many control measures relate to isolating the power supply. For this and further information, see National Operational Guidance: Utilities and fuel.

On-site machinery

Hazard	Control measures
On-site machinery	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Restrict or prohibit movement of on-site

	machinery Consider isolating power supplies for on-site machinery Use competent people to operate on-site machinery Provide supervision

Hazard knowledge

Some industries use the word 'plant' to indicate specialist equipment, machinery or industrial premises. For the purposes of this guidance, the word 'plant' has purposely been avoided and is referred to as 'on-site machinery', 'on-site vehicles', 'sites' or 'facilities'.

Types of on-site machinery include:

Generic

- Automated equipment
- Robotics – refer to supplementary information
- Lifts
- Hoists – refer to supplementary information
- Cranes – refer to supplementary information
- Conveyor belt systems – refer to supplementary information
- Electric motors
- Mixing machinery
- Drilling machinery
- Welding equipment

Commercial and business

- Escalators and moving walkways – refer to supplementary information

Places of assembly and entertainment

- Theme park and fairground rides – refer to supplementary information
- Moving platforms and stages
- Retractable roofs

Medical facilities

- Motorised wheelchairs
- Motorised trolleys
- Static or movable medical equipment

- Beds that use electric motors to manoeuvre patients

Agriculture

- Machinery for feeding livestock
- Automated (robotic) milking systems

Waste sites

- Compactors
- Shredders
- Incinerators

Construction sites

- Small equipment, such as handheld tools up to large-scale machinery

Machinery can present many types of hazards including:

- Drawing in
- Entanglement
- Friction and abrasion
- Cutting or shearing
- Stabbing or puncturing
- Impact or crush injuries
- Hazardous substances and emissions
- Noise and vibration
- Pressure or vacuum
- Extreme temperatures
- Electrocution
- Damage to eyes by intense ultraviolet light from welding equipment
- Epidermal injection (hydraulic fluid)

Some machinery is highly automated and may be operated by remote control systems. Machinery may be time controlled and could start up automatically. Similarly, the robotic system may be in an inert phase, but reactivate on a timed or activity-triggered basis.

Machinery may be old or poorly maintained, resulting in the absence of safety equipment; this may increase the risk of entrapment or injury. Machinery may present hazards if not correctly secured, controlled, earthed or isolated.

Machinery may contain moving parts, such as exposed shafts or fan bearings. Certain types of machinery may be fitted with machine guards to offer some protection from moving parts. Safety devices may have been removed or compromised prior to the arrival of fire and rescue service personnel.

Machine guards should not be removed until power to the machine has been isolated and confirmed. Where safety devices, such as brakes and interlocks have activated, they should not be overridden before the effect of doing so has been carefully considered. Releasing such devices could result in the uncontrolled movement of machinery.

If a machine is stopped suddenly, particularly by a blockage, there may be residual stored energy within the system. When the blockage is removed, the energy released can cause the machinery to move.

On-site machinery may be located in confined or restricted areas, making access and egress difficult and potentially arduous.

Control measure – Restrict or prohibit movement of on-site machinery

Control measure knowledge

If on-site machinery has the potential to cause harm to fire and rescue personnel or other responders, it may be necessary to restrict or prohibit its movement.

Strategic actions

Fire and rescue services should:

- Ensure that information about on-site machinery and its use is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Ensure fire and rescue service personnel wear high visibility clothing where appropriate
- Consider implementing cordons to restrict or prohibit on-site machinery movements
- Consider requesting that on-site machinery movements are restricted or prohibited
- Ensure on-site machinery operators are made aware of the presence of fire and rescue service personnel

Control measure – Consider isolating power supplies for on-site machinery

Control measure knowledge

On-site machinery may still be operating when the fire and rescue service arrives. Fire and rescue service personnel should liaise with site staff to identify where and how to isolate the on-site machinery, and to consider the implications of isolating power supplies to it. Keeping processes going may support fire and rescue service operations, for example, by reducing the volume of material that could be affected by the incident.

Power supplies to on-site machinery may include:

- Electricity
- Gas
- Pneumatics
- Hydraulics
- Kinetic, for example, windmills and watermills

Industries will use various methods for isolating power supplies. Some types of machinery may take a considerable time to isolate and in some circumstances it may not be possible to prevent reactivation.

Isolating power supplies to machinery may have an impact on the business; some on-site machinery may be damaged by emergency isolation.

The power supply for the machinery may be remote from the equipment. Instructions may be displayed for isolating the power supply or using manual controls.

Isolating power supplies may involve using:

- A tag out system – where a warning tag is attached to the power controls once in a safe position (off or closed), but reactivation may be possible
- A lock out system – where a padlock or bolt is used to prevent reactivation

Strategic actions

Fire and rescue services should:

- Ensure details about power supplies are included in Site-Specific Risk Information (SSRI)
- Ensure that information about emergency isolation of on-site machinery is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Liaise with the responsible person (or nominated competent person)
- Consider isolating power supplies to on-site machinery
- Identify on-site machinery that will require a period of time to be isolated
- Consider implementing cordons to restrict or prohibit access
- Seek specialist advice if there is any doubt about the isolation of machinery
- Ensure that if on-site machinery is not being used and has been isolated, a robust system is implemented to ensure this equipment is not brought back into operation until agreed with the incident commander

Control measure – Use competent people to operate on-site machinery

Control measure knowledge

On-site machinery may prove useful during an incident to move or separate materials, such as waste or items of stock; however, this should be done under the supervision of the fire and rescue service.

The on-site machinery would need to be identified and only competent people should operate it. This activity could create additional hazards, as other people may not be used to working with fire and rescue service personnel. Detailed briefings should therefore take place and any actions should be closely monitored.

If a competent person will be working within the inner cordon, communication methods, including evacuation signals, should be implemented and understood before commencing operations.

Strategic actions

Fire and rescue services should:

- Ensure that all fire and rescue service personnel are aware that on-site machinery should only be operated by competent people
- Consider identifying suitable on-site machinery in pre-planning and site inspection visits
- Consider establishing contingency arrangements about additional or specialist machinery with the site owner; this may need to be hired in the event of an incident

Tactical actions

Incident commanders should:

- Identify suitable on-site machinery that will achieve the objectives required
- Liaise with the site operator about on-site machinery, how it is used and who can use it
- Carry out a risk assessment before using on-site machinery
- Ensure appropriate personal protective equipment (PPE) and high visibility clothing is worn in the area where on-site machinery is being operated where appropriate
- Provide a full safety brief to fire and rescue service personnel and others
- Develop agreed communication methods between fire and rescue service personnel and others
- Arrange for a competent person to remove any on-site machinery not being used in the incident to an agreed location, where it will not have an impact on, or become involved in, the incident

Control measure – Supervise on-site staff operating machinery in the hazard area

Control measure knowledge

When using on-site machinery, on-site staff should be closely supervised to ensure they are not taking unnecessary risks, they have the appropriate personal protective equipment (PPE) and they are aware of the presence of fire and rescue service personnel.

If the incident is fire-related, the incident commander has the final decision on what is used, how it is used and by whom.

Fire and rescue service personnel are trained to understand the incident command protocols. However, this may not be the same for other people, who may require a high level of supervision when operating in the hazard area.

Strategic actions

Fire and rescue services should:

- Ensure that all fire and rescue service personnel understand that on-site machinery should only be operated under the supervision of the fire and rescue service

Tactical actions

Incident commanders should:

- Ensure on-site staff are closely supervised when operating on-site machinery in the hazard area
- Ensure detailed briefings and constant monitoring takes place
- Refer to the tactical actions for 'Use competent people to operate on-site machinery'

On-site vehicles

Hazard	Control measures
On-site vehicles	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Restrict, prohibit or manage movement of on-site vehicles Use competent people to operate on-site vehicles Provide supervision

Hazard knowledge

Some industries use the word 'plant' to indicate specialist equipment, machinery or industrial premises. For the purposes of this guidance, the word 'plant' has purposely been avoided and is referred to as 'on-site machinery', 'on-site vehicles', 'sites' or 'facilities'.

Types of on-site vehicles include:

- Forklift trucks
- Electric buggies, used to transport goods or on-site staff
- Bulldozers
- Grabbers
- HGVs, cars, vans, motorbikes or bicycles
- Military and armoured vehicles
- Rolling stock on rail tracks
- Access vehicles, such as scissor lifts or cherry pickers – classified by the Health and Safety Executive (HSE) as mobile elevating work platforms (MEWP)
- Remotely or computer-operated vehicles

There is the potential for fire and rescue service personnel or other responders to be struck by on-site vehicles.

Vehicle operators may be unaware of the presence of fire and rescue service personnel and may expect people to only use designated walkways. However, in an emergency situation this may not be possible.

Control measure – Restrict, prohibit or manage movement of on-site vehicles

Control measure knowledge

To avoid fire and rescue service personnel or other responders being struck by on-site vehicles, it may be necessary to request that their movement is restricted or prohibited.

In some types of industry a large number of non-fire and rescue service vehicle movements, on-site and off-site, are likely. Fire and rescue service operations are likely to stop or reduce these traffic movements. This may have an impact on the business or community, for example, where food cannot be distributed.

See National Operational Guidance: Transport for the control measures when dealing with road or rail transport.

