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Fire and Rescue Service Operational Guidance

GRAs
generic risk assessments

GRA 5.4
Incidents involving biological hazards

Generic Risk Assessment 5.4

Incidents involving biological hazards

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SECTION 1

GRA 5.4 Incidents involving biological hazards

Scope

This Generic Risk Assessment (GRA) examines the hazards, risks and control measures relating to Fire and Rescue Service (FRS) personnel, the personnel of other agencies and members of the public attending incidents involving biohazards.

Depending on the nature and scale of the operational incident a variety of significant hazards may be present. FRS may therefore need to consider the contents of other specific GRAs in this series. This GRA should therefore be considered in conjunction with all other relevant GRAs in the series.

FRS must conduct their own assessments and produce their own Safe Systems of Work (which include Standard Operating Procedures [SOPs], training programmes, provision of equipment, levels of response etc.) within the context of Integrated Risk Management Plans, local conditions, knowledge and existing organisational arrangements.

Significant hazards and risks

A biological hazard is any micro organism, cell culture or human endoparasite, including any that have been genetically modified, that can cause infection, allergy, toxicity or otherwise create a hazard to human health.

The biohazard can enter the body via skin contact, puncture wounds, cuts, inhalation and also by ingestion of contaminated food or drink.

Biohazards can be grouped into four different classes:

1. **Bacteria**: (esherichia coli (E.coli), TB, salmonella, legionella)
2. **Viruses**: (hepatitis B, C, HIV)
3. **Protozoa**: (toxoplasmosis, ringworm, malaria)
4. **Fungi and spores**: (aspergillosis)

Included within the above list, there is a serious health risk to personnel by the transmission of infectious diseases (zoonoses) through direct or indirect contact with animals, which are alive or dead and animal waste. Examples of zoonoses are rabies and ringworm.

Contact between pregnant firefighters and sheep and goats carrying chlamydia psittaci can also result in miscarriage. (see GRA 2.5 *Rescues of animals* for further guidance)

Biological hazards may be encountered in a wide range of situations:

- hospitals e.g. isolation wards, post mortem areas, medical schools, laboratories etc.
- biotechnology laboratories using genetically modified organisms
- universities, colleges
- veterinary laboratories, quarantine kennels, abattoirs
- government research establishments
- biological, medical, animal research establishments
- farms, zoos, wildlife parks
- sewers, sewage treatment plants and flood water
- casualty handling/cadavers at fires, transport incidents or other special service calls
- residential premises where persons maybe infected
- post offices and mail delivery couriers
- funeral parlours/embalmers
- biological warfare or terrorist incidents.

The Advisory Committee on Dangerous Pathogens (ACDP) advises the Health and Safety Executive and appropriate government ministers on pathogens. The ACDP categorises biological agents into one of four Hazard Groups based on their ability to infect healthy adult humans and category of containment.

ACDP Hazard Groups for biological agents	
Group	Pathogen
1	Unlikely to cause human disease
2	Can cause human disease and may be a hazard to employees; it is unlikely to spread to the community and there is usually effective prophylaxis or treatment available. Examples include E.coli 157 and straphlococcus aureus (including MRSA)
3	Can cause severe human disease and may be a serious hazard to employees; it may spread to the community but there is usually effective prophylaxis or treatment available. Examples include hepatitis B and rabies
4	Causes severe human disease and is a serious hazard to employees; it is likely to spread to the community and there is usually no effective prophylaxis or treatment available. Examples include smallpox and lassa fever

The ACDP also issues guidance in the form of an *Approved List of Biological Agents*.[1] This categorisation forms the basis for the adoption of the appropriate laboratory containment measures as required by the *Control of Substances Hazardous to Health Regulations (COSHH)*.

There are additional hazards associated with biological agent research and development premises, these may include:

- high security levels, including electronic locking mechanisms, preventing unauthorised access
- premises containing hazard group 3 and 4 are required to maintain negative pressure (up to –50Pa) in order to prevent the release of biological agents outside the building. Due to security reasons, these types of premises are required to be located above ground floor
- an uninterruptible power supplying lab equipment and building facilities
- regular disinfection of labs generally takes the form of gaseous formaldehyde fumigation over a 12 hour period
- various types of animals used for research purposes
- gases, including nitrogen, hydrogen, helium and oxygen
- chemicals, including acids, bases, alcohols, volatile agents and toxic or carcinogenic organic compounds e.g. benzene
- various radiation sources for sterilisation.

Key control measures

Pre-planning

Pre-planning is key to enhancing the safety of firefighters and others likely to be affected by FRS operations. Each FRS's Integrated Risk Management Plan (IRMP) will set standards and identify the resources required to ensure safe systems of work are maintained.

