Northern Ireland
Fire & Rescue Service

Protecting Our Community

SERVICE TRAINING NOTE

HAZMAT 03

Hazardous Materials

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Prepared by: Learning & Development Centre

VERSION CONTROL

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NATIONAL OCCUPATIONAL STANDARDS

4 & 5

NOTES

1. AIM

To provide students with hazardous materials training.

2. LEARNING OUTCOMES

At the end of the session students will be able to:

1. Define the term hazardous material.
2. Recognise the different classes of Hazardous Materials from their Hazard Warning Diamonds.
3. Draw and label a UKHIS and ADR panel.
4. List the actions on arrival to an incident involving hazardous materials.
5. Detail the considerations of the Dynamic Risk Assessment at an incident involving hazardous materials.
6. List the possible sources of information at an incident involving hazardous materials.
7. Define the meaning of fire ground decontamination.
8. List the different methods of decontamination.
9. List the factors that should be taken into account when siting a decontamination zone.
10. Describe the circumstances when emergency decontamination may be necessary.
11. List the Health and Safety considerations at an incident involving decontamination.
12. Understand personal limits of authority.

3. INTRODUCTION

WHAT ARE HAZARDOUS MATERIALS?

Hazardous materials will fall into one or all of the following criteria:

They appear on the “approved list”.

They are harmful to humans, animals and / or property.

Legislation has been devised to control production, packaging, transportation & safe storage.

Hazardous materials fall into one of the following categories:

NOTES

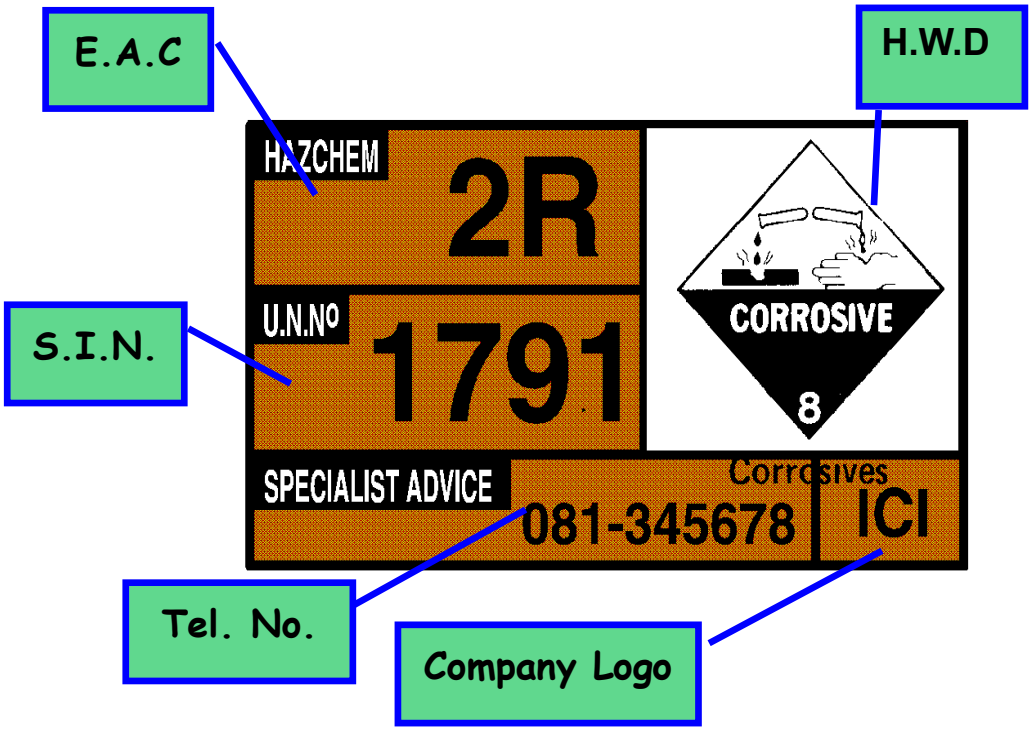
1. Explosive substances or articles
2. Gases.
3. Flammable Liquids.
4. Flammable Solids.
5. Oxidising Substances
6. Toxic Substances
7. Radioactive Materials
8. Corrosive Substances
9. Miscellaneous