Strategic actions

Fire and rescue services should:

- Ensure that information about on-site vehicles and their use is included in Site-Specific Risk

Information (SSRI)

- Consider recording possible traffic management solutions for an incident in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Ensure personnel wear high visibility clothing
- Consider requesting that on-site vehicle movements are restricted or prohibited
- Ensure vehicle operators are made aware of the presence of fire and rescue service personnel
- Use designated walkways where possible
- Assess the impact of the incident on traffic management in the local and wider areas
- Agree a traffic management plan with the site operator and other agencies
- Regularly update all parties on expected incident size and duration

Control measure – Use competent people to operate on-site vehicles

Control measure knowledge

On-site vehicles may prove useful to move or separate materials during an incident, such as waste or items of stock; however, this should be done under the supervision of the fire and rescue service.

Identify on-site vehicles, which should only be operated by competent persons. This activity could create additional hazards, as other people may not be used to working with fire and rescue service personnel. Detailed briefings should therefore take place and any actions should be closely monitored.

If a competent person will be working within the inner cordon, communication methods, including evacuation signals, should be implemented before starting operations.

Strategic actions

Fire and rescue services should:

- Ensure that all fire and rescue service personnel are aware that on-site vehicles should be only be operated by competent people
- Consider identifying on-site vehicles in pre-planning and site inspection visits
- Consider establishing contingency arrangements about additional or specialist vehicles with the site owner; these may need to be hired in the event of an incident

Tactical actions

Incident commanders should:

- Identify suitable on-site vehicles that will achieve the objectives required
- Carry out a risk assessment before using on-site vehicles
- Ensure appropriate personal protective equipment (PPE) and high visibility clothing is worn in the area where vehicles are being operated
- Provide a full safety brief to fire and rescue service personnel and others
- Develop agreed communication methods between fire and rescue service personnel and others
- Ensure that if vehicles are not being used and have been isolated, a robust system is implemented to ensure the vehicles are not brought back into operation until agreed with the incident commander
- Arrange for a competent person to remove any on-site vehicles not being used in the incident to an agreed location, where they will not have an impact on, or become involved in, the incident

Control measure – Supervise on-site staff operating vehicles in the hazard area

Control measure knowledge

When using on-site vehicles, the vehicle operator should be closely supervised to ensure they are not taking unnecessary risks, they have the appropriate personal protective equipment (PPE) and they are aware of the presence of fire and rescue service personnel.

The incident commander has the final decision on what is used, how it is used and by whom.

Fire and rescue service personnel are trained to understand incident command protocols. However, this may not be the same for other people, who may require a high level of supervision when operating in the hazard area.

Strategic actions

Fire and rescue services should:

- Ensure that all fire and rescue service personnel understand that site vehicles should only be operated by competent people
- Consider identifying on-site vehicles in pre-planning and site inspection visits

Tactical actions

Incident commanders should:

- Ensure on-site staff are closely supervised when operating on-site vehicles in the hazard area
- Ensure detailed tasking and constant monitoring
- Refer to the tactical actions for ‘Use only competent people to operate on-site vehicles’

Design, layout, fixtures and fittings

Hazard	Control measures
Design, layout, fixtures and fittings	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify and maintain appropriate access and egress routes for industrial sites

Hazard knowledge

Industrial sites vary in size, type and complexity, which may have an impact on dealing with an incident. Features that should be considered include:

- Design and method of construction – refer to the Building Research Establishment supplementary information for further information
- Building alterations
- Complex internal layouts
- Fixtures and fittings

Some features may pose a significant hazard, especially if visibility is poor. The size, construction and internal layout of the industrial site may also affect incident ground communications.

There may also have been changes in use of an industrial site, presenting unexpected internal hazards. Some site owners sublet rooms, buildings or areas within a site; consideration should be given to their use, which may be completely different to the main industry.

Manufacturing, processing and engineering

Large manufacturing sites may cover many acres, making it essential to gather information about which area or building the incident is located in.

There may be inspection pits, pipework, machinery, tanks and unprotected edges.

Commercial and business

Sites such as shopping centres and warehouses can cover a considerable area, resulting in extended travel distances to reach an incident.

Very high shelving or racking systems, often found in warehouses, may become unstable. These fixtures may restrict access to the incident or present the need to work at height. Refer to supplementary information about racking systems and pallets.

Clad-rack warehouses, or self-supporting warehouses, are major works of engineering in which the racking itself makes up the building's structure, together with side and roof cladding.

Places of assembly and entertainment

In permanent sites there may be fittings such as fire curtains, stage trapdoors and lighting rigs.

For shorter-term use, there may be temporary structures, fixtures and fittings – refer to the hazard for temporary structures.

Medical facilities

Medical facilities often have a complex layout, especially where they have been extended. There may be numerous corridors, rooms within rooms and large quantities of fixed and mobile equipment.

Agricultural sites

Many buildings have relatively lightweight, combustible or fragile materials used in their construction, such as corrugated metal or asbestos cement roofs. They may also be of timber or steel construction, or use more traditional materials such as stone and thatch.

Construction sites

Some small construction sites or buildings undergoing building work may be unknown to fire and rescue services, making pre-planning difficult. Sites known to fire and rescue services may alter significantly throughout the life of the project. Refer to supplementary information.

Control measure – Identify and maintain appropriate access and egress routes for industrial sites

Control measure knowledge

Safe routes for accessing the scene of operations should be identified, taking account of compartmentation and other engineered solutions. These routes should be monitored and maintained. It may be necessary to switch off or isolate power supplies prior to gaining access. Scene lighting may be required to illuminate access and egress routes and identify hazard areas.

Alternative access and egress routes may need to be established and maintained, as the normal entrances and exits may be compromised by an incident. The responsible person or site plans may assist with identifying appropriate points and routes for access and egress.

It may also be necessary for personnel to use vertical ladders, gantries and hatches to access areas such as machine rooms, basements and mezzanine levels.

If radio communications are compromised, alternative means of communication may be required, such as fixed communication systems, runners, or mobile phones.

Strategic actions

Fire and rescue services should:

- Ensure that information about design, layout, access and egress, fixed installations, water supplies, fixtures and fittings is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Liaise with the responsible person (or nominated competent person) for information about design, layout, fixtures and fittings
- Obtain and refer to site plans if available
- Identify, use or create appropriate access and egress routes
- Consider isolating power supplies
- Consider appropriate means of communication
- Consider the use of scene lighting – see national Operational Guidance: Operations
- Consider the use of work at height procedures – see national Operational Guidance: Sub-surface, height, structures and confined spaces

Security features

Hazard	Control measures
Security features	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Gain and maintain access and egress for sites with security features

Hazard knowledge

Gaining, securing and maintaining access to industrial sites may be affected by security measures.

Generic security measures include:

- Security doors and glazing
- Barriers
- Roller shutters
- Reinforced walls
- Security glass
- One-way access doors
- Control lobbies or holding areas under electronic door control
- Remote control locking devices
- Time delay locks
- Air locks
- Security guards

- Guard dogs

Commercial and business

- Security smoke
- Safety vault doors

Medical facilities

- Doors secured, often with electronic locks and combination keypads, for:
  - Secure patient areas
  - Laboratories
  - Pharmacies

Animal facilities

- Electrified fences

Construction sites

- Fences and hoarding
- Boarding up

Lawful detention facilities

- Complex and multiple doors
- Self-locking doors
- Razor wire on roofs, walls and other structures

Sensitive sites, for example, military and defence establishments, nuclear sites and munitions manufacturing or storage

- Armed guards

Control measure – Gain and maintain access and egress for sites with security features

Control measure knowledge

The fire and rescue service may be able to gain access via codes or keys for sites with security features. The responsible person, or a security company, should be contacted to assist with gaining access.

If it is not possible to deactivate the security feature, it may be necessary to make a forcible entry. The type of building construction, possible entry points and the security features present should be assessed. This will assist with selecting the most appropriate equipment and techniques for the situation, which can save time and prevent unnecessary damage.

For further information about forcible entry see National Operational Guidance: Fires and firefighting.

Having gained access to sites that have security features, it may be necessary to disable security features, or position personnel to ensure access and egress routes are not compromised.

Security smoke (sometimes called security fog or smoke screen) is thermally generated white smoke specifically used as a security measure. Security smoke machines may use glycol or glycerine mixed with distilled water to produce a dense white fog that obscures vision.

Where there are armed guards, fire and rescue service activity will be carried out under escort and in accordance with pre-determined arrangements.

Strategic actions

Fire and rescue services should:

- Ensure that information about security features, and who to contact for information or assistance, is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Attempt to contact the responsible person or security company to obtain information about security features and gain access
- Obtain keys or key codes to gain access to secure areas, if appropriate
- Consider overriding security features, using equipment or positioning personnel to maintain access and egress
- Consider alterative access and egress points using ladders or aerial appliances
- Consider using forcible entry if security features cannot be disabled – see National Operational Guidance: Fires and firefighting
- Consider cutting roller shutters to gain access, remembering that some shutters may retract once cut
- Consider seeking assistance for dealing with guard dogs from specialist animal handlers
- Ensure fire and rescue service personnel are aware of escorting arrangements where armed guards are present
- Consider using ventilation and wearing respiratory protective equipment (RPE) if the building is fitted with a security smoke system

Temporary structures

Hazard	Control measures
Temporary structures	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify the use and contents of temporary

	structures Monitor for signs of collapse or instability of temporary structures

Hazard knowledge

There are various types of temporary structures that may present hazards due to their construction, instability or internal layout. They may be constructed from non-traditional materials. Refer to the Building Research Establishment knowledge sheets for further information about the construction of demountable structures.

Types of temporary structures include:

- Seating stands
- Stages
- Lighting and audio rigs
- Temporary accommodation units (TAUs), including portable cabins and shipping (ISO) containers
- Tents and marquees
- Air-filled structures
- Fairgrounds

The nature of temporary structures means that their use is difficult to regulate or monitor. They are frequently used for more than their intended purpose and are often adapted. This can result in additional hazards for fire and rescue service personnel, especially if information about their use, layout and what is stored within them is lacking.

