NORTHERN IRELAND FIRE BRIGADE

OPERATIONS POLICY AND PERFORMANCE REVIEW

STANDARD OPERATING PROCEDURE NO 16

MASS DECONTAMINATION FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR (CBRN) INCIDENTS

NORTHERN IRELAND FIRE BRIGADE

STANDARD OPERATING PROCEDURE NO 16

MASS DECONTAMINATION FOR CBRN INCIDENTS

1 INTRODUCTION

1.1 In the aftermath of the tragic events of September 11th 2001, the Northern Ireland Fire Brigade has continued to review its preparedness to deal with Chemical, Biological, Radiological or Nuclear (CBRN) incidents.

1.2 Part of the planning process for the successful management of CBRN events is the safe and rapid decontamination/ washdown of large numbers of people who may become contaminated as a result of their proximity to a CBRN incident, whether an accidental or deliberate act. This process shall be referred to as 'Mass Decontamination'.

1.3 The incidents that might involve the mass decontamination of members of the public are uncommon and, therefore, require specific guidance to facilitate effective management. They fall into 5 main categories:

1.3.1 Recognised chemical weapons, eg, Sarin, Tabun, Soman, GF and UX.

1.3.2 Chemicals in transit, such as Anhydrous Ammonia, Chlorine and Hydrogen Cyanide.

1.3.3 Industrial sites storing highly toxic material in large quantities.

1.3.4 Biological weaponry, such as Anthrax, Smallpox and Ebola.

1.3.5 Incidents involving radioactive contamination, either during transportation, from activation of a terrorist device, or on site.

1.3.6 Or a combination of the above.

1.4 The implementation of mass decontamination procedures should be undertaken when it becomes apparent to the Incident Commander that existing decontamination/washdown procedures would be inadequate to speedily and safely deal with the number of casualties/contaminated persons.

1.5 It is likely that in most cases the responding crews will only recognise that a CBRN incident has occurred by the physical signs of contamination/poisoning to members of the public, animals or damage to foliage in the vicinity of the incident (see Appendix 'A' – *'Signs and Symptoms of a Chemical Event'*). As a consequence, it is very likely that the nature of the substance involved will not be known at the time of the incident and, therefore, any decontamination/washdown procedure must, of necessity, be generic.

1.6 The information contained within this Standard Operating Procedure (SOP) has been collated to provide responding crews with interim guidance so as to assist in the planning for incidents that may necessitate mass decontamination. The content of this SOP reflects current national guidance on the subject and, as such, will be subject to review as a result of the work presently being undertaken by the New Dimension Working Groups.

2 TYPES OF INCIDENTS

2.1 Incidents will generally fall into 2 categories:

2.1.1 OVERT

This term is used to indicate a warning of a terrorist incident has been given, which may or may not include details of the nature of the incident or release.

2.1.2 COVERT

This term relates to a suspected incident having occurred without any prior notice.

2.2 In both of these cases the only indication that an incident has actually taken place might be the presence of suspect packages, damage to structures, physical signs of poisoning to members of the public, animals or damage to foliage in the vicinity. Personnel should refer to the detailed CBRN Hazard Awareness information contained within SOP NO 11.

2.3 The signs and symptoms of chemical weapon material and generic chemical poisoning are attached at Appendix 'A'. Such information should allow the Incident Commander to make a rapid assessment of the likelihood that casualties are suffering from chemical poisoning.

2.4 It should be noted that in the case of biological or radioactive contamination, members of the public would not show any such symptoms for hours, or possibly days.

3 INDUSTRIAL RELEASE OF CHEMICALS OR RADIOACTIVE MATERIAL

3.1 It can be foreseen that a release of toxic commercial chemicals or radioactive materials in transit, or from an industrial site, could result in the need to decontaminate/ washdown large numbers of casualties. Such a release may be as a result of an accident or deliberate act. It is likely that such a release would be obvious.

3.2 The process of decontaminating casualties must form part of the Incident Commander's Dynamic Risk Assessment. The Fire Brigade has the responsibility for the safety of all personnel working within the Inner Cordon (Hot and Warm Zones – refer to Appendices 'B' and 'C').

3.3 Further advice as to the management of the decontamination/ washdown process can be found in SOP No 6A – Decontamination/Washdown.