NOTES

4. UKHIS PANEL

UNITED KINGDOM TRANSPORT

OF HAZARDOUS MATERIALS INFORMATION SYSTEM

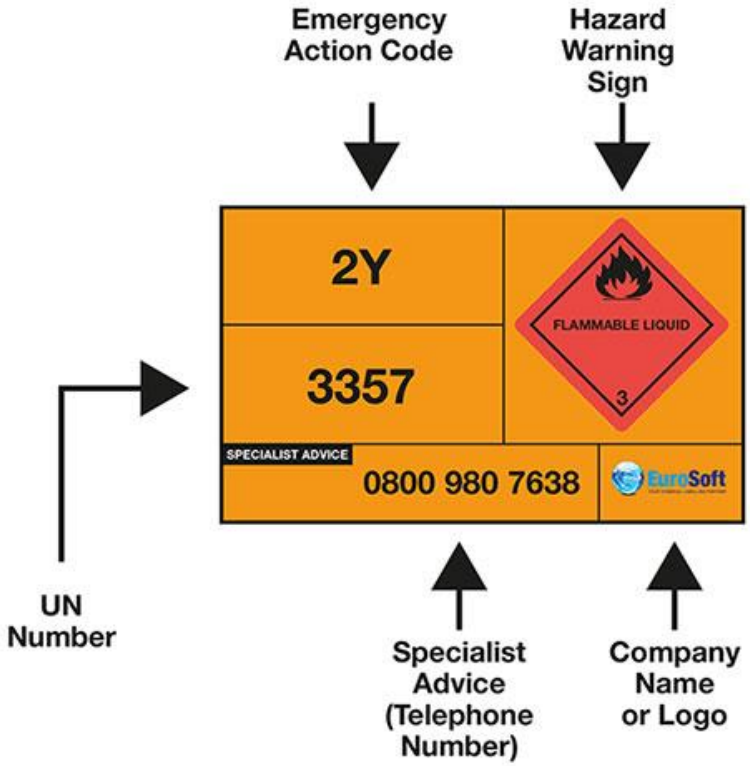


E.A.C. -Emergency Action Code

S.I.N. -Scientific Identification Number or Substance Identification Number.

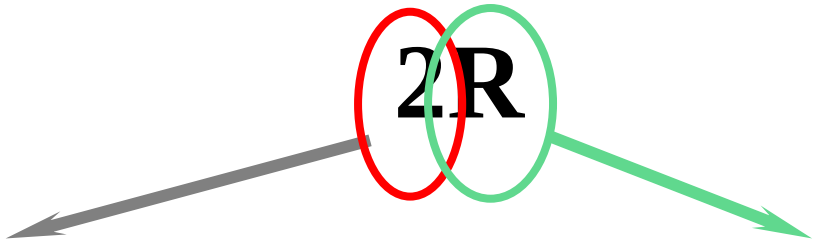
(UN No - United Nations Number)

NOTES


Emergency Action Code
Hazard Warning Sign
2Y
3357
FLAMMABLE LIQUID
3
SPECIALIST ADVICE
0800 980 7638
EuroSoft
UN Number
Specialist Advice (Telephone Number)
Company Name or Logo

NOTES

EMERGENCY ACTION CODE



Firefighting Medium

1. Course spray
2. Fine Spray
3. Foam
4. Dry Agent

Protection & Action

R =

- Violently reactive +
- CPC +
- Dilute

This table shows the level of protection necessary and actions to be taken depending on the Emergency Action

P	V	CPC	DILUTE
R			
S	V	BA & FIRE KIT	
T			
W	V	CPC	CONTAIN
X			
Y	V	BA & FIRE KIT	
Z			

E	PUBLIC SAFETY HAZARD

Code given by a UKHIS panel.

NOTES

Hazchem Guide

1	Coarse spray	3	Foam
2	Fine spray	4	Dry agent

P	V	LTS	Dilute
R			
S	V	BA & Fire Kit	
T			
W	V	LTS	Contain
X			
Y	V	BA & Fire Kit	
Z			