Some lightweight structures, such as marquees and inflatable structures, may become unstable and move across significant distances in high winds if not anchored appropriately.

Control measure – Identify the type, use and contents of temporary structures

Control measure knowledge

Temporary accommodation units (TAUs) primarily provide offices, canteens, welfare facilities or storage solutions. TAUs can vary from very simple single mobile units to complex multi-storey composite units. TAUs are usually situated in the open air, but can be located inside structures.

TAUs may be identified by signage such as ‘Site Office’ or ‘Canteen’. However, their general appearance may not be easily identifiable; for example, a converted ISO shipping container or a part of a building could be fitted out with temporary partitions.

TAUs typically comprise modular units, whether constructed as portable cabins, ISO containers, mobile homes or other purpose-built structures. The location of the TAUs may change during

different times of the year. TAUs may come equipped with separate power and heating which may need to be isolated.

Due to the temporary nature of the structures they may not be subject to the requirements of building regulations. Normal fire safety provisions, as found in typical offices and associated accommodation, may not be provided by the structure itself.

Further information about some types of temporary structures can be found in the Building Research Establishment supplementary information.

Strategic actions

Fire and rescue services should:

- Gather information about the location, type, use and contents of temporary structures, where feasible

Tactical actions

Incident commanders should:

- Look for signage on temporary structures
- Liaise with the responsible person on site to identify the type, use and contents of the temporary structure
- Consider the possibility of unauthorised use, for example, as sleeping accommodation or for storing hazardous materials
- Consider isolating utilities for temporary structures

Control measure – Monitor for signs of collapse or instability of temporary structures

Control measure knowledge

Temporary structures may collapse suddenly, with little or no warning. It is important to understand the type of construction involved and the method and sequence of construction or erection. This information should assist in assessing the likelihood of partial or structural collapse.

Partial collapse of a temporary structure may lead to instability and further collapse, especially if it is subjected to strong winds or other loads.

For further information about signs of collapse due to fire, see National Operational Guidance: Fires in the built environment – Look for signs of collapse.

Strategic actions

Fire and rescue services should:

- Gather information about the location and type of temporary structures where feasible

Tactical actions

Incident commanders should:

- Liaise with the responsible person; in the case of temporary structures this may be a hire company
- Identify the type of structure, its method of construction and what it is being used for
- Look for signs and assess the likelihood of instability or collapse
- Look for signs of structural support that has been compromised or is missing
- Look for and assess the suitability of temporary supports, ground anchors and propping
- Consider the impact of current and forecast weather conditions on temporary structures
- Consider requesting specialist advice from local authority building control teams, structural engineers or urban search and rescue (USAR) tactical advisers

Scaffolding

Hazard	Control measures
Scaffolding	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Monitor for signs of collapse or instability of scaffolding Consider the appropriate use of scaffolding

Hazard knowledge

Scaffolding is used to provide a means of access, working platforms or support to structures under construction or demolition. Working near to scaffolding may be hazardous because of objects falling from height.

As some scaffolding relies on suitable anchors to the building for support, scaffolding may be unstable. Heat from fire, high winds or structural failure of the building may affect the anchor bolts, fixings or tubing, leading to weakening or failure of the scaffolding. If scaffolding does fail it may result in the collapse of a structure it was supporting and may pull other scaffolding sections with it.

Different materials and methods are used in scaffolding, depending on the requirement. Some scaffolding components that can span across a fragile roof or shop front, particularly beams, may be aluminium. Not all scaffolding structures are load-bearing; this is considered during the design stage and scaffolding constructed accordingly. Scaffolding can be mobile or fixed, with common structures being the 'tower scaffold' or 'tube and fittings' type of fixed scaffold. Refer to the Building Research Establishment knowledge sheets for further information about scaffolding.

Scaffolding may also be covered in sheeting or netting to:

- Prevent falls from height
- Prevent tools, materials and debris falling
- Provide a more aesthetic appearance
- Provide fire protection

There is no method of evaluating the integrity of scaffolding, particularly where it is covered in sheeting or netting. If netting is used to prevent items from falling it may present an entrapment hazard.

On some construction sites scaffolding may also be fitted with lighting and cables, resulting in entanglement or exposure to electricity.

For further information regarding scaffolding that is involved in fire, see National Operational Guidance: Fires in buildings under construction or demolition.

Control measure – Monitor for signs of collapse or instability of scaffolding

Control measure knowledge

Scaffolding may collapse suddenly, with little or no warning. It is important to understand the purpose of the scaffolding, type of scaffolding and the method and sequence of construction or erection. This information should assist in assessing the likelihood of partial or structural collapse.

Localised collapse may leave other sections of the scaffolding and structures vulnerable, particularly in wind or where affected by heat from fire. Unstable structures or failure of anchoring may result in progressive collapse.

For further information about signs of collapse due to fire see National Operational Guidance: Fires in the built environment – Look for signs of collapse.

Tactical actions

Incident commanders should:

- Liaise with the responsible person; in the case of scaffolding this will be the scaffolding provider
- Identify the purpose and type of the scaffolding
- Exercise caution when operating near to scaffolding
- Look for signs, and assess the likelihood of, collapse
- Look for signs of structural support that has been compromised or is missing
- Look for signs of temporary supports, shoring or propping
- Consider the impact of current and forecast weather conditions on scaffolding
- Consider requesting specialist advice from local authority building control teams, structural engineers or urban search and rescue (USAR) tactical advisers

- Consider the likely footprint of a collapse when establishing cordons

Control measure – Consider the appropriate use of scaffolding

Control measure knowledge

Fire and rescue service personnel should not use scaffolding if there is any doubt about its integrity. Other means of access and egress should be evaluated.

If there are urgent circumstances where it could be used, an appropriate risk assessment must be carried out. If the decision is taken to proceed, it must be with the minimum numbers of personnel and equipment with regard to weight limitations and lateral loading. Consideration must also be given to working at height procedures.

Tactical actions

Incident commanders should:

- Confirm with the competent person or scaffolding provider that the scaffolding is safe to use
- Deploy the minimum numbers of personnel and equipment required for the task
- Implement work at height procedures

Unstable structures in industry

Hazard	Control measures
Unstable structures in industry	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Look for signs of disrepair, collapse or instability

Hazard knowledge

Fire and rescue service personnel may encounter unstable structures in various industries, which may be subject to an increased risk of partial or structural collapse.

Unstable structures may be as a result of:

- Construction or demolition work
- Derelict or deteriorated condition
- Fire damage
- Exemption from, or non-conformity with, building regulations
- Severe weather conditions, such as flooding, heavy snow or high winds

If the unstable structure is involved in fire, see National Operational Guidance for Fires in buildings and the National Operational Guidance for Fires in buildings under construction or demolition for

further information. If the unstable structure is not involved in fire, see National Operational Guidance for Sub-surface, height, structure and confined spaces for further information.

Stacked materials

Hazard	Control measures
Stacked materials	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Exercise caution when working near or on stacked materials

Hazard knowledge

Stacked materials may be encountered at industries such as:

- Paper mills
- Timber yards
- Pallet manufacture and storage sites
- Warehouses and storage facilities
- Agricultural sites
- Waste sites

As stacked material is unsupported, for example by a shelving system, stacks may be unstable, resulting in collapse.

The materials and packaging in the stack may have been affected by fire or water, resulting in a loss of integrity of the stack. There may also be hidden voids, making the stack non-load bearing.

Control measure – Exercise caution when working near or on stacked materials

Control measure knowledge

Fire and rescue service personnel should exercise caution when working near stacked materials as the stack or material may fall.

Fire and rescue service personnel should avoid working on stacked material as there may be a risk of falling from height or falling into the stacked materials.

Tactical actions

Incident commanders should:

- Identify the type of stacked materials
- Carry out an appropriate risk assessment if it is unavoidable for personnel to work near to or on stacked materials

- Monitor the effects of operational activity to ensure it will not affect or worsen stability of the stacked materials
- Monitor current and forecast weather conditions if this could affect the stability of the stacked materials
- Implement working at height procedures

Unstable ground in industry

Hazard	Control measures
Unstable ground in industry	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Monitor ground conditions at industrial sites

Hazard knowledge

Unstable ground may commonly be encountered at industries such as:

- Mines
- Quarries
- Waste sites
- Agricultural sites
- Wildlife parks
- Festivals
- Construction sites
- Caravan and camping sites
- Military and defence establishments
- Shooting clubs

Vehicles

Fire and rescue service vehicles could become trapped or stranded on unstable, soft or uneven ground.

On a site that does not have designated hard standing or purpose-made vehicle routes, ground conditions can quickly deteriorate as a consequence of weather conditions, firefighting operations or vehicle movements.

Personnel

Fire and rescue service personnel may need to walk across unstable ground to access the scene of operations. Care should be taken when crossing the unstable ground on foot, as there may be hidden voids prone to collapse with little or no warning.

Control measure – Monitor ground conditions at industrial sites

Control measure knowledge

The stability of the ground should be monitored throughout the incident to ensure that it has not deteriorated due to weather conditions, firefighting operations or vehicle movements.

Appropriate routes should be identified, communicated to personnel and clearly marked if possible.

Vehicles

Care should be taken whenever vehicles are driven off purpose-built vehicle routes. An assessment should be made to ensure that the surface can take the weight of the vehicle, avoiding the possibility of it becoming stranded.

For generic information about the positioning of fire and rescue service vehicles, see National Operational Guidance: Operations for the control measure of 'Ensure appropriate mobilising and a safe and controlled approach to the incident'.