4 DECONTAMINATION METHOD

4.1 The principal aim of this SOP is to aid rapid mass decontamination of casualties at the scene, or as close as possible to the scene. This should result in an improved prognosis for the casualty, reduce the possibility of contaminating Emergency Service personnel and spread of contaminant beyond the incident site itself.

4.2 The removal of clothing from a contaminated casualty, **including underwear if there are signs of possible contamination**, will dramatically reduce the degree of contamination and, as a result, make further decontamination easier. In the case of a **biological or radiological** contaminant, re-suspension of the material should be reduced by damping down the casualty's clothing first, fitting a dust mask to the casualty, and then careful disrobing downwards, thereby reducing the possibility of inhalation of dust/spores, etc.

4.3 The utilisation of wet decontamination methods, using improvised Mass Decontamination Units, allows for large numbers of people to be processed quickly (see Appendices 'D', 'E', 'F' and 'G').

4.4 The following mixtures are considered the best readily available material to use in this process:

4.4.1 Suspected chemical weaponry/unknown materials = 1% bleach + 1% detergent in water.

4.4.2 Industrial chemicals/radioactive material = 1% detergent in water.

4.4.3 Biological material = 1% household bleach in water (this should not be quickly washed off unless absolutely necessary).

NOTE: The skin consists of a large amount of water. Even when casualties have been contaminated with water-reactive chemicals, they should be treated with water and detergent, in copious amounts. Particular care should be taken when decontaminating near the eyes.

If skin is broken, the application of the bleach solution should only be used following medical advice from Paramedics/Doctors at the scene or via Brigade Control.

All such mixtures should be applied on a rinse-wipe-rinse basis, ie, casualty enters first shower, rinses, then wipes contaminated skin with a sponge soaked in the appropriate solution, then rinses this from the skin prior to exit.

5 REMOVAL OF CASUALTIES FROM THE IMMEDIATE AREA SURROUNDING THE SOURCE OF THE RELEASE (HOT ZONE)

5.1 If casualties are able to walk from the area of gross contamination (Hot Zone) to open air (if inside a building), or towards the edge of the Hot/Warm Zone, then they should be directed to the decontamination area by personnel wearing (at least) liquid tight Chemical Protection Suits and self-contained Breathing Apparatus.

5.2 Within the Hot Zone, if any of the casualties are not breathing, or are not moving on the ground, they should be left in situ. It is necessary to provide assistance to those that are ambulant first. **The principle aim is to save the maximum numbers of saveable lives**.

5.3 Personnel tasked to work within the Hot Zone will don Personal Protective Equipment (PPE) and employ procedures appropriate for the CBRN agent involved as a result of pre-planning, immediate Chemdata information and/or the advice of a Hazmat Officer.

6 ROLE OF NORTHERN IRELAND AMBULANCE SERVICE (NIAS)

6.1 NIAS personnel will normally work within the Cold Zone, where they shall triage and transport casualties to hospital, where required.

6.2 Providing that the Ambulance Service/Medical Advisors have appropriate PPE, NIAS personnel may be able to provide medical support to casualties through the triaging of casualties or decontamination of non-ambulant casualties within the Warm Zone. Joint NIAS/NIFB training has been conducted to familiarise NIAS personnel with Brigade procedures.

6.3 The term 'contaminated casualties' includes members of the public, Brigade or members of other attending services affected by the release. It should be remembered that NIAS is responsible for the medical treatment of all **injured casualties**, be they physical injuries or obvious signs of trauma.

7 ROLE OF POLICE SERVICE OF NORTHERN IRELAND

7.1 The particular role and responsibilities for the Police, in such circumstances, would include inter alia:

7.1.1 Saving of life in conjunction with other services present.

7.1.2 Co-ordinating measures to contain the incident; securing the outer cordon.

7.1.3 Assist in the process of identifying the hazardous substance involved.

7.1.4 The collation and dissemination of casualty information.

7.1.5 The identification of the dead.

7.1.6 Administration and safe custody of property removed from or abandoned by casualties.

7.1.7 Protection, preservation of the scene and investigation of the crime/incident in conjunction with other investigative bodies, where applicable.

7.1.8 Assisting in the restoration of normality.

8 DEALING WITH AMBULANT CASUALTIES

8.1 The rationale behind the undertaking of the mass decontamination process is that all casualties, irrespective of whether injured or suspected of being contaminated, will receive primary decontamination/washdown at the scene. Of necessity, this will require the rapid, safe decontamination of a large number of people.