E	Public Safety Hazard

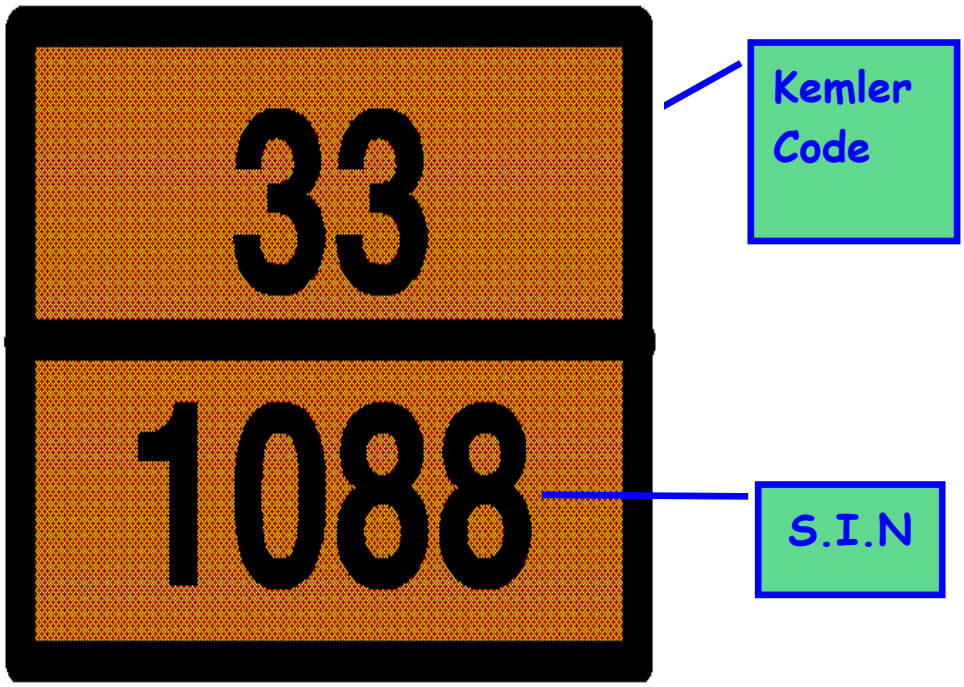
KEY

V	Can be violently or even explosively reactive
LTS	Liquid tight chemical protective clothing used in combination with BA.
DILUTE	Spillages may be washed to drains with large quantities of water. However due care must be taken to avoid unnecessary pollution of watercourses. For further information contact the Environment Agency or Scottish Environment protection agency.
CONTAIN	Prevent the spillage from entering drains and watercourses using any means available.
DRY AGENT	Water MUST NOT be allowed to come into contact with the substance
E	People should be warned to stay indoors with all doors and windows closed but evacuation may need to be considered. Consult Control, Police and product expert.

5. ADR

NOTES

This is the Hazardous materials placard system used by the remainder of Europe and can be found on a number of vehicles in this country. It only provides the Kemler Code to identify the hazards of the substances and the S.I.N. to identify the substance



NOTES

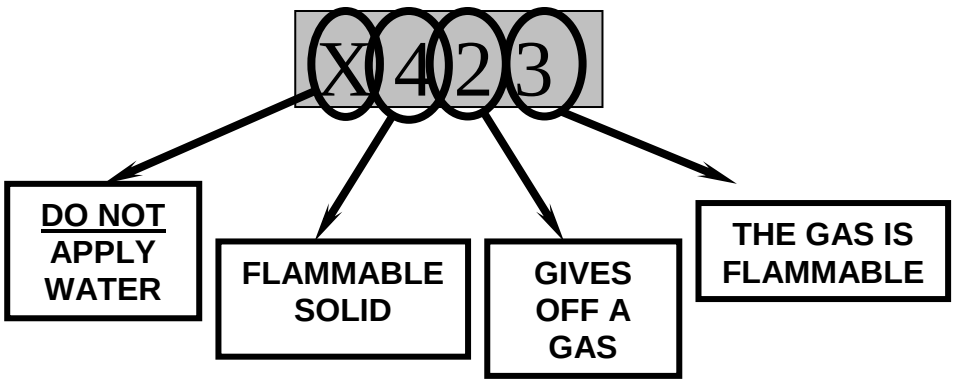
6. KEMLER CODE – INTERPRETATION

The table below shows how the numbers describe the primary and secondary hazards of a substance. The same number repeated twice signifies an increase in risk and an X at the beginning of the code signifies that the substance is violently reactive water.