Personnel

When working on unstable ground at an industrial site, the surface should be observed continually to spot any movement or dipping; this may indicate subsidence and possible collapse into unidentified voids.

See National Operational Guidance: Operations for information about working on unstable ground.

Strategic actions

Fire and rescue services should consider:

- Mobilising specialist vehicles as part of the pre-determined attendance
- Pre-planning to identify ground conditions and suitable access routes and egress routes, and record in Site-Specific Risk Information

Tactical actions

Incident commanders should:

- Identify and use the appropriate routes
- Monitor the stability of the ground
- Be prepared to move vehicles if the ground is becoming unsafe, to avoid vehicle entrapment
- Consider using specialist vehicles and equipment
- Consider tactical withdrawal of personnel if ground becomes unsafe
- Consider implementing working at height procedures

Presence of people

Hazard	Control measures
Presence of people	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Evacuate people Evacuate people from medical facilities Rescue people Implement joint working at lawful detention facilities

Hazard knowledge

Fire and rescue service personnel may have to deal with people when attending incidents involving industry. There is the potential for large numbers of people to be involved; dealing with them may present hazards to members of the public and responders.

The behaviour of people may be influenced by the environment they are in. This should be taken into account if they need to be evacuated or rescued.

Wherever large numbers of people are evacuating, there may be an impact on fire and rescue personnel or vehicles attempting to gain access. Once people have evacuated, they may create a significant obstacle to responders trying to access the area.

People may be:

- Unfamiliar with their surroundings
- Unfamiliar with evacuation procedures
- Unwilling or unable to evacuate
- Unable to hear or understand evacuation instructions
- Unaware of the need to evacuate
- Impaired by alcohol or drugs

Some contexts, as shown below, should provide indicators for why people may behave in a certain way.

Places of assembly and entertainment

People may be unwilling to evacuate if they are not fully clothed, for example, at leisure facilities.

Many theme parks and fairgrounds will involve people being at height – see National Operational Guidance: Sub-surface, height, structures and confined spaces.

Some places of assembly and entertainment also involve animals – refer to the Hazard – Presence of captive animals.

Commercial accommodation

Unlike longer-term rented accommodation, including houses in multiple occupation (HMOs), people may be less familiar with their surroundings and evacuation procedures.

Medical facilities

At medical facilities, people will mainly fall into three groups:

- Patients
- Visitors
- Staff

These groups will have varying levels of familiarity with their surroundings and evacuation procedures. Patients may have mobility issues or medical dependencies.

Fire and rescue service personnel may have to provide assistance to evacuate non-ambulant patients.

Derelict buildings

In derelict or unoccupied buildings, there could be people who are not meant to be there and may be unwilling to alert responders to their presence.

Military and defence establishments and shooting clubs

Munitions and explosives may hinder evacuation.

Lawful detention facilities

At lawful detention facilities, people will mainly fall into three groups:

- Detainees
- Visitors
- Staff

Detainees may behave unpredictably and show verbal or physical hostility to fire and rescue service personnel. Potential hazards from detainees are:

- Attempts to ambush or take hostage fire and rescue service personnel
- Firesetting
- Biological hazards from detainees, ‘dirty protests’ or drug paraphernalia
- Missiles being thrown at fire and rescue service personnel or vehicles
- Theft of fire and rescue service equipment or vehicles
- Riots or sieges

Control measure – Evacuate people

See National Operational Guidance: Operations – Involvement of people.

Control measure – Evacuate people from medical facilities

Control measure knowledge

Medical facilities may have more than one evacuation strategy. This may include simultaneous evacuation, where people immediately go to a designated assembly point, 'horizontal phased' or 'vertical phased' evacuation.

Methods of horizontal phased evacuation are particularly useful when dealing with seriously ill or infirm people, who may require life support equipment, medical gases or strict environmental conditions for their wellbeing.

Strategic actions

Fire and rescue services should:

- Participate in pre-planning and exercises for evacuating medical facilities
- Record evacuation strategies in Site-Specific Risk Information

Tactical actions

Incident commanders should:

- Liaise closely with on-site staff
- Provide assistance with evacuating patients who have special medical requirements
- Consider resource requirements

Control measure – Rescue people

See National Operational Guidance: Performing rescues for information about search, extrication and casualty care.

Control measure – Implement joint working at lawful detention facilities

Control measure knowledge

Fire and rescue personnel should liaise with on-site staff to determine locations with potential hazards and to identify safe access and egress routes. Fire and rescue service personnel should be accompanied by on-site staff and there should not be any lone working.

Hostile detainees should be secured so that they cannot come into contact with fire and rescue service personnel.

Fire and rescue service personnel should remain vigilant, especially with regard to security arrangements in places of lawful detention, to prevent them from being accidently locked in cells or other areas. For further information refer to the hazard for security arrangements.

Fire and rescue service vehicles and equipment should be positioned in an area away from detainees and secured.

On-site CCTV may support in monitoring the lawful detention facility, and in assessing any activity that could affect fire and rescue service personnel.

Strategic actions

Fire and rescue services should:

- Establish joint working arrangements with places of lawful detention in their area; this may include the development of response plans and memoranda of understanding
- Identify types of equipment that are prohibited within the place of lawful detention
- Provide familiarisation information for fire and rescue service personnel
- Carry out exercises to test response, procedures and joint working

Tactical actions

Incident commanders should

- Liaise with the responsible person
- Refer to response plans and memoranda of understanding
- Ensure prohibited equipment is not taken into the site
- Ensure fire and rescue service personnel are accompanied by on-site staff
- Ensure there is no lone working
- Monitor and assess activity in the lawful detention facility that could impact on fire and rescue service personnel, vehicles or equipment
- Carry out an inventory check before leaving the site
- Consider contingency arrangements, which can be quickly implemented if fire and rescue service personnel become isolated in unsafe areas

Extreme heat

Hazard	Control measures
Extreme heat	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies to control extreme heat

	Wear appropriate personal protective equipment (PPE)

Hazard knowledge

Fire and rescue service personnel may encounter extreme heat when attending industrial sites. Any personnel who cannot avoid being exposed to extreme heat should do so for as short a period as possible with an appropriate egress route.

Sources of extreme heat include:

- Ovens and kilns
- Boiler rooms
- Incinerators
- Equipment used for cleaning and sterilising
- Manufacturing processes
- Molten metals and furnaces

Control measure – Consider isolating power supplies to control extreme heat

Control measure knowledge

The initial method of controlling the hazard of extreme heat may be to isolate power or fuel supplies to the source of the heat.

However, in many circumstances it is unlikely that doing this will reduce the temperature of surfaces, items of equipment or atmospheres in a short space of time.

Strategic actions

Fire and rescue services should:

- Ensure that information about equipment that generates extreme heat is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Liaise with the responsible person for information about equipment or processes that generate extreme heat and the isolation procedures
- Consider isolating the source of extreme heat
- Consider avoiding the area affected by extreme heat
- Closely supervise personnel and implement appropriate crew rotation for those working in affected areas

- Consider tactical ventilation to reduce temperatures

Control measure – Wear appropriate personal protective equipment (PPE)

See National Operational Guidance: Operations

Extreme cold

Hazard	Control measures
Extreme cold	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies to control extreme cold Wear appropriate personal protective equipment (PPE)

Hazard knowledge

Fire and rescue service personnel may encounter extreme cold when attending industrial sites where there are refrigerators, freezers or cryogenic liquids. Refer to supplementary information about cryogenics, temperature-controlled storage and kitchens.

Coming into contact with cryogenic liquids or equipment could cause frostbite or cryogenic burns.

For further information on dealing with cryogenic hazards see National Operational Guidance: Hazardous materials.

Control measure – Consider isolating power supplies to control extreme cold

Control measure knowledge

The initial method of controlling the hazard of extreme cold may be to isolate power or fuel supplies to the source of the cold.

However, in many circumstances it is unlikely that doing this will increase the temperature of surfaces, items of equipment or atmospheres in a short space of time.

Strategic actions

Fire and rescue services should:

- Ensure that information about equipment that generates extreme cold is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Liaise with the responsible person for information about equipment that generates extreme cold and the isolation procedures
- Consider isolating the source of extreme cold
- Consider avoiding the area affected by extreme cold
- Closely supervise personnel and implement appropriate crew rotation for those working in affected areas
- Consider tactical ventilation to increase temperature

Control measure – Wear appropriate personal protective equipment (PPE)

See National Operational Guidance: Operations. There may also be specialist PPE available on site, such as cryogenic gloves.

Noise

Hazard	Control measures
Noise	Apply generic control measures [as detailed for the hazard of 'Incidents in industry' Assess and manage the impact of on-site alarms on operations

Hazard knowledge

On-site alarms

Fire and rescue service personnel may need to work at industrial sites where there are on-site alarms and warning systems. This may present a hazard if alarms have been activated.

The alarms may be associated with a single building, may operate site-wide or even be installed to provide a warning to those outside the site's boundary. Alarms or audible warning devices may interfere with:

- Communications
- The impact on audible tactical withdrawal or emergency evacuation instructions
- Response to the actuation of an automatic distress signal unit (ADSU)
- The ability to hear distress calls from casualties

For further information see National Operational Guidance: Operations – Noise.

Noise levels

Personnel may be exposed to high levels of noise, including that from:

- Machinery, tools and equipment
- Vehicles

- Music
- People
- Animals
- Munitions
- Explosions

Noise may affect operational activity. For further information on the hazard for noise see National Operational Guidance: Operations – Noise.

