National Operational Guidance

Hazard

Undetected or unidentified hazardous materials at incidents

NFCC National Fire Chiefs Council

Developed and maintained by the NFCC

Contents

Hazard - Undetected or unidentified hazardous materials at incidents

Hazard Knowledge

Hazardous materials have a number of properties and behaviours that can make an incident more dangerous. Therefore, it is vital to recognise their presence as soon as possible to prevent harm occurring. Responders may meet this hazard at:

- Incidents where hazardous materials are known or suspected to be involved before arrival
- Incidents where hazardous materials are encountered during operations

Control measure - Substance identification

Control measure knowledge

The information provided through legislation on hazardous materials containers is a key factor in identifying hazards to responders and the public. Other sources of information should also be considered and their value not overlooked in determining a complete picture of the incident. There are also times when marking, placarding and signs are not present, or are incorrect, damaged or obscured. Examples include during a fire, or where hazardous materials are badly controlled or used illicitly.

In addition to marking and signage, other legislative requirements for the use of substances require sites to keep records of substances held, their hazards and control measures. These requirements mean that sites should have access to Safety Data Sheets (SDS) or Control of Substances Hazardous to Health (COSHH) sheets. This information can provide information about the hazards, health effects, behaviours and control measures. Similar information can be obtained from written and/or electronic data sources such as Chemdata or the Emergency Response Guidebook.

Other sources of information that can assist may be obtained from scientific advisers such as the National Chemical Emergency Centre (NCEC) or other company or product specialists and industry mutual aid schemes, for example Bromaid. This may provide information on a substance, process or premises, or may provide assistance in interpreting information gained.

Signs, labels and other marking system

It is important for responders to recognise signs, labels and other marking systems so that they can gain information regarding the hazards associated with substance safety. These will generally be found on modes of transport or fixed sites.

Transport

The legal framework for the international transport of hazardous materials is set out in the United Nations (UN) model regulations ('Recommendations on the transport of dangerous goods', commonly known as the 'orange book'). These rules are revised every two years and form the basis of the internationally and nationally recognised legislation.

The recommendations are adopted in Europe and consequently in the UK, as ADR (Accord européen relatif au transport international des marchandises Dangereuses par Route) for road transport and RID (Reglement International concernant le transport de marchandises Dangereuses par chemin de fer) for rail transport. Additionally, the UK maintains some deviations from ADR, for example, Hazchem placards. As both marking systems are permitted in the UK it is important for responders to be familiar with both.

The International Maritime Dangerous Goods (IMDG) code contains internationally agreed guidance on the safe transport of dangerous goods by sea, and most commonly relates to the carriage of dangerous goods in freight containers and tank containers. It is primarily used by shipping operators, but it is also relevant to those transporting dangerous goods on journeys involving a sea crossing.

Fixed sites

For static sites, warning signage is governed by the dangerous substances Notification and Marking of Sites) (NAMOS) Regulations. The aim of these regulations is to ensure that firefighters arriving at an incident are warned of the presence of hazardous materials. It is a legal requirement to notify the fire and rescue service about any site with a total quantity of 25 tonnes or more (150 tonnes for ammonium nitrate fertilisers). There is a requirement to place warning signs at access points.

See the Health and Safety Executive website for further details. Dangerous Substances (Notification and Marking of Sites) Regulations (NAMOS)

Labelling of hazardous materials for general use is governed by the Classification, Labelling and Packaging regulations (CLP). These regulations adopt the UN Globally Harmonised System (GHS) on the classification and labelling of chemicals across all European Union countries, including the UK.

Equivalent legislation in Northern Ireland is The Dangerous Substances (Notification and Marking of Sites) Regulations (Northern Ireland).

Under the Control of Asbestos Regulations (CAR), there are specific labelling requirements for asbestos in non-domestic buildings. Responders should recognise these labels.

Containment systems

Hazardous materials containers range in size from small vials and jars used in laboratories through larger packages and transport containers holding many tonnes to site storage tanks and vessels that can hold many thousands of tonnes.