Primary Hazard		Secondary Hazard	
1	Not Used (Explosives not covered by ADR)		
2	Flammable Gases	2	Gas may be given off
3	Flammable Liquids	3	Flammable Risk
4	Flammable Solids	4	
5	Oxidising Agent	5	Oxidising Risk
6	Toxic	6	Toxic Risk
7	Radioactive	7	
8	Corrosive	8	Corrosive Risk
9	Violent Reaction	9	Violent/Spontaneous Decomposition
10		10	No Meaning

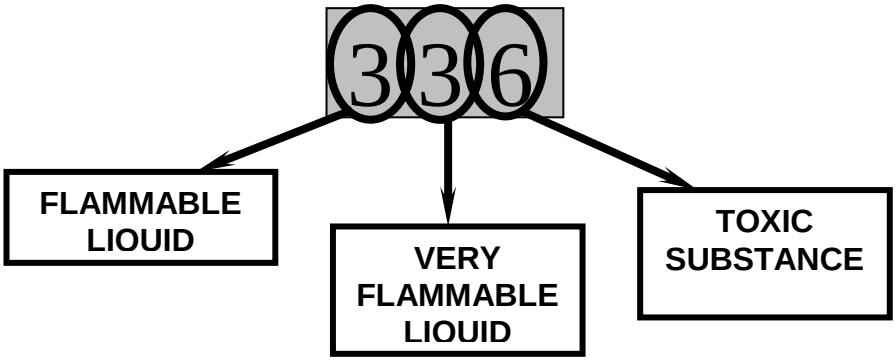
THE KEMLER CODE – EXAMPLES

For example the Kemler Code is explained below and represents a flammable solid that reacts violently with water and gives off a flammable gas.



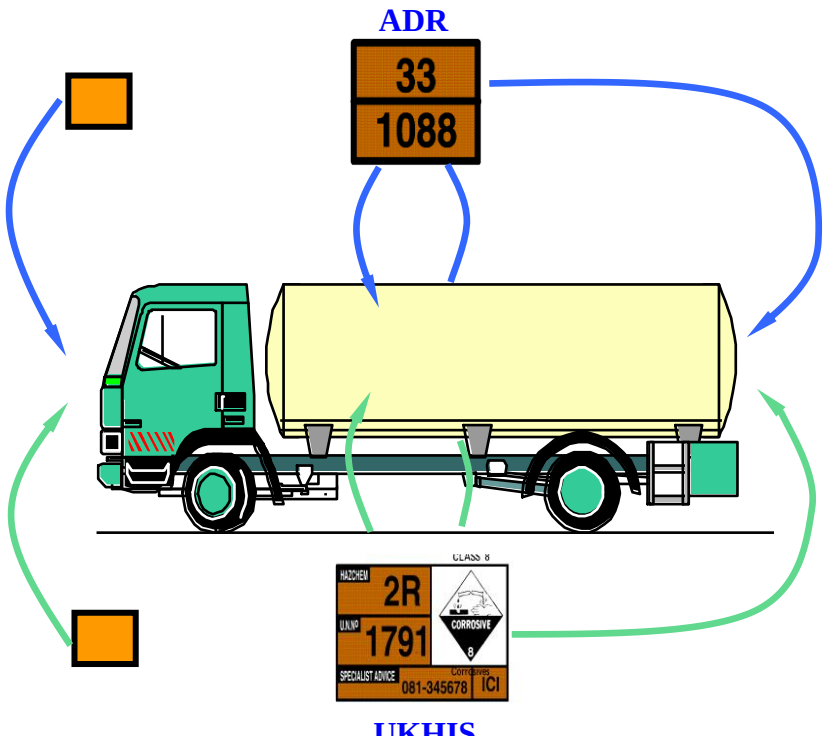
The following represents a substance that is a very flammable liquid that is a toxic substance.