Each FRS should assess the hazards and risks in their area relating to this GRA and site-specific plans should be considered for locations where these are significant. This assessment should include other FRS's areas where "cross border" arrangements make this appropriate.

Such contingency plans should include:

- levels of response
- relevant SOPs
- tactical considerations. Including rendezvous points (RVPs), appliance marshalling areas and access points.

[1] www.hse.gov.uk/biosafety/biologagents.pdf

Pre-planning is underpinned by information gathering, much of which will be gained through inspections or visits by FRS staff – for example, those covered by section 7(2)(d) [etc] risk information, 8(2)(d) road traffic accidents and 9(3)(d) other emergencies of the *Fire and Rescue Services Act 2004*.

Information should also be gathered and used to review safe systems of work, etc from sources both within and outside the FRS, including:

- fire safety audits
- incident de-briefs
- health and safety events
- local authorities
- Local Resilience Forum.

Involving others in pre-planning is also an effective way to build good working relations with partner agencies and other interested parties, such as site owners.

FRSs should ensure systems are in place to record and regularly review risk information and to ensure that new risks are identified and recorded as soon as practicable.

FRSs must ensure that the information gathered is treated as confidential, unless disclosure is made in the course of duty or is required for legal reasons.

FRSs should consider the benefits of using consistent systems and formats to record information from all sources. Consideration should also be given to how timely access will be provided to information to support operational decision-making.

Information needs and the capacity of FRS staff to assimilate information will vary, in proportion to the nature and size of incident and what stage the operational response has reached. Arrangements need to be flexible and may be based on more than one system.

COSHH requires that any premises that contain biohazards of hazard group 3 or 4 have written contingency plans for dealing with an emergency. In premises where hazard group 4 agents are in use, expert advice will be available at all times.

FRSs will need to consider the levels of multi-agency liaison and advice that are required to resolve all foreseeable incidents involving biological agents within their areas.

Stakeholders that are likely to provide positive benefits in this regard will include:

- Health Protection Agency
- Local Resilience Forum
- emergency planning departments
- Environment Agency (SEA)
- Environmental Health Department
- police
- Ambulance Service

- Health and Safety Executive
- Highways Agency (for incidents on major roads)
- specialist advice through industry experts
- hospitals.

Training

Section 2 of the *Health and Safety at Work etc Act 1974* lays down the general duties of employers to their employees.

Section 2 (2) (c) of the act requires employees to provide information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees.

When formulating a training strategy a FRS should be mindful of the following points:

- all FRSs must ensure their personnel are adequately trained to deal with risk/ hazard associated with incidents involving biological hazards
- the level and nature of training undertaken should be shaped by informed assessment of operational and individual needs in accordance with the FRS guidance on the integrated personal development system, national occupational standards and any internal training plan
- training and development should follow the principles set out in national guidance documents
- training and development programmes should generally be structured so that they move from simple to more complex tasks and from lower to higher levels of risk
- training and development will typically cover standard operational procedures as well as ensuring knowledge and understanding of equipment and the associated skills that will be required to use it
- training and development programmes should consider the need for appropriate levels of assessment and provide for continuous professional development to ensure maintenance of skills and to update personnel whenever there are changes to procedure, equipment etc.

Training outcomes should be evaluated to ensure that the training provided is effective, current and it meets defined operational needs as determined by the FRS IRMP.

Command and control

The IC should follow the principles of the current national incident command system. Prior to committing personnel into any hazard area, the IC must take account of the actual information about the incident that is available to make operational decisions in what are recognised as sometimes dangerous, fast moving and emotionally charged environments.

A thorough safety brief prior to deployment of personnel within the hazard zone must be carried out.

The command and control of incidents should always involve the dynamic management of risk. The process begins with a risk assessment as part of emergency planning and will certainly continue as the incident develops and priorities change. The Incident Commander will be guided by a number of factors, which may include:

- nature of incident
- FRS doctrine towards dynamic management of risk (i.e. some risk to save saveable life)
- quantity and nature of the biological hazard
- resources required (including non FRS)
- advice from site staff
- advice and guidance from Hazardous Materials and Environmental Protection Officers' (HMEPO) or Detection Identification & Monitoring Officers (DIM)
- 7(2)d risk information
- PPE required to protect against biological hazards
- decontamination requirements
- additional non-biological hazards
- available scientific expertise
- off site considerations
- potential effect on the environment.

Safety Officer(s)

The early appointment of one or more Safety Officer(s) will help ensure that risks are either eliminated or reduced to an acceptable level.

A safety decision-making model should be used to brief Safety Officers regarding the nature of the incident, the allocated task and prevailing hazards and risks. The IC should confirm that the Safety Officer understands:

- their role and area of responsibility
- allocated tasks
- lines of communication.