Control measure – Assess and manage the impact of on-site alarms on operations

Control measure knowledge

Audible on-site alarms could impact on the safety of fire and rescue service personnel or the management of the incident. If this is assessed to be the case, on-site alarms will need to be managed appropriately.

Strategic actions

Fire and rescue services should:

- Provide suitable and sufficient personal protective equipment (PPE) for hearing protection
- Record information about alarms in the Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Identify and liaise with on-site staff to determine which site alarms have, or are likely to actuate
- Use on-site staff and the Site-Specific Risk Information (SSRI) to assess the likely impact of the alarm on operations
- Request alarms are silenced if appropriate
- Consider alternative methods of communication
- Avoid prolonged exposure to the alarm
- Ensure hearing protection is used when required
- Consider alternative means for the evacuation of emergency service personnel

Lasers

Hazard	Control measures
Lasers	Apply generic control measures [as detailed for the hazard of 'Incidents in industry']

	Consider isolating laser equipment Consider wearing appropriate personal protective equipment (PPE)

Hazard knowledge

Lasers may be used for cutting, welding, sorting, counting, printing and measuring. They emit radiation as narrow concentrated beams of light, not necessarily visible to the human eye. Their most commonly-recognised hazard is their ability to damage eyesight or burn skin, which varies according to the wavelength and power of the output. However, in some cases, other associated risks from using the equipment may be more hazardous, such as heat, dust and fumes.

Refer to the supplementary information about lasers. They have many uses including:

Manufacturing, processing and engineering

- Industrial processes
- Laboratories

Commercial and business

- Creating a billboard effect to the outside of buildings
- Fibre optic installations for communications
- Laser printing

Places of assembly and entertainment

- Schools, colleges and universities for scientific purposes
- Nightclubs, outdoor events and concerts for display purposes
- Rangefinders on golf courses

Medical facilities and animal facilities

- For medical procedures

Construction sites

- Surveying tools

Military and defence establishments and shooting clubs

- Rangefinders for military purposes and shooting clubs

Control measure – Consider isolating laser equipment

Control measure knowledge

It may be necessary to switch off, contain or isolate the power supply to the laser equipment.

Strategic actions

Fire and rescue services should:

- Ensure that information about laser equipment is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Liaise with the responsible person for information about the type and location of laser equipment and the isolation procedures
- Consider isolating laser equipment
- Consider avoiding the area affected by the laser equipment

Control measure – Consider wearing appropriate specialist personal protective equipment (PPE)

Control measure knowledge

If it is not possible to switch off, contain or isolate the power supply to the laser equipment, appropriate specialist personal protective equipment (PPE) such as protective eye wear or face shields may be available on-site.

Strategic actions

Fire and rescue services should:

- Establish if the site would be able to provide appropriate specialist personal protective equipment (PPE) if required

Tactical actions

Incident commanders should:

- Consider using appropriate specialist personal protective equipment (PPE) if required

X-ray machines

Hazard	Control measures
X-ray machines	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies for the X-ray machine

Hazard knowledge

X-ray machines are used in many industries, including:

- Engineering workshops
- Medical facilities
- Animal facilities
- Food industry processes, to detect contaminants
- Lawful detention facilities
- Security facilities, such as at airports

X-rays can only be created through the application of a very high voltage, which may be hazardous in itself. However, as soon as the power supply is isolated, all X-ray emission ceases.

The level of radiation emitted from X-ray machines varies depending on their application; those used for detection purposes such as scanning baggage are less powerful than those used for medical purposes.

Refer to the supplementary information about X-ray machines.

Control measure – Consider isolating power supplies for the X-ray machine

Control measure knowledge

Access to the room housing an X-ray machine should be restricted until the power supply has been confirmed as either switched off or isolated.

Strategic actions

Fire and rescue services should:

- Ensure that information about the type and location of X-ray machines is included in Site-Specific Risk Information (SSRI), along with procedures for isolating their power supply

Tactical actions

Incident commanders should:

- Consider requesting advice or assistance from the responsible person to isolate power supplies to X-ray machines, taking into account any consequences of this action
- If the responsible person is unavailable, consider requesting advice from another specialist, such as the manufacturer of the X-ray machine, and/or refer to instructions provided
- Ensure that personnel are made aware of the type and location of any X-ray machines
- If the X-ray machine has been compromised by a fire or other type of incident, implement hazardous materials procedures for radiation, until the source has been confirmed as safe

MRI scanners

Hazard	Control measures
MRI scanners	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider implementing an emergency shutdown of the MRI scanner Do not enter the magnetic field with metal objects Consider isolating power supplies for the MRI scanner Consider using alternative communication methods

Hazard knowledge

MRI (magnetic resonance imaging) scanners will most commonly be found in medical facilities, such as hospitals. However, they may also be found in animal facilities, such as veterinary clinics and hospitals. Refer to the supplementary information for further detail about MRI scanners.

The main hazards relating to MRI scanners are:

- Electricity
- Strong magnetic fields
- Super-conducting magnets
- Cryogenic materials
- Asphyxiation
- Impact on communications

Electricity

Fixed and mobile scanners require a three-phase 400V electricity supply. Mobile scanners may have power supplied by a generator or by cable from an adjacent building.

It is important to understand that isolating the electrical supply will not stop the magnetic field being generated for several hours.

Strong magnetic fields

MRI scanners produce strong magnetic fields; these are emitted in all directions around the equipment but the strongest fields are towards the centre of the scanner where the patient enters.

Any metallic material, regardless of whether it is attracted to magnetic fields, may be strongly attracted to the core of the scanner. These objects can become projectile hazards. Even non-magnetic materials, such as aluminium, can be affected and may twist violently in the magnetic field.

The magnetic field may severely affect some pacemakers and other surgically-implanted metal.

Although the magnetic field cannot be shut down quickly, there are other emergency procedures that will shut down the magnetic field within several minutes. During that time a high magnetic field will still exist.

Super-conducting magnets

The magnets within the scanner consist of a large number of tightly wound wires, through which a current passes to produce a magnetic field. MRI scanners have a helium liquid in the magnet, which usually vents through ducting. If it fails, helium gas will be released into the room, depleting oxygen levels.

Cryogenic liquids

The super-conducting magnets are kept at extremely low temperatures by being immersed in liquid helium (-269^{o}C), which is sometimes surrounded by an insulating layer of liquid nitrogen (-196^{o}C). For further information on dealing with cryogenic hazards see national Operational Guidance: Hazardous materials.

Asphyxiation

During an emergency shutdown (or quenching) of an MRI scanner the cryogenic liquids are allowed to 'gas off' and are rapidly vented outside the facility. However, it is possible that some of the gases could be released into the room containing the scanner. This may present an asphyxiation hazard as oxygen is displaced from the atmosphere.

Impact on communication

The scanner room is constructed as a 'Faraday cage' to ensure that the magnetic field remains confined within the room. It continues to work even after electrical power is isolated, and will also block all radio signals, incident ground radios, breathing apparatus (BA) telemetry systems and mobile phones.

Control measure – Consider implementing an emergency shutdown of the MRI scanner

Control measure knowledge

In the event of fire or entrapment, for example if somebody becomes trapped in the magnetic field because they are holding or wearing a metallic item, the operators of the MRI scanner are trained to perform an emergency shutdown (quench) of the scanner.

To shut down the magnetic field, the scanner is quenched of cryogenic liquids. This task will take several minutes, during which time a high magnetic field will still exist.

Taking this course of action should only be done when there is a significant life risk due to the high financial cost. Quenching has the potential to damage the scanner. Once quenched, the scanner

cannot be restarted without specialist engineers replenishing the cryogenic liquids and resetting the equipment.

Strategic actions

Fire and rescue services should:

- Ensure information about MRI scanners, their location and their emergency shutdown procedures is recorded in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Consider requesting an emergency shutdown of the MRI scanner, taking into account the consequences of this action
- Ensure cryogenic gases have not leaked into the scanner room prior to committing fire and rescue service personnel by means of atmospheric monitoring
- Ensure any fire and rescue service personnel committed into the scanner room where there may be a hazard of asphyxiation wear appropriate respiratory protective equipment (RPE)

Control measure – Do not enter the magnetic field with metal objects

Control measure knowledge

If the MRI scanner is still emitting a strong magnetic field, fire and rescue service personnel should not enter the scanner room (beyond the demarcation line) with any metal objects including:

- Firefighting and rescue equipment
- Medical implants, such as joint pins or cardiac pacemakers
- Metal fragments or splinters

Strategic actions

Fire and rescue services should:

- Inform their fire and rescue service personnel about the hazard of exposure to strong magnetic fields if they have metal medical implants

Tactical actions

Incident commanders should:

- Not deploy any metallic equipment into the scanner room (beyond the demarcation line) unless the magnetic field has been shut down
- Only use equipment, such as extinguishers, that has been produced for use in magnetic fields unless the magnetic field has been shut down

- Ensure fire and rescue service personnel are made aware of the strong magnetic field

Control measure – Consider isolating power supplies for the MRI scanner

Control measure knowledge

Isolating the power supply to an MRI scanner will not stop the strong magnetic field being generated. However, there may be some incidents, for example if the scanner is involved in fire, where isolating the power supply would be necessary.

It would be preferable for this to be carried out by the scanner operator, but could be carried out by fire and rescue service personnel.

Refer to the hazard of on-site machinery and the control measure 'Consider isolating power supplies for on-site machinery'.

Control measure – Consider using alternative communication methods

Control measure knowledge

Because the Faraday cage around an MRI scanner blocks normal communication equipment, it may be necessary to implement line of sight communications or to physically relay messages.

See National Operational Guidance: Operations for generic information about communication.