NOTES



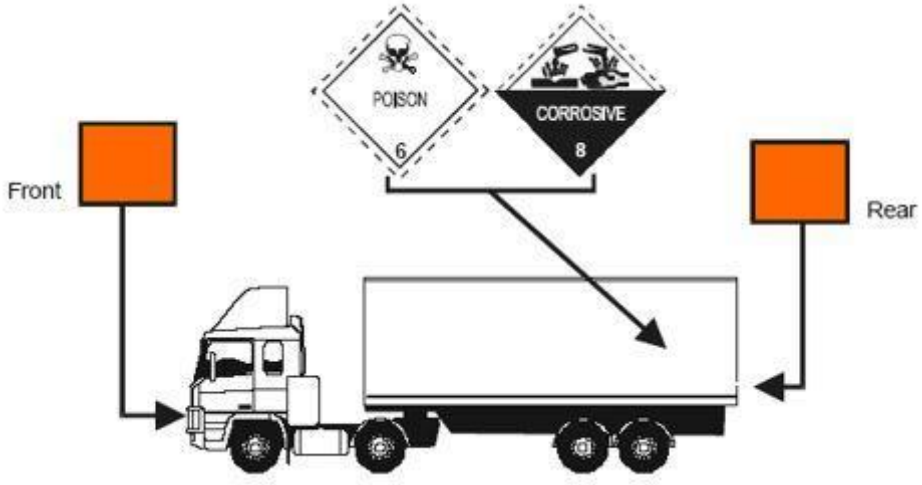
7. TRANSPORTATION BY ROAD

Depending on the vehicle and the types of type of load, placarding will be found on the front, rear and sides of vehicles. This will enable firefighters to read the signs regardless of the position of the vehicle. In general there will be an identification panel on the sides and rear and a large orange panel on the front of the vehicle.



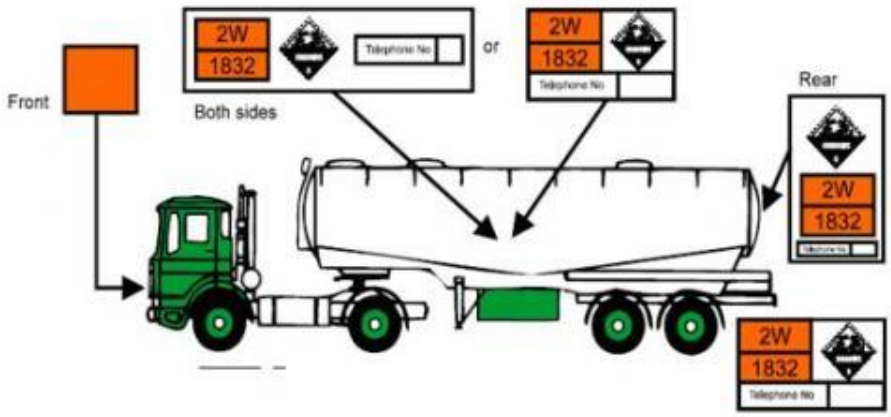
NOTES

Single load in packages in a freight container



The image above shows signage for a vehicle carrying dangerous goods in packages in a demountable freight container. In addition to the orange panels to the front and the rear of the vehicle all sides will have the standard warning signage according to the load carried.

Single Load Tanker

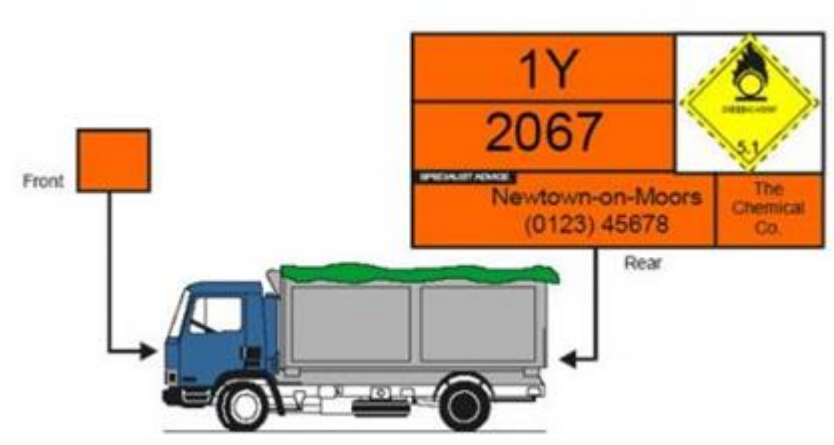


The image above shows a single load tanker, note the variations in showing the key information

