COMMUNITY DOCUMENTATION CENTRE
ON INDUSTRIAL RISK
Lessons Learnt from Emergencies After Accidents in the
United Kingdom Involving Dangerous Substances
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Lessons Learnt from Emergencies After Accidents in the United Kingdom Involving Dangerous Substances

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PREFACE

The Community Documentation Centre on Industrial Risk (CDIR) mainly aims at a systematic diffusion of information and knowledge in process industry safety related issues.

Emergency planning is a necessary step in parallel to a loss prevention active policy for mitigating consequences and minimizing casualties of major accidents.

A better insight in the national approaches to emergency planning based on the collection and review of the experience gained in handling emergencies is necessary for achieving a mutual understanding, for promoting a common learning process and for tackling the complex problem of emergency response to major accidents.

For this reason, a series of studies on lessons learnt from emergencies after accidents involving dangerous substances in various Member States has been promoted by the JRC.

The objectives of these studies can be summarized as follows:

a) Collection of information of the statutory basis for the organization of emergency response in various countries with emphasis on major accidents involving dangerous chemical materials and their comparative study for getting a better insight and assist the mutual understanding of the national approaches.

b) Collection of information about accidents (accident characteristics, off-site actions taken during the emergency), where dangerous chemical substances have been involved and there was accident impact/potential impact off-site or to the public. Aim is to collect examples of both positive and negative experience for extracting constructive lessons.

c) Evaluation of collected information for drawing conclusions of general interest to European authorities for emergency planning.

This volume describes the results of such a study for the United Kingdom performed by TECHNICA Ltd.

The general conclusions drawn reinforce the:

a) need of a structured dissemination of experience gained and lessons learnt from handling emergencies;

b) desirability of an effective, flexible and easily accessible informative system for assisting in managing emergencies.

G. Drogaris
Technica wishes to express its appreciation to the many individuals and organisations who have contributed information to this study. The interpretation of that information and the conclusions drawn in this report represent Technica's views only.
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Part 1

INTRODUCTION AND OVERVIEW
INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION TO STUDY

Technica were asked by the Commission of the European Communities (CEC) to carry out a study into the arrangements in the UK for tackling emergencies involving hazardous substances. The broad purpose of this study has been to gather information to enhance mutual understanding in the Community; a similar study is at present underway in West Germany, further studies are planned for other member states. The study has been primarily concerned with the nature and scale of the emergency response rather than the causes of the incidents themselves.

The study has fallen into two distinct stages. Firstly, a comprehensive review of the statutory basis for emergency response in the UK, the organisations involved and their roles. These include central and local government, the emergency services, voluntary organisations and industry. In this review, we have tried to ensure we represent fully the wide range of organisations involved in emergency planning and response to chemical emergencies. We have particularly considered the range and depth of information available to the emergency services at the scene of the incident to allow them to make decisions on the best actions to take to safeguard the public, their personnel and nearby property.

The second phase of the study involved the selection of a limited number of chemical incidents for indepth analysis. Our purpose here was to collect sufficient information of the scale and nature of the response in each case to demonstrate the wide number of parties involved, their roles and the effects of pre-planning. The incident itself is only described in sufficient detail to show how the emergency response was influenced by the type, location and magnitude of the incident. In each case we have also tried to draw out and summarise those lessons which appeared to have been learnt by those who responded, those concerned with planning and those with responsibilities for legislation. These 'lessons learnt' include positive as well as negative lessons. They have been further summarised in order to draw broad conclusions.
1.2 APPROACH ADOPTED FOR THIS STUDY

As there is no one central authority in the UK, the collection of information for this study could have proved difficult. To aid us in selecting the incidents for study and to ensure we fully and adequately represented the complex responsibilities and roles in the area of emergency planning and response, we invited representatives from interested government departments, the emergency services, local and county authorities, the health service and industry to sit on a small working group. The members of the group are listed in Appendix VI.

The working group members have provided invaluable information on the general approach their organisations adopt in planning for and tackling chemical emergencies and specific information on the incidents we eventually selected to study. They advised us on the most appropriate incidents for study and the aspects to highlight in the data collection form. Through their good offices, we were able to make contact with key personnel at a local level with first hand knowledge of the incidents. Finally, the working group members and their parent organisations have commented on this report to ensure it accurately represent the situation in the UK.
1.3 OVERVIEW OF THE UK RESPONSE TO CHEMICAL EMERGENCIES

In the UK, the arrangements and responsibilities in the area of emergency planning and response are complex and not easily summarised. However, four basic characteristics are apparent and are encouraged as part of UK government policy:

- that local government with the support of the emergency services and local industry should plan for civil emergencies including chemical accidents;

- that emergency planning should be conducted at a local level with coordination between the authorities and organisations at that level;

- that emergency plans should not be specific to one hazard, an 'all hazards approach' should be adopted where the organisations adopt their appropriate role whatever the hazard;

- that any emergency plan should be flexible, allowing for the response to be tailored to the nature of the hazard and the size of the incident.