8.2 The difficulty in controlling this process should not be underestimated. The requirement to quickly identify and establish zones is a crucial element in the safe management of the process. In addition, difficulties will also be encountered in communicating the decontamination/washdown plan to those effected. This problem will be further compounded by the need for Brigade personnel to wear Chemical Protection Suits and Breathing Apparatus within the Hot/Warm Zones.

8.3 Good use should be made of any available cordoning facilities, signage and public address systems.

8.4 As the majority of contaminant will have been absorbed onto clothing, the process will require ambulant casualties to undress, as mentioned in Section 4. Removed clothing should, therefore, be treated as hazardous waste and controlled, stored and disposed of in an appropriate manner.

8.5 The decontamination/washdown process should follow the following guidelines:

8.5.1 Ensure all ambulant casualties leave the Hot Zone as quickly as possible.

8.5.2 Segregate sexes, where possible, to allow for casualty dignity.

8.5.3 Relay instruction to casualties to remove clothing to their underwear (where underwear is obviously contaminated, this too should be removed).

8.5.4 Casualties should be informed to place clothing into bags provided. When the numbers of casualties are small and it is practical to do so, ambulant casualties may place valuables in a separate bag. It is accepted that the primary aim is to save saveable life and, as such, where large numbers of people are involved/contaminated by a CBRN attack, then the careful bagging of personal items is of secondary importance. The bagging of contaminated clothing remains of critical importance, given the potential for secondary contamination.

8.5.5 Instruct casualties to move through the improvised Mass Decontamination Unit's water spray while rubbing any chemical residue from the body.

NOTE: Where casualties are contaminated with a substantial amount of contaminant, they shall be instructed to self-decontaminate by primarily entering the water rinse, followed by washing the exposed skin with a sponge and appropriate solution (see Section 4.4 for concentrations), before rinsing residue of same from skin. Casualties should be instructed to wash from the head down.

8.5.6 Casualties shall then be instructed to move forward towards the drying and clothing area before exiting into the Cold Zone (refer to zone diagram – Appendix 'H'.)

8.5.7 All items of clothing removed at the scene will be treated as hazardous waste and, therefore, placed in a controlled area for disposal by the appropriate authorities.

8.5.8 Personal items/valuables should be secured within the Warm Zone for transfer to the custody of Police at the scene.

It should be noted that, depending on the numbers or contaminant involved in this process, casualties may be deemed to have only undergone primary decontamination/ washdown and may, therefore, require further decontamination after triage, prior to their receipt of medical treatment. This further decontamination will be given at hospital Accident and Emergency Units.

8.5.9 Mass decontamination will necessitate the use of cold water sprays from fire appliance hose reels (refer to Appendix 'D' for description of improvised Mass Decontamination Units' construction). If well-ventilated cover is available within the outer cordon of the incident site, then this should be utilised for weather protection of casualties following the decontamination/washdown process. This function may also be provided by using Aireshelta tents, however, under no circumstances should areas with limited/poor ventilation be used for this purpose.

8.6 A summary of the procedures for ambulant casualties is attached at Appendix 'E'.

9 DEALING WITH NON-AMBULANT CASUALTIES

9.1 As stated in Section 5, the principle aim is to save the maximum number of saveable lives. This aim will necessitate first responding crews to encourage and facilitate the full evacuation of the Hot Zone by all ambulant casualties.

9.2 On completion of this initial evacuation, or when resources permit, the following guidelines should be followed:

9.2.1 After a further Dynamic Risk Assessment, crew members should be directed to rescue/remove saveable non-ambulant casualties from the Hot Zone.

9.2.2 Non-ambulant casualties should be removed to a decontamination area designated for the decontamination/washdown of improvised stretcher-borne/non-ambulant casualties.

9.2.3 Casualties may be removed utilising spinal boards or sections of the short extension ladder, which will allow for the casualty to be kept clear of the ground and facilitate drainage of decontamination/washdown water run-off.

9.2.4 The decontamination/washdown process for these casualties may be undertaken with NIAS/Medical support.

9.2.5 Clothing may have to be cut away from the casualty following the general decontamination/ washdown methods described earlier, with particular attention being paid to the level of urgency required, as listed in Section 4.

9.2.6 Casualties should be decontaminated/washed down from the head first. Priority should be given to the decontamination/washdown of the face and mouth prior to disrobing.