Those undertaking the Safety Officer role should:

- be competent to perform the role
- ensure personnel are wearing appropriate PPE

- monitor the physical condition of personnel and/or general or specific safety conditions at the incident, in accordance with their brief
- take any urgent corrective action required to ensure safety of personnel
- update the IC or senior safety officer regarding any change in circumstances
- not be engaged in any other aspect of operations, unless this is required to deal with a risk critical situation.

A Safety Officer can be any role, but the complexity of the task, size of the incident and scope of responsibility should be considered by the IC when determining the supervisory level required.

Safety Officers should wear nationally recognised identification to indicate they are undertaking the Safety Officer role.

FRSs should ensure that training and other measures (such as aide-memoires) are in place and available to support those staff liable to undertake this role.

Personal Protective Equipment (PPE)

FRSs must ensure that any PPE provided is fit for purpose and meets all required safety standards. When choosing suitable protective garments, the standard of clothing worn beneath the specialist PPE should also be taken into account. Consideration should also be given to the selection of suitable sizes and gender specific requirements of PPE.

PPE should also take account of the need for rescuers to be visible against the operational background including night working and for the IC and other managerial and functional roles (defined in the national incident command system) to be distinguishable.

All personnel must use appropriate levels of Service provided PPE and Respiratory Protective Equipment (RPE) as determined by the safe system of work.

The level of PPE required will be determined by the following:

- the nature of any biohazard present
- the potential for exposure to known biohazards, or due to the nature of the incident, those biohazards that could reasonably be expected to be present (e.g. animal rescues and road traffic collisions)
- the attendance of a biohazard expert to confirm the required PPE levels.

Liquid Tight Chemical Protective Clothing (LTS) and Breathing Apparatus will provide adequate protection for all biological hazards, including hazard group 4.

Health surveillance

Arrangements should be in place for effective health surveillance of all staff that are suspected of being exposed to any biohazards during an incident. This may be by means of an on-site specialist or Health Protection Agency (HPA) whilst the incident is still in progress. Certain circumstances may require prophylaxis to be given for potential exposures.

Note: In cases of suspected exposure to HIV or Hepatitis virus there may be a need to provide Post Exposure Prophylaxis (PEP) within one hour.

Plans should be in place to provide monitoring and recording of biohazard exposure. COSHH requires that employers keep a list of all personnel exposed to hazard group 3 and 4 agents for at least 10 years (for those agents with delayed effects this list should be kept for 40 years).

Staff should also be provided with follow-up monitoring by the Occupational Health Unit as necessary. This will enable more sensitive whole body monitoring or analysis of biological samples, such as urine etc. to be carried out.

Location and marking

Where biological agents are present within a building there should always be a warning symbol present at the entrances to laboratories and refrigeration units for agents of hazard groups 2, 3 and 4, but they may not be found externally.

For transportation, infectious substances will be assigned to UN 2814, UN 2900, UN 3373 or UN 3291 for clinical waste. Vehicles used for the transportation of biological agents will come under UN hazard classification 6.2 and may display the warning triangle for "substances containing disease-producing micro-organisms".

Packages containing materials which present a biological hazard can be transported by road, rail, sea or air. For all substances a triple packaging system is used which incorporates a waterproof and leak proof system with an external international warning sign clearly shown.

It is not permitted to send hazard group 4 materials through the postal system. All other hazard groups may be transported through the post providing they comply with packaging requirements.

Decontamination

Depending on the type of biohazard exposure, decontamination will be required. The identification of a restricted area around the hazard area and limitation of the number of staff entering the restricted area must be actioned.

Specialist advice about on-site decontamination may be required especially if the incident involves group 3 or 4 pathogens. Advice on the suitability of shower units and disposal of water run-off may require special consideration. The type of decontamination required will depend on the contamination, equipment involved and individual FRS's procedures.

Post incident

The following measures should be considered to help eliminate or remove risks after an incident, as appropriate to the nature and scale of the incident:

- any safety events; personal injuries, exposure to hazardous substances or near-misses should be recorded, investigated and reported in line with legislative requirements such as *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995*, etc.

- arrangements should be in place to either remove all contamination from PPE or to ensure its safe and appropriate disposal and to check that PPE maintains the agreed levels of integrity and protection for the wearer throughout its lifecycle
- as appropriate, occupational health support and surveillance follow up
- conduct a de-brief to identify and record any "lessons learned" from the incident. De-briefs will range in complexity and formality, proportionate to the scale of the incident and in line with individual FRS procedures
- consider any changes required to safe systems of work, appliances or equipment in the light of any lessons learned from de-briefs or from safety events
- consider the need to review existing information held on a premises or location, or the need to add a new premises or location into future pre-planning e.g. by adding to visit or inspection programme
- staff should be supported and monitored to identify whether they are experiencing any adverse affects and to check whether they would benefit from accessing counselling and support services.