These arrangements, responsibilities and the underlying legislative framework are complex and unique to Britain. They have evolved on the basis of experience, to suit the problems of Britain, with its systems of central and local government, its geography, its climate and its socio-political culture. While an exercise such as this study is useful in that it allows wider understanding between members states and the exchange of useful information, the members of our working group were concerned with the problems that can arise if 'harmonisation' is pursued in an insensitive manner. The present debate concerning the harmonisation of placarding systems for the transport of dangerous goods was cited as an example. This is discussed in more detail in 3.3.6.

Technica would hope that the information contained in this report will lead to greater understanding of the complex situation in Britain and a better appreciation in other Member States of the reasons why Britain has developed these strategies to minimise the consequences of incidents involving dangerous chemicals.
Part 2
DETAILED DESCRIPTION OF THE ORGANISATIONS ARRANGEMENTS AND LEGISLATION
2 DETAILED DESCRIPTION OF THE ORGANISATIONS, ARRANGEMENTS AND LEGISLATION

2.1 INTRODUCTION

This review of the organisations and arrangements for the emergency response to chemical accidents in the United Kingdom has four main sections:

- legislation relevant to emergency response;
- pre-accident advice and codes of practice;
- information sources available at an incident;
- the roles played by the various organisations concerned in an incident.

The text relates to accidents involving toxic or flammable chemicals. Radioactive or nuclear incidents were not considered part of this review.

Unlike other member states, the UK is an island with coastlines bordering some of the busiest shipping lanes in Europe. Drums and containers of hazardous material which are washed up on the beaches create particular problems for the emergency services. However, they deal with these incidents using the same principles and arrangements described in this report.

To set the scene for these sections, the principles of UK national policy will first be described in very general terms.

There is no single 'British Competent Authority' in the sense of one person, or organisation, empowered by the Government to deal with major emergencies. Successive administrations have maintained the policy that control in such matters must be exercised locally - principally at Local Authority, or equivalent, level (1,2). The local authority in co-operation with local manufacturers makes such preparations as it considers appropriate for the hazards it foresees in its area. If an emergency occurs it may summon help from neighbouring areas or from National Government: but the responsibility to plan for, and the control of, an incident remains at the local level.

Secondly, there is no general requirement in the UK for the cost of dealing with an incident to be paid by the owner of the factory, the road tanker or ship, or the goods in transit, which are involved in an accident. Anyone suffering injury or loss may seek compensation through the courts, but the costs of dealing with the immediate effect of the incident and cleaning-up afterwards are normally borne by the local community.
The UK Home Office has recently carried out a thorough review of peacetime emergencies (3). A full account of the conclusions of that review can be found in the extract from the Home Office report at Appendix III. In broad terms the conclusions were:

- that prime responsibility for handling particular disasters should remain at the local level. It would not be assisted by anything in the nature of a 'national disaster squad';

- new arrangements are needed to give national oversight to the development of coordinated emergency planning and to address specific practical issues raised by recent disasters; and

- more needs to be done to encourage and develop co-ordination of the various services at the local level.

To meet these objectives the following steps have been taken so far:

1. A Civil Emergencies Adviser has been appointed to oversee the subject who reports directly to the Home Secretary;

2. The present Civil Defence College at Easingwold has had its remit widened to include peacetime emergency planning;

3. No new legislation placing duties on local authorities is considered necessary at present but the situation will be kept under review;

4. The existing role of central Government Departments will not change. The department with closest involvement in the disaster will continue to act as 'lead department' to coordinate central Government response, keeping Parliament and the public informed.
2.2 LEGISLATION ETC RELEVANT TO EMERGENCY RESPONSE

New laws in the United Kingdom are usually produced by the Government in two stages. "Acts of Parliament" (or "statutes") are the primary elements of law-making: they may revoke or amend previous statutes or they may introduce new laws. Acts can be brief documents containing little detail. Generally they operate by enabling a Secretary of State (or sometimes a Local Authority or other body) to issue detailed Regulations. These Regulations are issued as "Statutory Instruments", that is, devices for carrying into effect the principles of the original statute. Once in effect the Acts and Regulations are, in general, enforced by the relevant agency and largely complied with by industry. This may contrast with the situation in other member states.