9.2.7 As stated in Section 7, all clothing and personal/ valuable items removed at the scene should be appropriately bagged, treated as hazardous waste and placed within the controlled area for disposal or surrender to the Police. It is accepted that the primary aim is to save saveable life and, as such, where large numbers of people are involved/ contaminated by a CBRN attack, then the careful bagging of personal items is of secondary importance.

9.2.8 Unfortunately, casualties may die within the Hot and Warm Zones and every attempt should be made to deal with this occurrence in a dignified way. Bodies should be covered in an appropriate manner and, where possible, removed to a designated temporary body-holding area within the Inner Cordon.

9.2.9 It may be that, due to the nature of the injuries (blast/burns/multiple wounds) that showering is inappropriate and the medical advice may be to simply remove potentially contaminated clothing and apply the rinse-wipe-rinse method with a bucket of water and sponge only.

9.2.10 It is envisaged that it will not be possible to clothe injured persons in disposable modesty overall suits once decontaminated and, therefore, 'foil blankets' should be made available from NIAS to cover casualties on stretchers/improvised stretchers.

9.3 A summary of the procedures for non-ambulant casualties is attached at Appendix 'F'.

10 DECONTAMINATION RUN-OFF

10.1 The decontamination of casualties suffering from **biological or radiologica**l materials is not as time critical as that for those contaminated by persistent chemical/nerve agents. It is important, however, that contamination is not spread beyond the site and that effective decontamination/washdown procedures are employed which allow for the containment/ control of water run-off, if at all possible.

10.2 In the case of large numbers of casualties suffering from chemical contamination, **speed** is of the essence. The removal of clothing will considerably reduce any such chemical in the run-off water, and will dramatically reduce any environmental impact from the decontamination/washdown process.

10.3 In all cases the immediate risk to life is the primary consideration in mass decontamination. It is acknowledged that the containment of water run-off is likely to be impractical where large numbers of casualties are encountered.

10.4 The effects of such a decontamination/washdown process on the environment are unknown and, therefore, the Environmental and Heritage Service (EHS) has requested that, where feasible, the Brigade contain any water run-off. Where this is not possible, an area over the foul sewer (where easily identifiable) should be selected and the EHS notified of the location of the incident and subsequent action taken.

11 IMPROVISED MASS DECONTAMINATION SHOWER UNITS

11.1 In conjunction with **an initial response utilising hand-held hose reel sprays**, crew members should prepare improvised Mass Decontamination Shower Units, as detailed in Appendix 'G'. These improvised shower units allow for the dignity of those being decontaminated to be maintained, whilst simultaneously affording a better means of establishing and maintaining effective cordons, zones and inter-agency liaison, as shown in Appendix 'H'.

DIVISIONAL OFFICER
(OPERATIONS POLICY)

APPENDIX 'A'

PATIENT SIGNS AND SYMPTOMS FOLLOWING AN ACCIDENTAL/DELIBERATE RELEASE OF A CHEMICAL AGENT

CASUALTY SUFFERING FROM GENERIC CHEMICAL POISONING

- Nausea.
- Coughing (possibly with blood).
- Tiredness.
- Breathing difficulties.
- Convulsions.
- Skin reddening.
- Blisters.

CASUALTY SUFFERING FROM LOW DOSES OF NERVE AGENTS

- The pupil of the eye becomes contracted.
- Headache.
- Tiredness.
- Slurred speech.
- Hallucinations.
- Nausea.

CASUALTY SUFFERING FROM HIGH DOES OF NERVE AGENTS

- Secretion from the mouth.
- Difficulty breathing.
- Coughing.
- Discomfort or cramps in the stomach.
- Vomiting.
- Involuntary discharge of urine and defecation.

The discharge of saliva is powerful and the victim may experience:

- Running eyes.
- Sweating.
- Muscular weakness.
- Tremors or convulsions.

CASUALTIES SUFFERING FROM DOSES OF MUSTARD AGENTS

Mustard attacks the skin, eyes, lungs and gastro-intestinal tract. Mustard agent gives no immediate effect on contact, and consequently a delay of between 2 hours and 24 hours may occur before pain is felt and the victim becomes aware.

The symptoms consist of:

- Aching eyes with abundant flow of tears.
- Inflammation of the skin.
- Irritation of the mucous membrane.
- Hoarseness.
- Coughing and sneezing.

Severe injuries may involve:

- Loss of sight.
- Blisters on the skin.
- Nausea.
- Vomiting.
- Diarrhoea.
- Severe respiratory difficulties.