It is important that during incidents, responders can:

- Recognise typical container shapes or types that would indicate the presence of hazardous materials whether in storage, in use or in transit
- Identify the basic design and construction features, including closures for storage, packaging and transportation systems

For further information on substance identification see National Operational Guidance: Health Hazards and National Operational Guidance: Physical Hazards

Strategic actions

Fire and rescue services should:

- Consider developing systems to gather pre-planning information on local risks and incident specific information
- Ensure responding personnel have the necessary instruction and training in the identification of hazardous materials containers
- Provide access to appropriate detection, identification and monitoring (DIM) equipment
- Ensure that Information on the recognition of hazardous materials is immediately available to personnel
- Ensure that responders can recognise signs, labels and other markings on hazardous materials packages

Tactical actions

Incident commanders should:

- Use signs, labels, markings, container types and detection equipment to identify substance
- Identify if containers indicating the presence of general or specific hazardous materials are involved
- Use available fire service or on-site detection equipment to identify the substance involved

Control measure - Signs and symptoms of exposure

Control measure knowledge

Symptoms of exposure to hazardous materials can provide important information to responders on the type of hazard and level of risk. Symptoms will also provide responders with key information to determine the priorities in dealing with those who have potentially been exposed. Exposure to chemical hazardous materials will usually lead to the onset of symptoms much quicker than from exposure to biological or radiological materials. At an unknown event, this can be used as an indicator of the type of hazardous material involved.

Important information can be gained from the type of symptoms that are displayed, the number of people exposed and the time from exposure to symptoms becoming apparent.

Four routes of exposure can lead to symptoms developing:

- Ingestion
- Contact with skin or eyes
- Inhalation
- Injection or through cuts

The route through which exposure occurs can also be a significant factor on the speed and type of symptoms displayed. For example, exposure through a cut may mean that some hazardous substances get absorbed into the blood stream more quickly, enabling symptoms to develop rapidly.

Symptoms from hazardous materials will be either acute or chronic:

- Acute: Substances whose effects develop quickly (usually within minutes to days) and worsen with increasing levels of exposure. These hazardous materials also have a level or threshold below which no harm is caused although, for example, in cases of highly toxic substance, this level can be very low.
- Chronic: Substances whose effects develop after significant periods of time and usually following repeated exposure, for example, substances that can cause cancer.

Step 1-2-3 Plus – Safety triggers for emergency personnel

First responders should follow the 'Step 1-2-3 Plus' process to judge what actions the situation requires:

Step 1 - One person is incapacitated with no obvious reason:

- Approach using standard protocols

Step 2 - Two people are incapacitated with no obvious reason:

- Approach with caution using standard protocols

Step 3 - Three or more people in close proximity are incapacitated with no obvious reason:

- Use caution and follow step 'Plus'

Plus - Follow the CBRN First Responder Flow Chart to consider what actions can be undertaken to save life using the following principles:

- **Remove** people from the immediate area to avoid further exposure to the substance
- **Remove** outer clothing
- **Remove** the substance from skin using a dry absorbent material to either soak it up or brush it off. Use wet decontamination when a caustic agent is suspected
- Communicate reassure and advise that immediate medical advice and help is on its way

See Initial operational response to a CBRN incident for the first responder flow chart

Visual indicators

The visual indicators, listed in National Operational Guidance: Hazardous materials – safe and controlled approach will assist responders in ascertaining whether CBRN materials might be present.

Some CBRN materials will not lead to any immediate signs or symptoms but this does not preclude

the dangers associated with their ongoing dispersal. It should also be borne in mind that some agents may travel considerable distances.

Multiple individuals may show unexplained signs of skin, eye or airway irritation, nausea, vomiting, twitching, sweating, pinpoint pupils (miosis), runny nose (rhinorrhoea), disorientation, breathing difficulties, convulsions and death.

Strategic actions

Fire and rescue services should:

- Ensure they have policies and procedures that reflect the contents of the CBRN(e) first responder aide-memoire and other relevant publications
- Ensure that documents regarding initial operational response (IOR) are distributed to relevant responding personnel
- Have policies for ensuring that members of the public and personnel from other agencies involved in a potential release are informed of the emergency actions they can take to minimise the impact on themselves
- Ensure staff are aware of the principles of IOR, Step 1-2-3 Plus, "Remove, Remove, Remove" and the CBRN First Responder Flow Chart and that they are incorporated into all policies and procedures which address CBRN(e) incidents
- Ensure that staff have the skills, knowledge and understanding to recognise release indicators and signs and symptoms of exposure to CBRN materials/agents

Tactical actions

Incident commanders should:

- Observe individuals for signs of exposure or contamination and check for consistency against identification
- Consider Step 1-2-3 Plus: Safety Triggers for Emergency Personnel

Control measure - Scene survey: Hazardous materials

Control measure knowledge

The initial scene assessment at a potential hazardous materials incident must be carried out from a place of safety to avoid responders becoming contaminated or exposed to a hazardous material and becoming part of the emergency.