Single Bulk Load

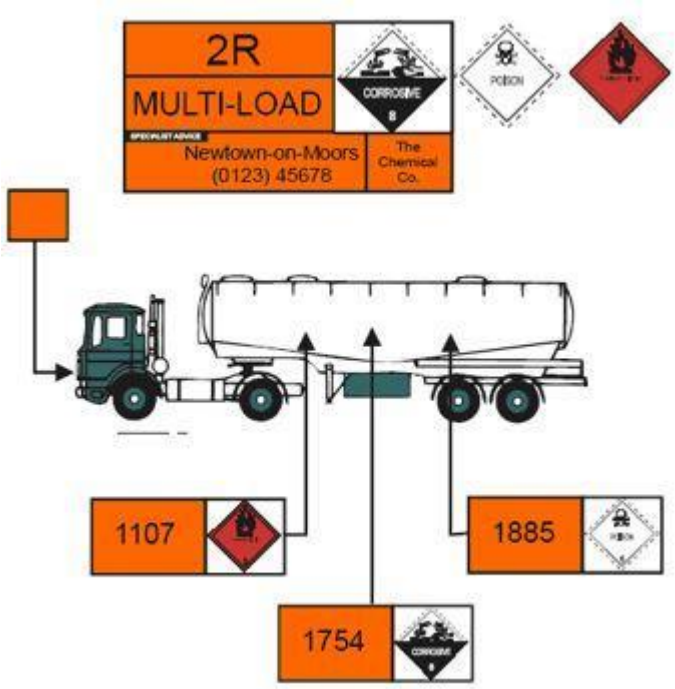
NOTES

Hazchem hazard warning panel – single bulk load



The image above shows the signage for a bulk single load in excess of 3 cubic meters. The detailed signage will be on the sides and rear of the vehicle

Multi Load Tanker



The image above shows the signage for a multi load tanker. The main placard will state multi load but the hazard symbols will show the hazards of the load. Each individual compartment of the tanker will have its own signage giving the UN number for the substance and the hazard symbol denoting its specific hazard.

NOTES

8. ACTION ON ARRIVAL

At all incidents, circumstances will vary in relation to the type, nature and location. Some common factors are:

1. Ensure a safe approach.
2. Approach from upwind and uphill.
3. Avoid any vapour clouds.

9. DYNAMIC RISK ASSESSMENT

The Dynamic Risk Assessment by the Officer in Charge of an incident involving hazardous materials should consider the following:

Are any rescues required to be carried out - is there actually any savable life?

Type of incident - fire or spillage - the addition of fire at an incident increases the likely hazards.

Position of the incident and vulnerable sites in the surrounding area.

The substance and associated hazards.

Firefighting media required and PPE-.stopping the spread of the incident.

Obtaining specialist advice from all available sources.

Does the incident require further resources?

Environmental considerations.

10. THE LAW AND HAZARDOUS MATERIALS

The Fire Service defence from prosecution for *polluting controlled waters* is in three parts, all of which must be in place:

Any action taken:

1. Must be to save or protect life.
2. NIEA must be informed.
3. Must mitigate effects.

11. INFORMATION GATHERING

NOTES

At all incidents involving hazardous materials it is important to quickly gather information about the chemicals involved. Information can be gathered from a number of different sources, including:

The vehicle

The packaging

Paperwork – inside the drivers cab (Tremcard).

The driver

Witnesses

Chemdata/Chemsafe – chemical database available via control or MDT

HMEPO/HMA – Hazardous Materials Environmental Protection Officer/ Hazardous Materials Advisor

On-site specialists

If the UKHIS or ADR plate cannot be easily read and, the driver or other responsible person is not available, it may be necessary to commit a crew to obtain the information required. However, non-intervention is always the safest policy.The Incident Commander will determine the appropriate level of protection to be worn.

DETAILS REQUIRED BY INVESTIGATING CREWS

Crews, required to, gather information at an incident involving chemicals will need to record:-

Name of the substance + UN number.

Emergency Action Code.

Maker's name, address and telephone no.

Quantity involved.

Fire or spillage, location and amount.

Form - liquid, solid or gas.

NOTES

Diagram showing Respirex TK Gas Tight Suits (GTS).

DECONTAMINATION - RESPONDER

The purpose of fire ground decontamination is to remove the wearer from the GTS and BA safely whilst ensuring no spread of contamination beyond the hot zone, and that the person can be safely removed from their clothing and equipment. The procedure is aimed at minimising the risk of cross contamination or keeping it as low as reasonably practicable (ALARP)

Possible Contaminants:

Water soluble liquid & solids.

Insoluble liquids & solids.

Water reactive substances.

Hazardous powders.

Radioactive substances.

Biohazards.

12. METHODS OF DECONTAMINATION

NOTES

There are a number of different methods of decontamination for responders, these are listed below.