EFFECTS ON VEGETATION

- Leaves and foliage changing colour.
- Light or matt spots as well as brown discolouration.

SPECIALIST ADVICE

Brigades may be aware of advisors who may be able to provide specialist assistance and guidance on the nature of release and its hazards.

APPENDIX 'B'

DEFINITIONS

HOT ZONE

The term 'Hot Zone' refers to an area where responders are likely to come into **direct** contact with the hazardous material. As such, there will be a need for responders to be appropriately protected from the perceived level of threat. In the case of a small release in an undamaged building or structure, such as a tunnel, the Hot Zone would be contained within the premises. If, however, the release is either large or in the open air, it is more difficult to predict. Research indicates that a cordon of approximately **150 metres initial isolation area for a small release of a typical chemical weapon** is desirable.

WARM ZONE

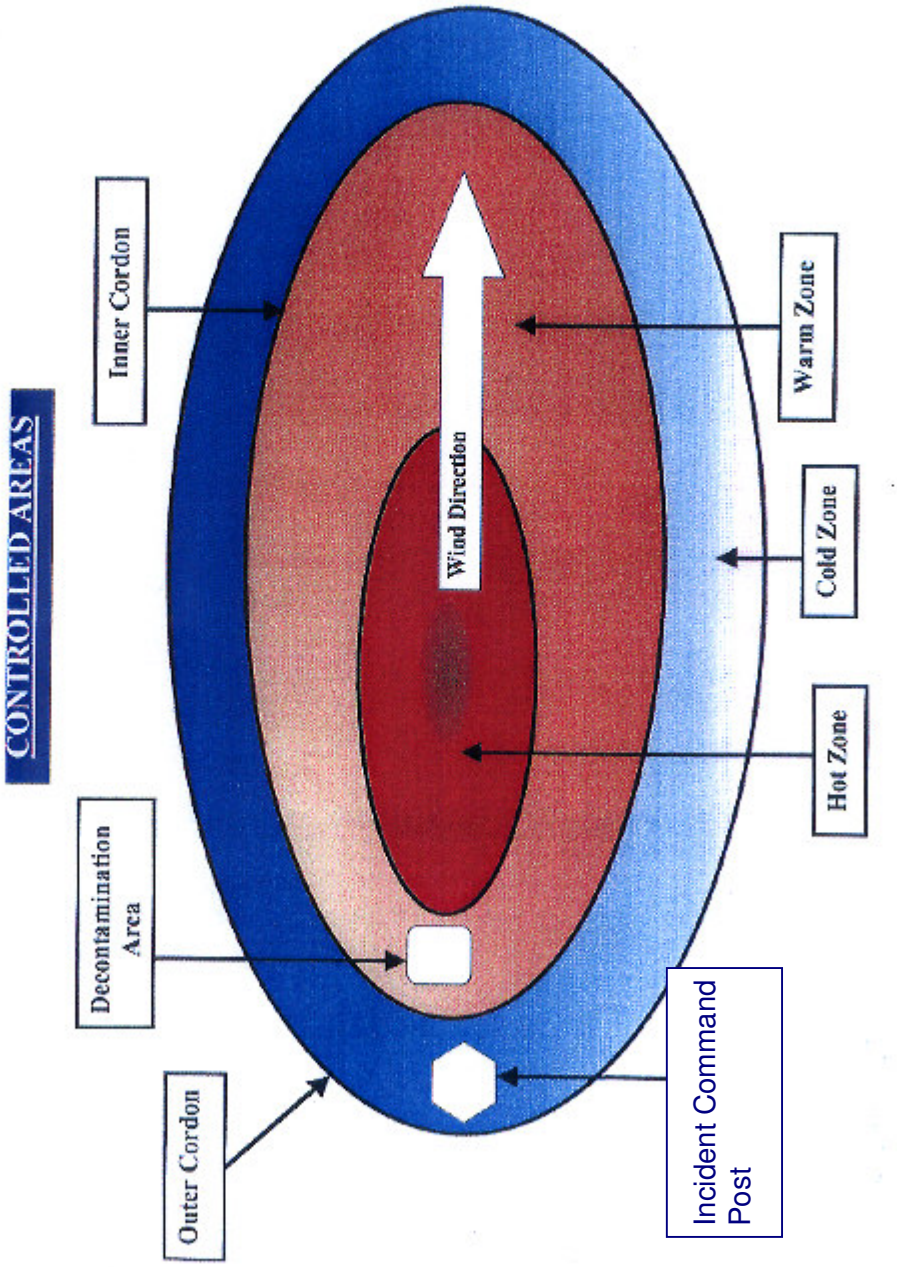
Warm Zone indicates the area where there is a low risk of exposure to the hazardous material, or there is a possibility of cross-contamination from casualties or equipment. In this zone it is still necessary for emergency responders to be appropriately protected, although a lesser standard may be appropriate for work within this area. The edge of this zone will be considered as the **Inner Cordon**. The Brigade is responsible for the safety and protection of all personnel working within the Inner Cordon.