It is necessary to find out what has caused, or is causing, the emergency or event then to estimate foreseeable developments and consequences, who and what will be adversely affected. To assist with this, responders should consider retrieving hazard and incident information from:

- Placarding and signage. For example, UN hazard warning labels, ADR (Accord européen relatif au transport international des marchandises Dangereuses par Route) placards, Notification and Marking of Sites (NAMOS) signs and Classification, Labelling and Packaging (CLP) labels.
- The Dangerous Goods Emergency Action code List (EAC)
- The Globally Harmonised System (GHS)
- United Kingdom Hazard Information System (UKHIS)
- Workplace exposure limit signs
- Safety Data Sheets (SDS)
- Transportation documents, for example instructions in writing (IIW)

They should also assess the condition of the containment system, in particular:

- Construction and operation of road, rail and other transport containers
- Construction and use of fixed storage tanks
- Construction and operation of intermediate bulk containers (IBC)
- That pressurised containers are inherently higher risk than non-pressurised
- Type of stressors involved (for example, direct flame impingement, heat, cold, chemical, mechanical, shock, friction)
- The operation of any engineered solutions or safety devices fitted, such as pressure relief valves

As part of their scene survey, incident commanders and other deployed personnel should be vigilant for indications that hazardous materials may be present in unexpected locations. Such instances may include, but are not exclusive to, the following:

Illicit drug laboratories

Clandestine locations may be established to produce illegal substances which could range in size from one room to a sophisticated operation. Indicators may include covered windows, strong odours, refuse containing chemical containers and occupants reluctant to allow entry to responder agencies, or a more formal laboratory setup such as scientific apparatus, beakers, mixing bowls, fans, eye protection, filter paper, scales, etc. Where a more formal laboratory layout has been identified, then this should not be confused with the manufacturing of improvised explosive devices; they share very similar equipment and should be confirmed as soon as possible.

Improvised explosive devices (IED)

Personnel may inadvertently encounter bomb factories whilst responding to other types of incident or could be called to deal with a suspected or confirmed improvised explosive device. An IED can take the form of a packed device, a vehicle or a suicide bomb.

Improvised explosive devices usually comprise of a range of homemade explosives, rather than standard commercial or military grade explosives. The main types are:

- Ammonium nitrate-based
- Sugar chlorate
- HMTD (Hexamethylene triperoxide diamine)
- TATP (Tricacetone triperoxide peroxyacetone)

These mixes can be highly unstable and may be sensitive to friction and heat, with the potential to self-heat (known as thermal runaway). Where personnel encounter an improvised explosive device during an incident it is imperative that the device is not touched in any way and the scene secured and evacuated.

During a scene survey certain material may be identified which would indicate or confirm the presence of an improvised explosive device, such as:

- Chemicals containing chlorates, ammonium nitrate, acetone (solvent/nail varnish remover), Acid (drain cleaner, battery acid), hydrogen peroxide (hair bleach) etc.
- Bomb making equipment, including detonators (improvised, such as bulbs), power sources (such as batteries), simple switches plus wiring and fragmentation material (such as ball bearings, nuts, bolts and nails)
- Bomb making paraphernalia or literature such as text books, notes, extremist material, academic material or scientific publications
- A similar laboratory setup to illicit drugs

Individual Chemical Exposure (ICE)

These are events where an individual uses a chemical or a mixture of chemicals with the intent to self-harm, predominantly by ingestion or inhalation. They commonly occur in sealed or partially

sealed environments such as vehicles, residential bathrooms, hotel rooms and other enclosed areas where a small amount of gas can quickly reach lethal concentrations.