CT scanners

Hazard	Control measures
CT scanners	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies for the CT scanner

Hazard knowledge

CT (computerised tomography) scanners will most commonly be found in medical facilities, such as hospitals. However, they may also be found in animal facilities, such as veterinary clinics and hospitals. Refer to the supplementary information for further detail about CT scanners.

The main hazards relating to CT scanners are:

- Electricity – CT scanners use a three-phase, 400V electrical supply
- Ionising X-ray radiation - the CT scanner takes many X-ray images which are then combined by computer to create a 3D image. The X-ray radiation is produced electrically and ceases to exist once power is isolated.

Control measure – Consider isolating power supplies for the CT scanner

Control measure knowledge

Unlike MRI scanners, isolating the electrical supply does not have a time delay and there is no cost implication or risk of damage to the instrument by operating the electrical isolation switch.

Strategic actions

Fire and rescue services should:

- Ensure information about CT scanners, their location and how to isolate their power supplies is recorded in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Liaise with the responsible person (which could be the scanner operator) if the power supply needs to be isolated
- Refer to the hazard of on-site machinery and the control measure 'Consider isolating power supplies for on-site machinery'

Magnetic equipment

Hazard	Control measures
Magnetic equipment	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating magnetic equipment

Hazard knowledge

Magnetic equipment is widely used in industry for a number of different applications. Magnets can be used to lift and move heavy loads. Industrial magnets are often used in conveyor and chute systems to separate ferrous materials from non-ferrous materials.

They can also be used in recycling centres where plastic, glass, and other items need to be separated from any stray ferrous material. Magnetic sweepers can be used to pick up ferrous materials from the floors of industrial factories and construction sites.

The material being lifted or moved may fall from the equipment, especially if the magnet fails following loss of power to the lifting device or due to incorrect operation.

Any metallic material, regardless of whether it is attracted to magnetic fields, may be strongly attracted to magnetic equipment. These objects can become projectile hazards. Even non-magnetic materials such as aluminium can be affected and may twist violently in the magnetic field. This effect may have an impact on fire and rescue service equipment.

The magnetic field may severely affect some pacemakers and other surgically implanted metal.

Control measure – Consider isolating magnetic equipment

Control measure knowledge

Fire and rescue service personnel should not enter 'lifting zones' while magnetic equipment is in use. The extent of the 'lifting zone' will depend on the size and type of load, its height and speed. There should be warning notices at entrances to places where magnetic lifting is taking place.

Magnetic equipment may have an operator or be part of an automated process. To isolate the equipment, it may be necessary to isolate the electrical supply, which may have back-up batteries. However, if the electrical supply is isolated or interrupted, the material being lifted may fall from the magnetic equipment. Therefore isolation should only be carried out once there is nobody in the 'lifting zone'.

Strategic actions

Fire and rescue services should:

- Ensure that information about magnetic equipment is included in Site-Specific Risk Information (SSRI)
- Inform their personnel about the hazard of exposure to strong magnetic fields if they have metal medical implants

Tactical actions

Incident commanders should:

- Liaise with the responsible person for information about the magnetic equipment and isolation procedures
- Consider isolating magnetic equipment
- Ensure fire and rescue service personnel are made aware of the strong magnetic field
- Consider avoiding the area affected by the magnetic equipment
- Ensure that fire and rescue service equipment that could be attracted to the magnetic equipment is not taken into the hazard area

Electromagnetic fields (EMFs)

Hazard	Control measures
Electromagnetic fields (EMFs)	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider avoiding or isolating the source of electromagnetic fields (EMFs)

Hazard knowledge

An electromagnetic field (EMF) is produced whenever a piece of electrical or electronic equipment is used. Electrical power supplies and appliances are the most common sources of low-frequency EMFs.

Mobile telephone, television and radio masts, along with radars and microwave ovens, produce high-frequency (also referred to as radiofrequency) EMFs.

There is no evidence to conclude that exposure to low level EMFs is harmful to health. However, the main effect of high-frequency EMFs is the heating of body tissues; even short-term exposure to very high levels of EMFs can be harmful to health. Refer to the World Health Organization website for further information.

EMFs may interfere with:

- The operation of medical implants, such as heart pacemakers or insulin pumps
- Fire and rescue service communications including radios, mobile phones and telemetry systems

Control measure – Consider avoiding or isolating the source of electromagnetic fields (EMFs)

Control measure knowledge

Refer to the Health and Safety Executive (HSE) publication, A guide to the Control of Electromagnetic Fields at Work Regulations 2016 for further information. This includes details about equipment with high-frequency EMFs such as:

- MRI scanners – see supplementary information
- Radars– see supplementary information
- Radio and mobile phone masts– see supplementary information

Strategic actions

Fire and rescue services should:

- Ensure that information about electrical or electronic equipment that generates high-frequency EMFs is included in Site-Specific Risk Information (SSRI)
- Inform their fire and rescue service personnel about the hazard of exposure to high-frequency EMFs, especially if they have medical implants that may be affected

Tactical actions

Incident commanders should:

- Liaise with the responsible person for information about electrical or electronic equipment that generates high-frequency EMFs and its isolation procedures

- Consider isolating the source of EMFs
- Consider avoiding the area affected by high-frequency EMFs
- Ensure that fire and rescue service personnel are made aware of the presence of EMFs
- Consider the impact of EMFs on fire and rescue service equipment and communications

Presence of hazardous substances

Hazard	Control measures
Presence of hazardous substances	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Implement hazardous materials procedures

Hazard knowledge

Fire and rescue service personnel, at any incidents in industrial contexts, need to be aware of the potential presence of hazardous substances and the possibility that they may need to be managed and controlled. There may be limited information, or no information, available about the hazardous substances.

Whilst gathering information for Site-Specific Risk Information (SSRI) and emergency response plans, a record of the type and quantities of hazardous substances should be made.

Hazardous substances in industry include:

- Chemicals and pharmaceuticals
- Fuel and lubricants
- Gases, including landfill gas – see supplementary information
- Asbestos
- Paint
- Pyrotechnics, munitions and explosives
- Biohazards
- Radioactive materials

Fire and rescue service personnel should be aware that hazardous substances may not be stored in accordance with regulations. This could include fuels being stored in tanks without bunds, or substances in unsuitable or unlabelled containers. Radioactive materials, discarded fireworks or munitions may also be present.

At illegal waste sites, there may be a higher risk of finding hazardous substances with little or no information about the contents.

It may not be possible to identify unknown hazardous substances without specialist advice and DIM (detection, identification and monitoring) equipment.

Control measure – Implement hazardous materials procedures

See National Operational Guidance: Hazardous materials for guidance about dealing with any release of hazardous substances.

Pressure systems and equipment

Hazard	Control measures
Pressure systems and equipment	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Consider isolating power supplies for pressure systems and equipment Consider depressurising the system

Hazard knowledge

Examples of pressure systems and equipment are:

- Boilers and steam heating systems
- Pressurised process machinery and piping
- Cylinders
- Compressed air systems (fixed and portable)
- Pressure cookers and autoclaves
- Heat exchangers and refrigeration equipment
- Valves, steam traps and filters
- Pipework and hoses
- Pressure gauges and level indicators
- Hydraulic equipment
- Slurry tankers

The potential hazards from pressure are:

- Impact from the blast of an explosion or release of compressed liquid or gas
- Impact from parts of equipment that fail or from flying debris
- Contact with the released liquid or gas – see national Operational Guidance: Hazardous materials, if appropriate
- Fire resulting from the escape of flammable liquids, gases or mists – see national Operational Guidance: Fires and firefighting

The hazards from pressurised systems increase if the equipment has not been installed or maintained correctly, is not suitable for its use, or has had safety features deactivated or removed.

Control measure – Consider isolating power supplies for pressure systems and equipment

Control measure knowledge

It may be necessary to isolate power supplies to pressure systems and equipment, especially if there is a potential hazard to fire and rescue service personnel or other responders. Where possible, advice or assistance should be requested from the responsible person; they may be able to isolate the power supplies for the pressure system.

Strategic actions

Fire and rescues services should:

- Ensure that information about the type, quantity and location of pressurised systems is included in Site-Specific Risk Information (SSRI) if appropriate, along with procedures for isolating power supplies

Tactical actions

Incident commanders should:

- Consider requesting advice or assistance from the responsible person to isolate power supplies to pressure systems and equipment, taking into account any consequences of this action
- Consider isolating power supplies for the pressure system or equipment

Control measure – Consider depressurising the system

Control measure knowledge

Safety valves may be fitted to the equipment to relieve excess pressure; it may be necessary to use these to depressurise equipment to reduce the risk of a pressurised system bursting.

Where possible, advice or assistance should be requested from the responsible person; they may be able to depressurise the system.

Strategic actions

Fire and rescues services should:

- Ensure that information about the type, quantity and location of pressurised systems is included in Site-Specific Risk Information (SSRI), along with procedures for depressurising equipment

Tactical actions

Incident commanders should:

- Consider requesting advice or assistance from the responsible person to depressurise systems, taking into account any consequences of this action
- Consider requesting that the use of pressurised systems is restricted or prohibited
- Ensure that operators are made aware of the presence of fire and rescue service personnel

Silos and storage tanks

Hazard	Control measures
Silos and storage tanks	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Isolate silo or storage tank equipment Carry out atmospheric monitoring Implement confined space procedures Implement working at height procedures Access a silo or storage tank

Hazard knowledge

Silos

Refer to the supplementary information about silos.