COLD ZONE (WITHIN THE OUTER CORDON)

Cold Zone indicates a sanitised area that is provided to allow for Emergency personnel and their advisors to work unhindered at an incident. It is necessary to have a designated area for their sole use. The Cold Zone is a suitable area for the Emergency Services to establish their control vehicles. In this area there would be no risk of exposure to the hazardous material and, as a consequence, no additional Personal Protective Equipment would be necessary for those operating within this zone.

APPENDIX 'C'

HOT AND WARM ZONES



APPENDIX 'D'

SETTING UP MASS DECONTAMINATION

1 Park appliances side by side, about 3 metres apart.

2 Place a short extension ladder between the roofs at the cab end.

3 Place a hose reel and open position through centre of this ladder.

4 Place a short rope between the appliances at the cab end, secured at head of each 135 ladder.

5 Drape a salvage cover over this rope.

6 Place a second short extension ladder between the appliances at the middle of the appliances and place a hose reel through the centre of this ladder.

7 Tie a second short rope between the ends of the 2 appliances and drape a salvage cover across this rope.

8 A bucket of water/bleach solution and a sponge shall be placed between the first hose reel shower and the second.

9 A supply of dry suits/towels should be deposited at the end of the appliance just outside the salvage cover and the clean casualty should then be able to lift one while protected by the cover, and dress behind it before moving out.

APPENDIX 'E'

PROCEDURE - AMBULANT

1 Casualty enters the Warm Zone after leaving the Hot Zone.

2 First Chemical Protection Suit (CPS) wearer tells the casualty to enter under the salvage cover, remove clothing and put them in the bag just inside of the first salvage cover (cab end).

3 Tell casualty to stand under the first shower.

4 Casualty then meets the second CPS wearer, who rinses them with water/bleach solution after they come out of the first shower.

5 The second CPS wearer tells casualty to walk into second shower to rinse off.

6 Casualty walks to end of appliances, lifts a towel and white coverall suite from a box at the side of the salvage cover, dries off, dons suit and emerges into NIAS triage area.

7 Casualty remains in custody of the NIAS.

APPENDIX 'F'

PROCEDURE – NON-AMBULANT/INJURED

1 The same procedure shall apply as for ambulant, however, it will be necessary to have Paramedic/Medical personnel, in appropriate PPE, to assist with casualty management while the mass decontamination process is taking place.

2 The decontamination process will involve a casualty being brought through the mass decontamination process on a stretcher/improvised stretcher and the shower/wipe/shower procedure shall be adopted under the direction of the Paramedic/Medical personnel present, who shall address airway maintenance and casualty handling throughout.

3 It may be that, due to the nature of the injuries (blast/burns/multiple wounds) that showering is inappropriate and the medical advice may be to simply remove potentially contaminated clothing and apply the rinse-wipe-rinse method with a bucket of water and sponge only.

4 It is envisaged that it will not be possible to clothe injured persons in disposable modesty overall suits once decontaminated and, therefore, 'foil blankets' should be made available from NIAS to cover casualties on stretchers/improvised stretchers.

IMPROVISED MASS DECONTAMINATION UNITS

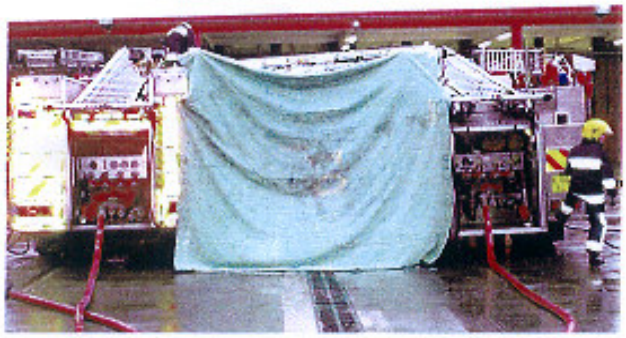
FIGURE 1

1. First park the appliances about three metres apart.

2. Two sections of a short extension ladder are then placed between them.

3. Between two and four hoesereel branches are hung from the ladders with the branches locked in the open position.

4. The aim should be to provide an adequate water curtain between the appliances.



5. The provision of salvage sheets across each end provides the necessary privacy.

6. This provides a large decontamination area whithin which additional plastic salvage sheets may be hung to separate the dressing areas from the shower.