It is important to note that the signs or indicators of individual chemical exposure may not be immediately obvious. However, there may be certain indications during a scene survey that could help confirm it such as:

- The signs and symptoms being displayed by casualties and their severity
- Casualties or emergency responders experiencing breathing difficulties or irritation to the eyes and nose
- The event taking place in an unusual location such as a vehicle parked in a beauty spot or remote rural area or a small enclosed room
- Information received (e.g. from a witness) that a person at the scene may be in possession of chemicals or that there is some history or intelligence that suggests the person has attempted to self-harm on a previous occasion
- Warning notes or safety data taped to vehicle or building windows or doors
- Duct tape, plastic or towels used to cover air vents windows and/or doors to produce a sealed environment
- Vehicle occupants appearing unconscious or unresponsive
- Presence of a 'suicide bag' or hood at the scene
- Suspicious (possibly spilled or empty) containers or cylinders
- Unexplained vapour in the air or a strong chemical smell such as the smell of rotten eggs, bitter almonds, garlic or decaying fish
- The presence of a barbecue within a sealed or partially sealed environment
- Disabled smoke or carbon monoxide alarms

White powder or suspicious substance incidents

A 'white powder' incident can actually be a powder of any colour. It is a suspicious unidentified powder that is known to be neither explosives nor drugs. A suspicious substance is an unidentified solid, liquid, gel, crystal, organic or granular material not believed to be explosive or drugs.

The role of the fire and rescue service at these incidents is to support the police service by providing a range of resources and personnel to perform the detection, identification and monitoring of the substances. If at any point during the process it is suspected that the item or substance may be explosive in nature or may in fact be some form of incendiary or improvised explosive device (IED), guidance for explosives or IEDs should be followed and the information communicated to update the joint understanding of risk. This will allow the threat assessment for the incident to be updated.

Following the request to attend an incident, the nature and seriousness of the circumstances will determine the level of specialist assets that a fire and rescue service may deploy. Early multi-agency

information sharing is essential, particularly between other emergency services who may also be preparing for a response to the incident or have prior knowledge of the incident. It may be beneficial to deploy a National Inter-Agency Liaison Officer (NILO) to provide advice (either at the scene or remotely) on the capacity and capability to support incident resolution.

The police will co-ordinate any multi agency response and ensure that a suitable environment exists before the fire and rescue service or ambulance service provide their respective specialist capabilities. The police will also co-ordinate the threat assessment as they have the capability to access, analyse and disseminate information and intelligence.

Forensic management of incident scenes will need to be considered before the deployment of multi-agency resources where criminal intent or terrorism is suspected, though maintaining any lifesaving activity is the highest priority. Some individual police forces use their own detection, identification and monitoring (DIM) capability (sometimes in conjunction with fire and rescue services) to carry out initial scene assessment under police supervision to mitigate the risk of forensic evidential loss.

Strategic actions

Fire and rescue services should:

- Provide personnel that deal with hazardous material incidents with specialist information, instruction and training on the process of identifying hazardous materials
- Ensure that personnel can identify illicit drug laboratories, improvised explosive devices, individual chemical exposure and suspicious packages

Tactical actions

Incident commanders should:

- Ensure that a hazardous materials scene survey is carried out at the earliest opportunity
- Gather incident information from a suitable safe distance based on hazard assessment
- Recognise indicators that hazardous materials may be present in unexpected places (e.g. Drug labs, IEDs, ICE)

- Identify any hazardous materials signage and other indicators as part of scene survey

Control measure - Specialist advice: Hazardous materials

Control measure knowledge

To ensure a hazardous materials incident is managed safely, the fire and rescue service will need to ensure that specialist advice is available to support the incident commander and operational crews. The amount, quantity and quality of information will be directed by the nature of the incident and it is crucial that the on-scene commander or fire control room can access the most current information possible.

Specialist hazardous materials advice may be required to:

- Identify the release or spill
- Identify the hazards posed by the release
- Identify or predict physical or chemical reactions
- Assist with the selection of the most appropriate personal protective equipment (PPE)
- Assist with decontamination of people and equipment
- Mitigate further damage to the environment
- Ensure response plans and tactics are appropriate and safe
- Advise on the treatment of people who have been exposed
- Assess wider public safety concerns
- Assist with investigations and debriefings

There is significant capability for both on-site and remote scientific and specialist support for hazardous material incidents, particularly CBRN(e) incidents. Specialist advice may be provided by many sources and there is the possibility of duplicated, confused or even contradictory advice being provided to the incident. There may also be confusion between the scientific advice and responders in terms of language and technical knowledge.