The main hazards to be considered when attending an incident with a silo are:

- The need for enclosed space working
- Oxygen-deficient atmosphere
- High concentrations of carbon dioxide
- Asphyxiation if trapped in contents
- Associated on-site machinery
- Explosive atmosphere
- Unstable contents
- Access and egress

The contents of a silo may act in a fluid manner and may not be load bearing. There is a phenomenon in silos known as bridging; this is where the material appears to be solid but has

actually formed a bridge above a void in the contents. Fire and rescue service personnel should not trust that seemingly solid surfaces in silos will be able to bear their weight.

The nature of the goods stored in silos may create a toxic, flammable, oxygen deficient or explosive atmosphere. Opening up a hatch or door may create an explosive mixture.

Oxygen limiting silos or controlled atmosphere silos have a greater risk of backdraft or explosion when they are involved in a fire.

When involved in a fire or suspected fire, opening any doors or hatches could result in a heat blast. For further information, see national Operational Guidance: Fires and firefighting.

Applying water or foam into a silo may result in the contents swelling. Due to the increase in weight, volume and pressure on internal walls, this could lead to structural collapse of the silo.

Many of the contents stored in a silo produce dust. Refer to the hazard for combustible dust.

Gaining access to a silo may involve working at height, with a hazard of fire and rescue service personnel or their equipment falling inside or outside of the silo.

Silos usually have internal and external machinery including:

- Augers, which sweep the contents inside the silo
- Screw feeders
- Conveyer belts
- Paddles
- Suction piping
- Mixing blades

For dealing with these items, refer to the hazard for on-site machinery

The nature of construction limits access and egress to and from silos and storage tanks, and they will lack natural light and ventilation. See national Operational Guidance: Sub-surface, height, structures and confined spaces.

Storage tanks

Storage tanks are used in many industries, mainly for the storage of liquids including:

- Fuels
- Water
- Chemicals

Storage tanks may be constructed of plastic, fibreglass or metal. Some tanks have covers that are not load-bearing.

Control measure – Isolate silo or storage tank equipment

Control measure knowledge

Discharge control mechanisms should be isolated in the closed position. This mechanism may be manually, mechanically or electronically operated. This will prevent contents from being discharged, which may injure somebody in the silo.

The mechanism should be monitored at all times throughout the incident to prevent it from being opened or turned back on without authorisation from the incident commander.

Other on-site machinery that may have an impact on the incident should be isolated – refer to the hazard for on-site machinery. It may also be necessary to isolate power supplies. See National Operational Guidance: Utilities and fuel.

Strategic actions

Fire and rescue services should:

- Ensure that information about silos and storage tanks is included in Site-Specific Risk Information (SSRI) if appropriate, along with procedures for isolating equipment

Tactical actions

Incident commanders should:

- Consider requesting advice or assistance for controlling the silo or storage tank from the responsible person
- Consider isolating and monitoring discharge control mechanisms, other on-site machinery and power supplies

Control measure – Carry out atmospheric monitoring

See National Operational Guidance: Hazardous materials

Control measure – Implement confined space procedures

See National Operational Guidance: Sub-surface, height, structures and confined spaces.

Control measure – Implement working at height procedures

See National Operational Guidance: Sub-surface, height, structures and confined spaces.

Control measure – Access a silo or storage tank

Control measure knowledge

If it is essential for fire and rescue service personnel to access the silo or storage tank, this could be by using fire and rescue service ladders, or, subject to an assessment of their condition, ladders that

are a fixed component of the silo or tank installation. Depending on the height of the silo or tank, it may be appropriate to use aerial appliances for access and egress.

Before opening any hatches, a risk assessment should be carried out. If hatches need to be opened, fire and rescue service personnel should have extinguishing media in place if appropriate, and should ensure that they are not positioned in front of hatches as they are opened.

Strategic actions

Fire and rescue services should:

- Ensure that information about silos and storage tanks is included in Site-Specific Risk Information (SSRI) if appropriate, along with procedures for accessing them

Tactical actions

Incident commanders should:

- Consider requesting advice or assistance for accessing the silo or storage tank from the responsible person
- Consider using fire and rescue service ladders, fixed ladders that form part of the installation, or aerial appliances for access and egress
- Avoid disturbing or dispersing dust
- Consider requesting the attendance of specialist rescue teams and equipment
- Consider regular crew rotation when working in arduous conditions

Slurry pits and lagoons

Hazard	Control measures
Slurry pits and lagoons	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify and control the hazard area around a slurry pit or lagoon Carry out atmospheric monitoring Implement hazardous materials procedures Implement confined space procedures Decontaminate fire and rescue service personnel and equipment

Hazard knowledge

Slurry pits may be above or below ground and are constructed from different materials including earth, plastic, concrete, fibreglass or metal. Slurry is also stored in lagoons.

Slurry is broken down by bacterial action that produces gases, especially when agitated. Slurry gases include methane, carbon dioxide, ammonia and hydrogen sulphide, which could be toxic, flammable or an asphyxiant.

Monitoring the atmosphere in the hazard area around a slurry pit may reduce the hazard of being overcome by toxic fumes, as would wearing respiratory protective equipment (RPE).

Slurry pits may form a crust and could be covered in organic material such as algae, grass and weeds. If their presence is not known, and especially in poor light, there could be a risk of fire and rescue service personnel falling into a slurry pit.

The slurry pit may be in a poor condition, or have been affected by the incident. If this is the case, there is the potential for structural collapse and release of the contents of the pit.

Slurry contains biohazards; people or equipment could become contaminated.

Control measure – Identify and control the hazard area around a slurry pit or lagoon

Control measure knowledge

An appropriate hazard area around a slurry pit or lagoon should be identified and controlled, especially if there is a risk that the contents will be released.

Access into the hazard area should be prevented, or limited to essential tasks with only the minimum number of fire and rescue service personnel. Fire and rescue service personnel should not enter a slurry pit or lagoon unless there is an immediate threat of serious injury or loss of life.

Fire and rescue service personnel entering the hazard area should wear the appropriate level of personal protective equipment (PPE) and respiratory protective equipment (RPE).

For further information, including strategic actions and tactical actions see National Operational Guidance: Incident command – Structuring an incident and National Operational Guidance: Operations

Strategic actions

Fire and rescue services should:

- Ensure that information about slurry pits or lagoons is included in Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Consider requesting advice or assistance from the responsible person before approaching the slurry pit or lagoon
- Ensure that fire and rescue service personnel are wearing appropriate personal protective equipment (PPE) and respiratory protective equipment (RPE)
- Consider requesting the attendance of specialist rescue teams and equipment
- Prohibit eating, drinking or smoking to prevent ingesting contaminants
- Consider restricting the number of fire and rescue personnel and vehicles within the hazard area

Control measure – Carry out atmospheric monitoring

See National Operational Guidance: Hazardous materials

Control measure – Implement hazardous materials procedures

See National Operational Guidance: Hazardous materials for guidance about dealing with any release of hazardous substances.

Control measure – Implement confined space procedures

See National Operational Guidance: Sub-surface, height, structures and confined spaces.

Control measure – Decontaminate fire and rescue service personnel and equipment

See National Operational Guidance: Hazardous materials

Respirable dust, fibres and fumes

Hazard	Control measures
Respirable dust, fibres and fumes	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Wear appropriate respiratory protective equipment (RPE)

Hazard knowledge

Many manufacturing processes will produce dust, fibres and fumes either as part of production or as a waste product. If contained and managed, they should not pose a significant risk to attending personnel. However, any respirable dust, fibres or fumes can be hazardous to health.

Control measure – Wear appropriate respiratory protective equipment (RPE)

See national Operational Guidance: Operations for further information.

Combustible dust

Hazard	Control measures
Combustible dust	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Prevent formation and ignition of combustible dust clouds Wear appropriate respiratory protective equipment (RPE)

Hazard knowledge

Many materials produce dust that is combustible and that, when in the form of a cloud, can explode, if ignited. Anything that can burn, and that exists in a fine powdered form, presents a hazard, for example:

- Sugar
- Coal
- Wood
- Grain
- Certain metals
- Synthetic organic chemicals

Refer to the Health and Safety Executive (HSE) publication, Safe handling of combustible dusts: Precautions against explosions for further information.

Secondary dust explosions may occur when the blast wave from a primary explosion entrains dust layers already present, creating a large dust-air combustible mixture that is ignited by the first explosion.

See National Operational Guidance: Fires and firefighting for the control measures required in the event of ignition or explosion.

Control measure – Prevent formation and ignition of combustible dust clouds

Control measure knowledge

The incident, fire and rescue service activity or ventilation may cause a dust cloud to form.

Ignition sources should be prohibited or removed where feasible. However, a build-up of static electricity may result in a static discharge providing an ignition source.

Water sprays can be used to damp down the dust.

Strategic actions

Fire and rescue services should:

- Ensure that information about the potential for incidents involving combustible dust is included in Site-Specific Risk Information (SSRI); this includes any industries that need to conform to the Dangerous Substances and Explosive Atmospheres Regulations

Tactical actions

Incident commanders should:

- Avoid disturbing or dispersing dust
- Consider the effects or use of ventilation
- Prohibit ignition sources and use intrinsically safe equipment if available
- Consider using water sprays

Control measure – Wear appropriate respiratory protective equipment (RPE)

See National Operational Guidance: Operations for further information.

Presence of captive animals

Hazard	Control measures
Presence of captive animals	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Contain or avoid animals Implement joint working at animal facilities

Hazard knowledge

Animals could be encountered at any incident; the hazards presented by animals range from physical injuries to infections and diseases. See National Operational Guidance: Operations and the Health precautions for firefighters knowledge sheets for further information.