Mass Decontamination of the Public

FIGURE 2

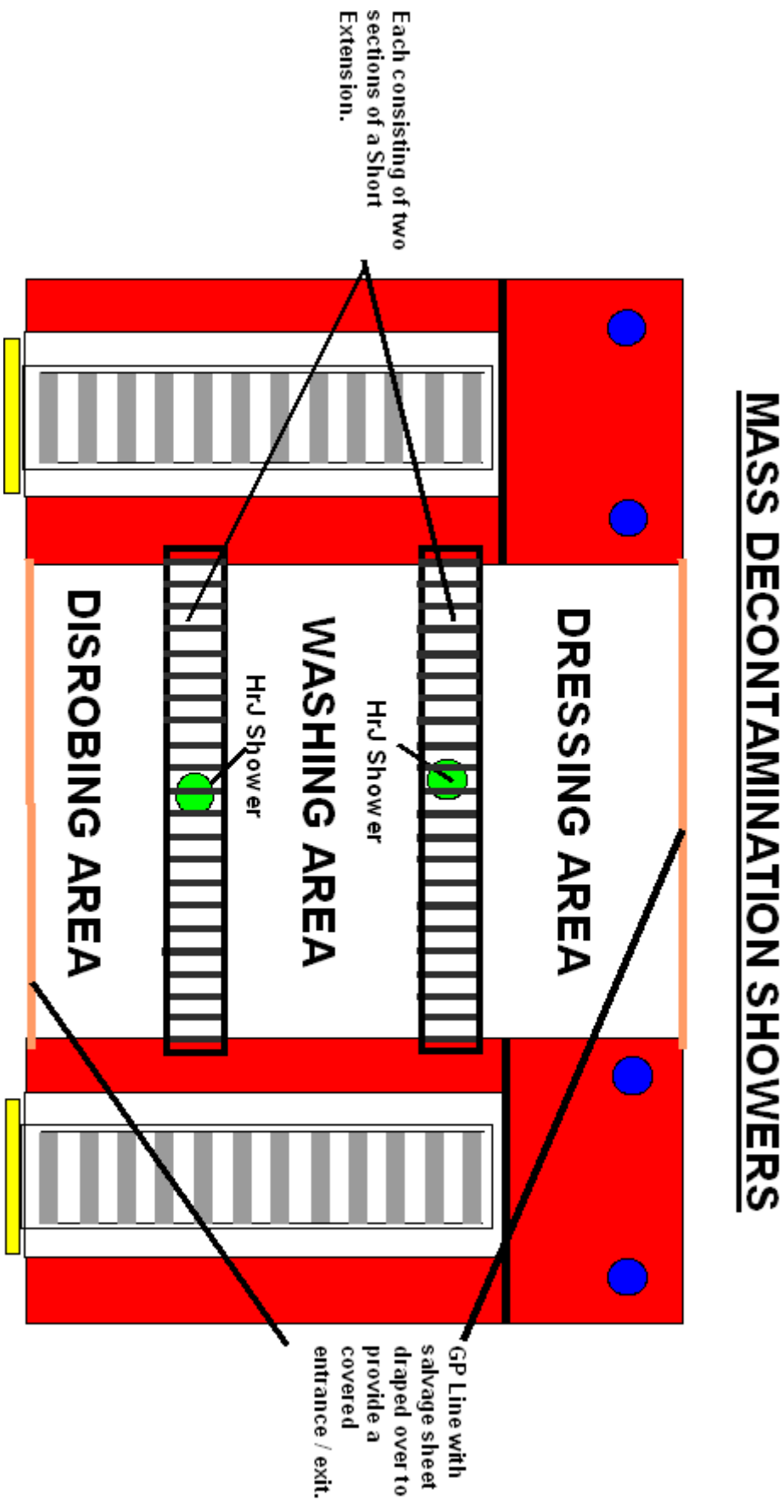
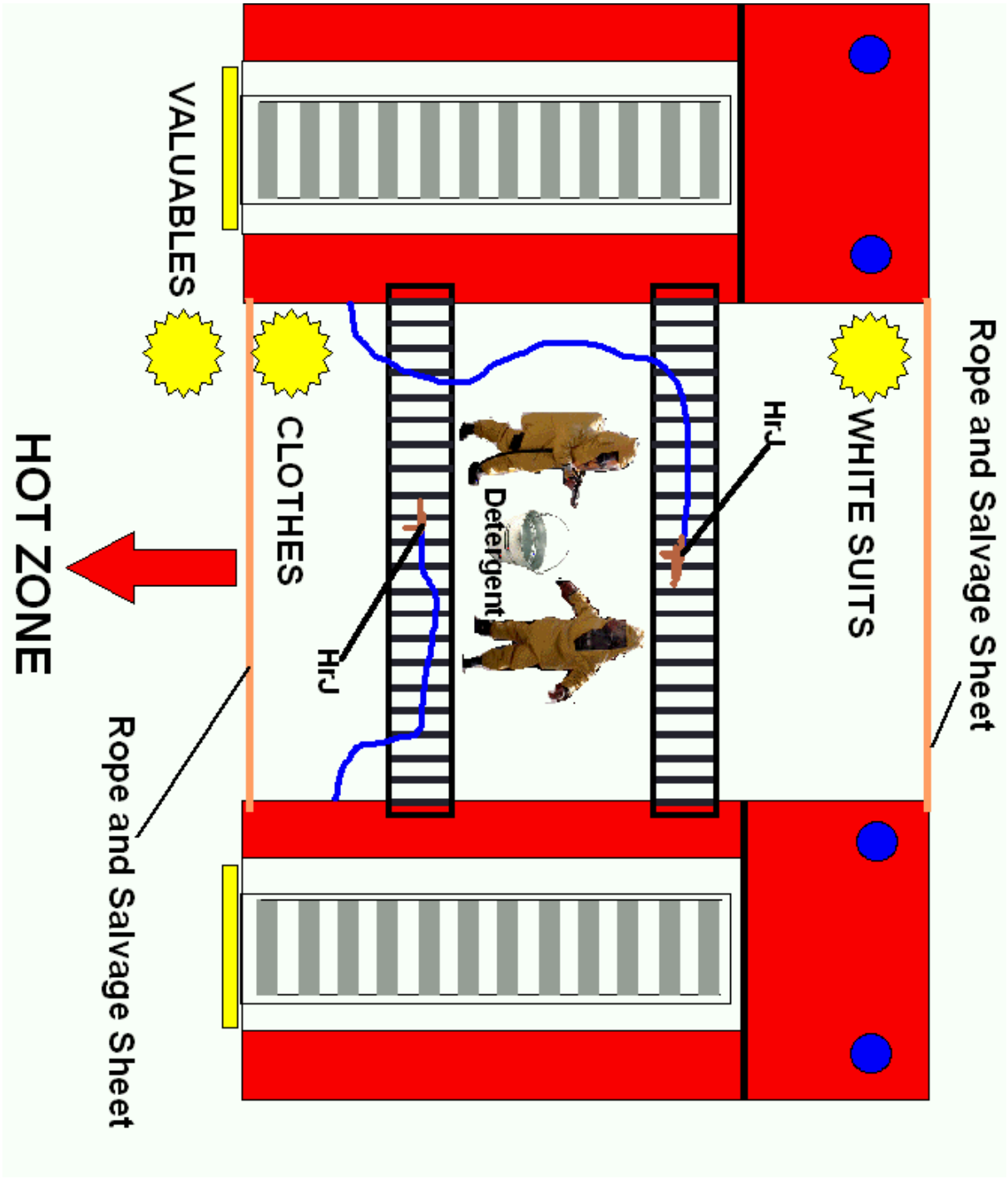

MASS DECONTAMINATION SHOWERS
DRESSING AREA
WASHING AREA
DISROBING AREA
HrJ Show er
HrJ Show er
Each consisting of two sections of a Short Extension.
GP Line with salvage sheet draped over to provide a covered entrance / exit.

FIGURE 3


VALUABLES
CLOTHES
WHITE SUITS
Rope and Salvage Sheet
HrJ
Detergent
HrJ
HOT ZONE
Rope and Salvage Sheet

MASS DECONTAMINATION ZONE DIAGRAM