It has become common practice for the Government Department concerned to issue more comprehensive codes of practice and guidance to clarify and amplify the requirement of the regulations. In the following parts of this section, legislation will sometimes be referenced in the form of these semi-legal guidance documents.

2.2.1 Central Government Involvement

Governments do not generally enact laws to control their own actions. This subsection is therefore concerned with those arrangements made by the UK Government for the involvement of Government Departments and other national bodies in planning for, and responding to, emergency situations.

The Peacetime Emergencies Review and the appointment of a Civil Emergencies Adviser have been mentioned in Section 1. The Adviser will be responsible for coordinating at a national level the concerns of administrators, the emergency services and the various Government-created inspectorates. He will also be involved in studying the lessons which can be learnt from incidents and ensuring that they are passed on and applied in future events. The Adviser will have a Secretariat in the Home Office, working in association with the Cabinet Office. They will carry out or sponsor studies on specific issues of concern, such as training and exercises, handling casualty inquiries and assistance in major emergencies abroad (4).

Many Government Departments may have an involvement with an emergency: the Home Office (the Police and Fire Services), the Department of Health (medical services), the Department of Employment (who fund the Health and Safety Commission and Executive). If a major emergency were to occur the Government would select one "lead department" to co-ordinate the involvement of the other Departments of State in providing assistance. The lead department would not manage the response to the incident, but would act as the link between the Departments of Central Government and the people involved at local level.
In some specific cases the Government might announce its willingness to reimburse Local Authorities for some or all of the costs they incurred in dealing with an incident. In the case of an extremely severe event the Government may declare a National Emergency; this does not imply that control of the situation would pass to a central body, but would facilitate the mobilisation of national support for the County, or Region, affected.

2.2.2 Local Authority Involvement

The two principal tiers of local authority in England and Wales are County and District Councils or Metropolitan Boroughs. In Scotland the principal authority is a Regional Council. These authorities have statutory powers and duties to provide and maintain those services for which they have responsibility delegated to them under normal circumstances.

The County Council or their equivalent will usually provide police and fire services, education, social services, libraries and maintain highways. It is the principal Civil Defence Authority for planning in the event of hostilities (5). District Councils are responsible for housing, waste collection and disposal, environmental health and local planning and development matters.

There is not a general duty on a local authority to plan for peacetime emergencies (2); a notable exception is the requirement under the Control of Industrial Major Accident Hazards Regulations (25) to prepare off-site emergency plans for specified industrial installations.

Section 156 of the Local Government and Housing Act 1989 (52) enables local authorities, including Fire and Civil Defence Authorities on behalf of metropolitan areas, to incur expenditure in coordinating local authority peacetime emergency planning and makes it clear that they may plan to deal with a possible emergency or disaster which could cause destruction of property or danger to life in their area. Contingency planning included making, reviewing and revising of such plans and associated training.

The Civil Protection in Peacetime Act 1986 (7) enables local authorities to use resources provided for civil defence purposes to be used in the event of a civil emergency in peacetime.

The general approach to emergency planning by many local authorities is one of "all hazards": that is, the plans are applicable for any emergency, in peace or war (8). This approach is deliberately flexible and a local authority may tailor its plans to the problems it foresees as existing in its area.
Each County has a "County Emergency Planning Officer" (CEPO) reporting directly to its Chief Executive. The CEPO's role includes the responsibility:

- to co-ordinate the emergency plans of all the relevant local authority departments and services;
- to co-ordinate the activities of the local authority with its local police, fire service, medical service, voluntary agencies, etc;
- to liaise with local industry; (especially in relation to site controlled under the CIMAH/SEVESO regulations);
- to liaise with other emergency planners in lower tiers of government and at regional level.

His role during an actual emergency is dealt with in Section 2.5.2.

2.2.3 The Emergency Services

The Police and Fire services are locally administered, generally on a County basis. The London (Metropolitan) Police is one exception, being administered directly by a Government Department, the Home Office. In London and some other large conurbations the Fire Services are run by "Joint Fire and Civil Defence Authorities" (see Section 2.2.2). However, these emergency services are not directly under the control of the local authority, but have powers (in the case of the Police, wide-ranging powers) which have been conferred on them by Central Government under Acts of Parliament (9,10).

The Home Office does not exercise any operational control over police and fire services, but it does maintain inspectorates whose duty it is to ensure that each local Constabulary and Fire Brigade is performing its duties satisfactorily. The Home Office also provides training establishments and certain other central facilities available to all forces.