This hazard specifically relates to animals in captivity that may be found in many industries including:

- Farms
- Veterinary facilities
- Boarding kennels and catteries
- Equine facilities – see supplementary information
- Zoos, aquariums and wildlife parks – see supplementary information
- Circuses

- Laboratories
- Abattoirs

This hazard could also apply to semi-captive animals, such as bees that are kept in hives.

For the purposes of this guidance, the term 'captive animals' refers to:

- Wild animals
- Domesticated animals
- Livestock

The behaviour of frightened, trapped or stressed animals may be very unpredictable, especially if they are protecting their territory or young.

Animals may be affected by the sound or sight of the incident including flashing lights on appliances and the sounding of audible warning devices; these may cause animals to panic or stampede.

Some livestock are inquisitive and may move towards the scene of activity, however, any sudden movement or noise could start a stampede.

In a laboratory environment, the infections and diseases may not be restricted to those normally carried by animals.

This guidance does not include the rescue of animals; see National Operational Guidance: Incidents involving animals (awaiting publication).

Control measure – Contain or avoid animals

Control measure knowledge

If it is necessary to enter an area where animals are kept, take advice from on-site staff and close gates, cages or pens where possible.

Assistance may be provided by:

- Animal owners or handlers
- Animal welfare charities
- Veterinary surgeons and nurses
- Specialist animal advisers
- Farmworkers
- Zookeepers

These specialists may be able to give advice on animal behaviour, handle the animals correctly or sedate them if required.

As a precaution, it may be necessary to seek the assistance of the police, especially if they may be required to deal with an animal that escapes.

Strategic actions

Fire and rescue services should:

- Ensure that information about animals, where held in a permanent location, is included in Site-Specific Risk Information (SSRI) where appropriate

Tactical actions

Incident commanders should:

- Liaise with the responsible person for information on the types and locations of animals
- Inform fire and rescue service personnel about the types and locations of animals
- Turn off appliance lights and beacons, and audible warning devices where possible, to prevent agitating the animals
- Ensure appropriate personal protective equipment (PPE) and respiratory protective equipment (RPE) is worn
- Consider using appropriate on-site specialist equipment
- Consider using CCTV, if available, to monitor animal location and behaviour
- Consider notifying the police if appropriate
- Request that animals are contained, away from the fire and rescue service personnel attending the incident
- Ensure personnel do not touch or handle animals unless unavoidable
- Consider appropriate access and egress points, along with managing and controlling gates, cages and pens
- Identify appropriate exit routes for animals and holding areas away from the scene of operations

Control measure – Implement joint working at animal facilities

Control measure knowledge

Where the facilities contain dangerous animals, fire and rescue personnel should liaise with on-site staff to determine locations with potential hazards and to identify safe access and egress routes. Fire and rescue service personnel should be accompanied by on-site staff and there should not be any lone working.

Animals should be secured so that they cannot come into contact with fire and rescue service personnel.

Fire and rescue service personnel should remain vigilant, especially with regard to security arrangements in animal facilities, to prevent them from being accidently locked in cages or other areas. For further information refer to the hazard for security arrangements.

On-site CCTV may be used to monitor and assess any activity that could affect fire and rescue service personnel.

Strategic actions

Fire and rescue services should:

- Establish joint working arrangements with animal facilities in their area
- Provide familiarisation information for fire and rescue service personnel

Tactical actions

Incident commanders should:

- Liaise with the responsible person
- Refer to joint working arrangements
- Ensure fire and rescue service personnel are accompanied by on-site staff
- Ensure there is no lone working
- Consider using CCTV, if available, to monitor animal location and behaviour
- Monitor and assess activity in the animal facility that could affect fire and rescue service personnel
- Liaise with the responsible person to obtain information about antidotes, anti-venom or specialist treatment, in case this is required
- Consider requesting specialist animal advisers
- Consider requesting a veterinary surgeon to anesthetise the animal
- Consider contingency arrangements, which can be implemented quickly if fire and rescue service personnel become isolated in unsafe areas

Munitions

Hazard	Control measures
Munitions	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Identify and control the hazard area around munitions Implement hazardous materials procedures

Hazard knowledge

The term munitions includes:

- Firearms and other military weapons

- Ammunition, such as shells, cartridges or bullets

There is the potential for fire and rescue service personnel to encounter munitions. Although often associated with the military, munitions may be encountered in the form of guns, shells and cartridges at various locations, for example:

- Gun clubs
- Firing ranges
- Farms and rural environment
- Veterinary surgeons
- Military and defence establishments
- Police stations
- Zoos and wildlife parks
- Abattoirs
- Television and film production

The use and storage of firearms is regulated under the Firearms Rules, the Firearms (Scotland) Rules and the Firearms (Northern Ireland) Order. However, appropriate secure storage regulations may not always be adhered to. Munitions may be encountered in unexpected areas, as unspent cartridges, or where being stored in quantities that are above the allowed limit.

The use of munitions is normally within controlled environments such as a firing range; however they may also be used in the rural environment for hunting or gun sports. Exposure to live munitions may result in death or serious injury. Personnel could be exposed to loud noise if in the vicinity of live firing, particularly if the range is enclosed.

If involved in fire, munitions may pose a significant hazard to personnel and members of the public.

Control measure – Identify and control the hazard area around munitions

Control measure knowledge

The likelihood of the presence of and type of munitions will depend on the use of the site. An appropriate hazard area should be identified and controlled, in liaison with the responsible person; in the case of ranges or gun clubs this may be the range officer or chief range officer. Access into the hazard area should be prevented if live firing is taking place.

Firing ranges at military or defence establishments and gun clubs should be well-controlled, with clear signage and warning signals present. For example, at a Ministry of Defence range, red flags (during the day) and red lamps (during the night) are used when firing is taking place. Military ranges may be subject to bylaws; in the case of military and defence establishments a Firing Notice may be published online.

If fire and rescue service personnel are operating in the rural environment and suspect live firing is taking place, they should maintain situational awareness, try to make themselves known and

withdraw to vehicles if necessary. Gather information about how to ensure the safety of fire and rescue service personnel before proceeding.

Unspent munitions should be avoided and not tampered with; report them immediately to the responsible person or range officer. Implement cordons and consider hazardous materials procedures for dealing with explosives.

Strategic actions

Fire and rescue services should:

- Ensure that information about sites with munitions and ranges is included in their Site-Specific Risk Information (SSRI)
- Carry out pre-planning and site inspections to identify and record the type, quantity and location of munitions that a site might hold
- Use site visits as an opportunity to discuss the likelihood of the presence of munitions

Tactical actions

Incident commanders should:

- Adhere to warning signs and signals – do not enter live ranges unless confirmation has been received from the range officer that firing has been stopped
- Liaise with the responsible person and identify the type, quantity and location of any munitions
- Liaise with the responsible person or range officer to cease firing if access to the range is required in an emergency
- Implement appropriate cordon distances, depending on type and size of the munitions
- Take action to protect or remove munitions at risk of fire
- Ensure fire and rescue personnel are wearing appropriate ear protection and high visibility clothing

Control measure – Implement hazardous materials procedures

See National Operation Guidance: Hazardous materials.

Explosives (including fireworks)

Hazard	Control measures
Explosives (including fireworks)	Apply generic control measures [as detailed for the hazard of 'Incidents in industry'] Implement hazardous materials procedures

Hazard knowledge

Explosives

Explosives may be found in bulk at factories, warehouses and other storage facilities. Explosives may be used at industrial sites including:

- Demolition sites
- Mines and quarries
- Military sites

The use and storage of explosives is strictly controlled, and they should be securely stored until the time of detonation.

With certain exceptions, an authorisation is required for the acquisition, keeping, transfer, storage and/or manufacture of explosives. See the Health and Safety Executive (HSE) website about authorisations for the storage of explosives and the manufacturing of explosives.

Fireworks

Fireworks are used by various industries including:

- Nightclubs
- Theatres
- Arenas and stadiums
- Festivals
- Theme parks and fairgrounds
- Circuses

Refer to the Health and Safety Executive (HSE) website about firework displays.

Control measure – Implement hazardous materials procedures

See National Operational Guidance: Hazardous materials.

Glossary

Term	Acronym	Description
Automatic distress signal unit	ADSU	A personal safety device used by firefighters when entering a hazardous environment. The device sounds a loud audible alert to notify others in the area that a firefighter is in distress.
Control of Major Accident Hazards Regulations	COMAH	Regulations that apply to any establishment storing or handling large quantities of industrial chemicals of a hazardous nature. Types of establishments include chemical warehousing, chemical production facilities and some distributors.

International Organization for Standardization	ISO	One of the standards applied to shipping containers
Site-Specific Risk Information	SSRI	This is fire and rescue service risk information, gathered for the benefit of responding personnel attending an SSRI-qualifying location.

References

Generic risk assessment 2.1.2: rescues from confined spaces (silos), 2013 (excluding the rescue activity and the context of confined spaces other than silos)

Generic risk assessment 2.3: rescues from lifts and escalators, 2012 (excluding the rescue activity)

Generic risk assessment 2.5: large-animal rescues, 2010 (excluding the rescue activity)

Generic risk assessment 3.5: fighting fires in farms, 2011 (excluding the firefighting activity)

Generic risk assessment 3.8: fighting fires in public entertainment venues, 2013 (excluding the firefighting activity)

Generic risk assessment 3.9: fighting fires in places of lawful detention, 2013 (excluding the firefighting activity)

http://www.who.int/peh-emf/about/WhatisEMF/en/

http://www.hse.gov.uk/pubns/books/hsg281.htm

http://www.hse.gov.uk/pubns/priced/hsg103.pdf

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http://www.hse.gov.uk/explosives/licensing/index.htm

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