There are a number of fire and rescue service specific resources.

National Resilience Assurance Team

A national cadre of advisers from the fire and rescue National Resilience Assurance Team (NRAT) and National Strategic Advisory Team (NSAT), who provide tactical National Resilience capability

advice to the fire and rescue service tactical and strategic commanders. These advisers are also able to provide communication conduits to the National Resilience Fire Control (NRFC) or Home Office Operations Centre where required.

For further information see the National coordination and advisory framework for the fire service in England (NCAF)

Tactical commanders with specific CBRN(e) training

CBRN(e) tactical commanders understand the structures which support the tactical function of the delivery of scientific and operational support to the incident and can assist the on-scene commander in creating, implementing and reviewing an appropriate tactical plan in line with the strategy and parameters determined by strategic command and with due regard for partner agency needs.

CBRN(e) tactical advisers

Tactical advisers have been identified within individual fire and rescue services to provide detailed tactical and capability relevant advice to on-scene incident, operations and sector commanders.

Hazardous materials advisers (HMA)

These officers provide specialist advice to the on-scene commander and where appropriate, tactical and strategic co-ordinating groups. They will liaise with other specialist advisers and emergency services to provide information on:

- The extent of the hazard zones
- Personal protective equipment (PPE) selection and decontamination procedures
- Safe systems of work for those within the ‘hot zone’
- The potential for escalation of the incident
- Interpretation of any information from other experts

Where available, the hazardous materials specialist may be supported by a:

- Detection, identification and monitoring (DIM) adviser
- CBRN(e) tactical adviser
- Multi-agency Scene Assessment Team (MASAT)

Police staff with an enhanced level of skill, knowledge and understanding

These include:

- Police CBRN(e) tactical advisers
- Police duty officers at the National CBRN Centre (N CBRN C) Operations Room

- Government Decontamination Service (GDS)

The UK Government Decontamination Service (GDS), is part of the Department for Environment, Food and Rural Affairs (Defra). GDS helps the UK prepare for recovery following a deliberate act involving chemical, biological, radiological and nuclear (CBRN) materials, or an accidental release of hazardous materials (HazMat), by providing a permanent on-call team for advice and guidance following a CBRN or major HazMat incident. Their role includes:

- Providing advice, guidance and assistance on decontamination to responsible authorities in their contingency planning for, and response to, CBRN and HazMat incidents
- Plan and arrange for decontamination operations to be available to the responsible authorities should the need arise
- Responsibility for maintaining and building the GDS framework of specialist providers and ensuring that responsible authorities have access to them
- Advising central government on the national capability for the decontamination of buildings, infrastructure, transport and open environment

Other specialist service personnel and organisations

- Ambulance services have specialist officers, such as:
  - Hazardous Area Response Team (HART)
  - Medical Emergency Response Incident Team (MERIT)
  - Specialist Operational Response Teams (SORT) etc. who can provide advice on clinical care and decontamination of casualties
- Other specialists or service providers with specific knowledge of CBRN or hazardous materials, for example: scientific advisers, radiation protection advisers etc.
- Other agencies including Environment Agency, Public Health agencies (PHE) etc.
- Non-fire and rescue service personnel with specific knowledge of hazardous materials or individual products/processes, such as scientific advisers or company chemists
- The National Chemical Emergency Centre (NCEC) that provides 24-hour assistance through the CHEMSAFE scheme
- Government agencies, for example:
  - The Met Office
  - Atomic Weapons Establishment (AWE)
  - Defence Science and Technology Laboratory (DSTL)
  - Environmental agencies
  - Public health agencies
- Industry response schemes such as Radsafe or Chlor-Aid

Incident commanders will also be able to access information sources, both printed and in electronic format. Printed information sources include:

- The Dangerous Goods Emergency Action Code List (EAC)
- The Emergency Response Guidebook (ERG)
- Safety Data Sheets (SDS) also referred to as Material Safety Data Sheets (MSDS) and Chemical Safety Data Sheets (CSDS)
- Transportation instructions in writing (IIW)

Electronic information sources include: The Met Office Hazard Manager application, CHEMDATA, Wireless Information System for Emergency Responders (WISER), the ERG application, etc.