Consideration should be given to arranging for staff to make a contemporaneous written record of their actions. This information may be used to assist in any internal or external investigations or enquiries that follow any incident e.g. Coroners Court, public enquiry, etc.

Technical References	
1	ACDP - Approved List of Biological Agents Categorisation 2004
2	ACDP - The management, design and operation of microbiological containment laboratories 2001
3	ACDP - Infection at work: controlling the risk 2003
4	ACDP - Biological agents: Managing the risks in laboratories and healthcare premises 2005
5	Genetically Modified Organisms Regulations 2002
6	Manual of Firemanship Book 12, Part 2, HMSO
7	Anti-terrorism, Crime and Security Act 2001 (Extension to Animal Pathogens) Order 2007, SI 2007 No.926
8	Fire and Other Occurrences Involving Hazardous Substances, Dear Chief Officer Letter 12/1982
9	Meteorological Advice in the Event of a Release of Toxic Chemicals : CHEMET Dear Chief Officer Letter 6/1989
10	Control of Substances Hazardous to Health Regulations 1994 and Approved Code of Practice on the Control of Biological Agents (5th Edition) 2002.
11	National guidance document – Fire service mass decontamination 2003
12	Fire Service Manual – Incident Command
13	Fire Service Manual – Environmental Protection
14	Fire Brigade Response Option – Final report 6/97

SECTION 2

Summary of GRA 5.4

Incidents involving biohazards

Task – Pre-incident

Ref. No.	Activity	Hazard	Risk	Persons at risk	Control measures
1	Approaching the incident and identifying the biohazard	Airborne contamination	Inhalation of biological agents	Operational personnel	Training/instruction Operational procedures Supervision PPE Dynamic management of risk Specialist advice Site specific 7(2)(d) [etc] risk information plans

Summary of GRA 5.4

Incidents involving biohazards

Task – Initial stages of the incident

Ref. no.	Activity	Hazard	Risk	Persons at risk	Control measures
2.1	Approaching the rendezvous point	Airborne contamination	Inhalation of biological agents	Operational personnel	Standard mobilising procedures to established rendezvous points Regular monitoring of weather conditions using CHEMET/ FIREMET or specialist advice
2.2	Triage/first aid (assessment of injuries, dealing with persons involved in incident)	Trauma/psychological stress	Contamination with biological agent: – inhalation – ingestion – skin contact – puncture wound	Operational personnel	Training Medical personnel First aid barrier techniques Standard operational procedures Effective Incident Command system in operation Ambulance Hazardous Area Response Teams In cases of suspected exposure to HIV or Hepatitis virus consider the need for Post Exposure Prophylaxis (PEP) within one hour

Summary of GRA 5.4

Incidents involving biohazards

Task – As the incident develops

Ref. No.	Activity	Hazard	Risk	Persons at risk	Control measures
3.1	Firefighting and rescues from incidents involving biological hazards Including: – animal rescues – road traffic accidents – sewer rescues – water rescues	Presence of biological agent	Contamination with biological agent: – inhalation – ingestion – skin contact – puncture wound	Operational Personnel Public Other category 1 responders	All staff to be briefed on potential biological hazards at these types of incidents All staff to be under strict supervision All personnel to don suitable PPE and RPE Additional appliances and Special Units to be ordered on as necessary Approach upwind and uphill as appropriate Cordon off area using inner and outer cordons (hot/cold zone) Ambulance in attendance as required Restrict number of staff to risk area Ensure briefing of all personnel working inside inner cordon (including other emergency services) In cases of suspected exposure to HIV or Hepatitis virus consider the need for Post Exposure Prophylaxis (PEP) within one hour Seek specialist advice Specialist decontamination needs Restrict number of personnel to risk All personnel aware of evacuation procedures Exercise caution with run off from jets/sprays entering drains and water courses Briefing on the presence of animals No smoking, eating or drinking unless in clearly defined clean area. Where food is being consumed adequate hand cleaned/disinfectant should be provided Effective liaison with external agencies Recording of exposure and health

Summary of GRA 5.4

Incidents involving biohazards

Task – Post incident

Ref. No.	Activity	Hazard	Risk	Persons at risk	Control measures
4.1	Site withdrawal procedures	Exposure to biological agents	Cross contamination	Operational personnel	Specialist decontamination needs – staff and equipment requirements to be serviced Recording of exposure and health monitoring for all staff before leaving the site Health monitoring Critical incident debriefing In cases of suspected exposure to HIV or Hepatitis virus consider the need for Post Exposure Prophylaxis (PEP) within one hour