Wet decontamination.

Primary = (Initial/Full).

Full = contained/ uncontained

Emergency = Dry / wet Peel-off.

Primary or firefighter decontamination: Using equipment in a planned and structured manner on the incident ground to minimise the risk of further harm and reducing cross contamination to a level as low as reasonably practicable. This is primary decontamination to minimise risk, carried out on-site. Firefighter or primary decontamination is divided into three levels:

- *Initial decontamination:* The decontamination of firefighters using equipment that is immediately available on a pumping appliance. It should be used in all cases where there has been unforeseen contamination of firefighters, where there is an immediate life risk or where, at a minor incident, the hazards posed by the substance can be adequately controlled by the procedures.
- *Full decontamination:* The decontamination of firefighters using decontamination equipment, structured procedures and personnel who have been trained fully in its use
- *Emergency decontamination:* A quick method of removing a responder from their personal protective equipment (PPE). It is an additional control measure for exceptional circumstances such as a break down of PPE, for example ripped chemical protective clothing (CPC), breathing apparatus (BA) malfunction or an injured wearer. The decontamination procedures to be adopted in such circumstances should be adapted from the principles and procedures detailed in this section.

CHOICE OF METHOD

The OIC will decide the method of decontamination. The OIC in charge will consult the HMA / Chemdata via MDT/control. The final decision will be based on the following factors.

Nature of the contamination.

Degree of contamination.

Type of protective clothing worn.

Risk to the environment.

Life risk and urgency to intervene

13. DECONTAMINATION ZONE

The following factors must be taken into account when siting the decontamination zone:

Operational circumstances and Risk Assessment

Level and method of decontamination.

Weather conditions and wind direction.

The slope of the ground.

Location of drains and watercourses (or their absence).