All fire and rescue services have access to specialist advice both from their own resources and from external sources, including scientific advisers and public health agencies. These are good sources of specialist knowledge but are not always available immediately on the incident ground.

Strategic actions

Fire and rescue services should:

- Have arrangements to access risk critical information from remote specialists quickly during incidents, for example, Chemdata via vehicle mounted mobile data terminals (MDT)
- Ensure specialist personnel with enhanced skills, knowledge and understanding in hazardous materials operations are available to perform the key role of hazardous materials adviser (HMA)
- Ensure personnel understand the purpose of the hazardous materials adviser role
- Ensure that key dangerous substance information sources are immediately available, reliable and resilient
- Have policies and procedures that identify levels of specialist advice and how this advice can quickly be made available to the incident commander
- Have arrangements to access risk critical information from remote specialists quickly during incidents
- Provide access to enhanced skills, knowledge and understanding in CBRN(e) operations to perform the key advisory roles at incidents

Tactical actions

Incident commanders should:

- Consider requesting the attendance of tactical advisers or subject matter experts
- Consider requesting the attendance of hazardous materials adviser (HMA)

Control measure - Multi-agency working: Hazardous materials

Control measure knowledge

Due to the complexity of hazardous materials incidents it is essential that the incident commander works with all appropriate agencies when attempting to control and contain hazardous material releases. The joint understanding of risk (JUR) is a key component in achieving a safe multi-agency response to deliver a safe resolution to the incident. The specialist knowledge and equipment which the fire and rescue service can provide at hazardous material incidents allows them to inform and advise other multi-agency partners on the significance of any risks, including the extent of cordons and advice to the public.

For further information see The Joint Emergency Services Interoperability (JESIP) Principles for joint working

Strategic actions

Fire and rescue services should:

- Ensure that call handlers and responders receive suitable and sufficient information and instruction to enable them to apply the Joint Decision Model (JDM) in a hazardous material environment to develop a multi-agency joint understanding of risk (JUR)
- Participate in multi-agency CBRN(e) training events and programmes

- Incorporate their multi-agency partners priorities into their own response plans to CBRN(e) and public decontamination

Tactical actions

Incident commanders should:

- Share situational awareness and establish a joint understanding of risk with other agencies
- Consider joint working in hazard areas based on joint understanding of risk

Control measure - Recognise the need for detection, identification and monitoring (DIM) equipment

Control measure knowledge

ARCHIVED - The identification of hazards is fundamental to any safe system of work at hazardous materials incidents. Typically, this is achieved either by direct observation of behaviours or by accessing information sources and specialists to get hazard information after obtaining a chemical name, UN number or Chemical Abstracts Service (CAS) number.

Where specific risks relating to substances or activities at local sites are known, fire and rescue services may provide equipment that will help responders to identify and monitor releases. Such equipment can, in some cases, determine the nature or name of the hazardous material involved. Once this is known, responders can access the usual data source and specialists to establish hazards and control measures.

In some cases, such as gas monitoring, it may be possible to monitor the spread of hazardous materials. This will help maintain safe cordon distances and determine whether intervention techniques are being effective.

In addition to monitoring equipment obtained by fire and rescue services, the government has provided a number of suites of detection identification and monitoring (DIM) equipment nationally as part of the National Resilience framework.

- Detection - recognising the presence of a hazardous or CBRN(E) material.
- Identification - determining the hazardous or CBRN(E) material that is present.
- Monitoring - quantitatively determining the presence or absence of hazardous or CBRN(E) material in a continuous or periodic process

At an incident where National Resilience detection identification and monitoring (DIM) teams are deployed the hazardous materials adviser (HMA) will act as the link between the detection identification and monitoring (DIM) team and the incident commander. At a CBRN(E) event, a CBRN(E) subject matter adviser or tactical adviser (Tac Ad), when mobilised, will be responsible for advising the incident commander on developing the tactical response plan.