Position of inner cordon and Hot zone

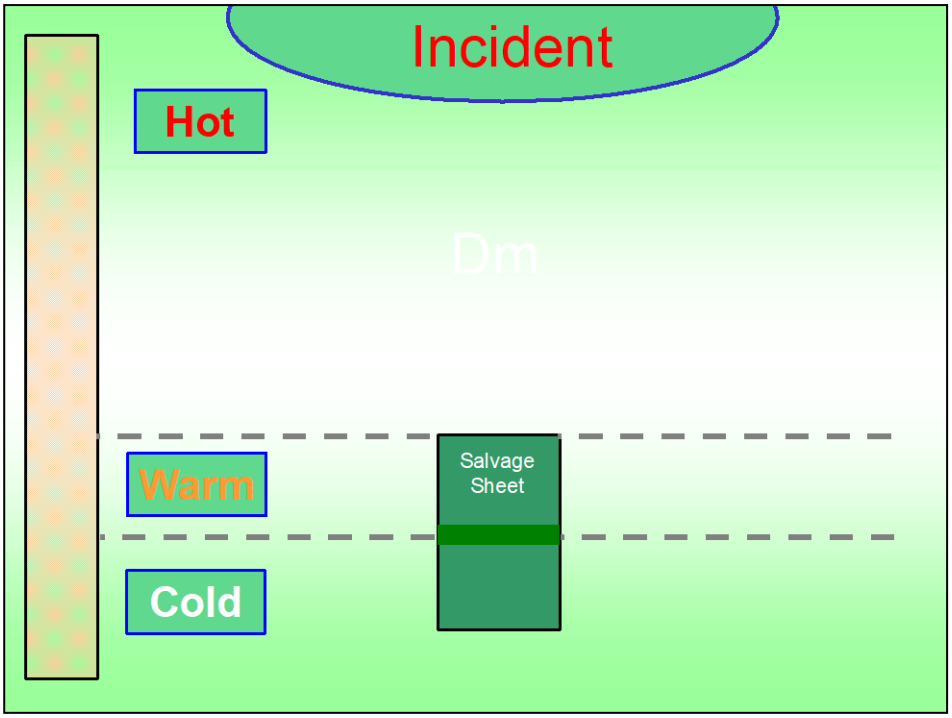
Location of BA entry control

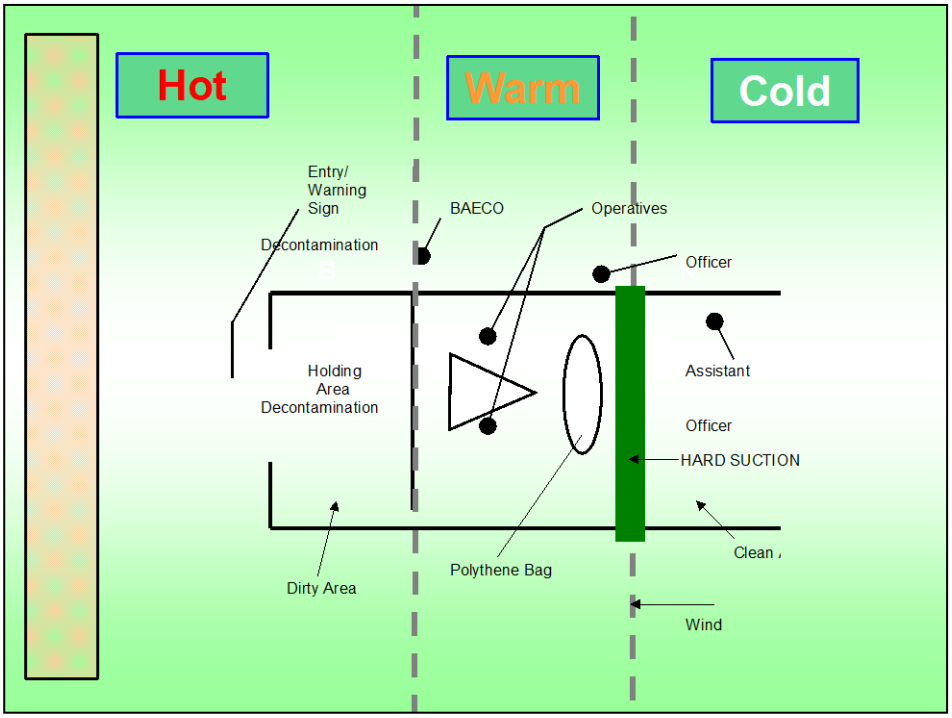
Location of pumping appliances

Welfare of staff

Decontamination area set up

NOTES





Salvage sheets overlapped with suction hose positioned underneath

NOTES

Initial Decontamination example layout

Images above show an example of Initial Firefighter decontamination using salvage sheets and hard suction hose to mark the decontamination area and separate the

clean from dirty areas. Note: that the dirty area has been clearly divided into a contamination reduction area (with improvised dam) and a safe undressing area (with undressing bags and tripod to assist with BA set removal) The clean area contains a bucket for hand washing and re-robe clothing.

NOTES

Also to be considered:

Location of BA entry control.

Location of a pumping appliance.

Location of the incident.

PROCEDURES

Contaminated wearers should emerge from the risk area with a minimum air pressure above the normal time off whistle.After reporting to the ECO personnel must proceed directly to the decontamination zone holding area.

The cylinder contents will normally determine the order for personnel to be decontaminated.

EMERGENCY DECONTAMINATION

May be necessary where fire service personnel have;

Inadequate protection or sustained damage to their GTS (including boots).

Suffered injury.

A breathing apparatus emergency.

May also be used formembers of the public or site personnel who are not protected or who have inadequate protection.

Use the best method available depending on time constraints.

POST INCIDENT

Items of uniform:

Seal in a plastic bag.
Boots, reflective jackets and equipment wash thoroughly before leaving incident
Items for disposal - Health and Safety Section.
Label all bags.

On return to station:

NOTES

Equipment: Wash with hot water and detergent and rinse.

Only condemned following assessment by supervisory officer/HMO

Personal hygiene carried out when appropriate to do so.
Recording: Accident book & Service Chemical Exposure forms completed SC27,28,29,207

HEALTH AND SAFETY CONSIDERATIONS

Site all personnel, appliances, equipment and control points upwind and in a safe clear area.

Wear full firefighting kit including GTS, with BA (APP)

If possible work in a well-illuminated clear area.

Do not eat, drink or smoke during the incident.

Avoid inhalation, ingestion and absorption of chemicals or vapour clouds.

Ensure equipment is “intrinsically safe” - can’t create a spark. Torches/radios can be used inside the danger area. Anyone feeling unwell at the incident must report to the Incident Commander immediately.

14. LIMITS OF AUTHORITY

It is imperative that all actions at hazardous material incidents are authorised through the Incident Command System.