An alternative or supplementary approach is to use techniques to determine the hazard directly through observation, as opposed to determining the identity and then looking up the hazards. This is given the term 'hazard categorisation' but is also often referred to as 'wet chemistry' or 'field chemistry' techniques.

The process is straightforward. A very small amount of the hazardous material is safely obtained as a sample. This is then subjected to a number of tests where behaviour is observed. For example, adding a small amount of water can provide a lot of information, such as whether the substance is water reactive, soluble, immiscible and floats or sinks in water. With this information, responders can predict the behaviour of the material that will help determine tactics for control.

Strategic actions

Fire and rescue services should:

- Consider local risks and obtain detection, identification and monitoring (DIM) equipment appropriate for the risk
- Develop and maintain systems to ensure mutual aid agreements are developed on a local, regional and national basis to ensure the access and availability of National Resilience detection, identification and monitoring (DIM) assets and personnel
- Ensure personnel are trained in the deployment, use and interpretation of their detection, identification and monitoring (DIM) equipment, such as gas monitoring equipment or dosimeters

Tactical actions

Incident commanders should:

- Request available detection, identification and monitoring equipment, for example:

  - Thermal imaging equipment
  - Gas or vapour detection and monitoring equipment, such as a lower explosive limit (LEL) meter
  - Radiation detection and monitoring equipment

- Consider requesting specialist resources for detection, identification and monitoring (DIM)
- Deploy competent responders with detection, identification and monitoring (DIM) equipment
- Provide a clear brief to responders including:
  - Locations of detection, identification and monitoring (DIM)
  - Sampling technique
  - Scene preservation
  - Appropriate personal protective equipment (PPE), decontamination and other safety controls

Control measure - Hazardous materials assessment

Control measure knowledge

Given the potential complexity of hazardous materials incidents, it is important to develop a clear and risk assessed response plan. This will ensure important factors are not overlooked and will help prioritise actions and tactics. Setting objectives is key to this process. Where more than one service or organisation is at the scene, this should be done on a multi-agency basis by establishing a joint understanding of risk (JUR).
Hazardous materials incidents should follow the same dynamic risk assessment (DRA) or analytical risk assessment (ARA) as any other emergency. However, at hazardous materials incidents a specific assessment of the substances and their hazards will need to be carried out to inform the incident risk assessment.
Incident risk assessment considers information from:

- Site-specific premises risk information
- Operational guidance, including those for hazard specific incidents, for example radiation, asbestos and acetylene cylinders.
- Observation of incident circumstances
- Eye witnesses at the time of the incident

The selected safe systems of work (SSoW) should be implemented, developed, maintained and reviewed throughout the life of any incident. There are several risk assessment methods that can be used in the initial and subsequent incident phases.
The process of risk assessment at hazardous materials incidents falls into three distinct phases:

- Initial attendance and risk assessment of time-critical actions
- Secondary actions to stabilise the incident
- Hazardous materials assessment

The hazardous materials assessment process requires personnel who have received specific training on the subject. Responders should be skilled in interpreting the information collected and how it can be applied to create a risk-assessed tactical plan. This should always be based on a dynamic risk assessment.
At larger or more complex incidents the volume and detail of applicable hazardous materials information is likely to be greater. The capacity of personnel to assimilate information will vary in proportion to the nature and size of the incident and the stage the operational response has reached. The ability to scale up the crucial process of hazardous materials assessment may require additional support to ensure the required tasks are completed in a precise, detailed and timely manner.

Strategic actions

Fire and rescue services should:

- Ensure personnel who respond to hazardous materials incidents receive specific information, instruction and training on conducting an initial hazardous materials assessment
- Ensure hazardous materials advisers receive specific information, instruction and training on the conducting a comprehensive hazardous materials assessment
- Consider using consistent systems and formats to record information from all hazardous materials incidents
- Provide mechanisms to enable the rapid assessment and interpretation of information retrieved from the scene
- Ensure personnel can interpret hazard data systems at scene to enable a suitable and sufficient risk assessment to be completed

- Ensure that any information gathered is treated as confidential unless disclosure is required for legal reasons

Tactical actions

Incident commanders should:

- Use specialist advisers to carry out hazard specific assessments and interpret information and advice

- Make a record of the hazardous materials assessment and incorporate into analytical risk assessment