The Health Authorities are administered through Regional and District Health Authorities, but not under the control of local authorities. The separate Authorities were originally set up as part of the broad structure of the National Health Service and are nationally funded by the Department of Health. Each Health Authority is responsible for the provision of Hospital services but not every Health Authority is responsible for the management of Ambulance services. Health service regions are concerned with capital allocation and strategic planning while District Health Authorities are responsible for the day to day management of the Health Service.
The Ambulance services are, in the main, managed on a supra-district basis; that is, one Health District will manage an ambulance service on behalf of others in a geographical county. There are one or two exceptions to this where a service is managed on a single district basis.

2.2.4 Health and Safety Commission and Executive

The Health and Safety Commission and Executive is the organisation primarily concerned with safety, especially that of employees and those who may be affected by an activity. Its controlling body is the Health and Safety Commission, which has representatives from Industry, Trade Unions, Local Authorities and independent organisations, under a Government-appointed Chairman. The Health and Safety Executive is headed by a Director General and two other people appointed by the Commission. It advises the Commission and comprises a number of different Inspectorates, policy and technical support divisions and research establishments. The Commission is also assisted by Local Authorities, the Railway Inspectorate and the Petroleum Engineering Division of the Department of Energy in the enforcement of legislation for particular work activities.

The Commission and Executive were set up in 1974 under an Act of Parliament (11). They are bodies independent of any Government Department (and are known as non-departmental public bodies- NDPB’s) but the Chairman responds to the Secretary of State for Employment and the Department of Employment also controls its funding. It is empowered under the Act to administer Regulations on a wide range of topics affecting the safety of employees and the general public.

The Executive enforces requirements concerning the safety of hazardous installations, including on-site emergency planning (35). Their interest in off-site planning at such sites extends to the adequacy of the information given by the hazardous installation to the Local Authority and to ensuring that the Local Authority has prepared and kept up to date adequate site-specific off-site emergency plans (16,25).

The HSE also specifies the extent of the area in which the public must be given information, for those installations that are subject to the emergency planning requirements of the Control of Industrial Major Accident Hazard Regulations 1984 (CIMAH) (16). The HSE advice to manufacturers about the nature and extent of the safety information goes substantially beyond that required by the Seveso Directive (82/501/EEC) and amendments (87/216/EEC). HSE has also to be consulted by local authorities when they are preparing off-site emergency plans under CIMAH.

HSE is also the enforcing authority that monitors compliance with Health and Safety legislation by the emergency services with respect to their own employees and others who may be affected by their activities.
HSE gives land-use planning advice to Local Authorities on proposed developments that would become NIHHS or CIMAH installation and also advises on other developments in the vicinity of existing hazardous installations. This advice is concerned with the residual risk arising from the operation of the installations or sites; the long term effect is to ensure a satisfactory separation between major hazards and other developments. This has a 'knock on' effect in terms of off-site emergency planning. The procedures are currently under review and may be changed in the near future to prevent the introduction onto land or subsequent movement on a site of hazardous substances without the consent of the planning authority.

2.2.5 Industrial Sites

These are generally controlled by Acts and Regulations administered by the HSE. The principal legislation is the Health and Safety at Work etc Act 1974 which is used to enforce overall standards of health and safety at work places. The HSE does not licence or approve hazardous installations but does licence some sites handling or storing Petroleum or other low flash-point liquids (14) and explosives.

The first set of regulations relevant to hazardous industrial sites was the Notification of Installations Handling Hazardous Substances Regulations 1982 (NIHHS) (15). Operators of sites where certain hazardous material are stored or handled, in quantities greater than a specified threshold, are required to provide details of their operations to the HSE. The HSE then passes on the relevant information to Local Authorities and emergency services. Although there are no specific requirements for the operators of sites subject to these regulations to plan for emergencies, the information they provide will assist Local Authorities to formulate appropriate plans for their areas. These regulations enable both the HSE and Emergency Services to target their resources on the most likely hazards.

Regulations made in the UK to implement the "Seveso Directive" are known as the CIMAH Regulations (16).

The principle objectives of the CIMAH Regulations are to prevent major accidents affecting people or the environment, and to limit the effects of any which happen. Industrial activities within the scope of the Regulations are defined in terms of storage and processes involving specified dangerous substances.

The Regulations have application at two levels. The general requirements apply widely and require: identification of potential major accidents, adequate steps to be taken to prevent them and to limit the consequences of any that do occur, provision of information, training and equipment necessary to ensure the safety of persons working on the site and reporting of major accidents.
More specific requirements apply to potentially more hazardous activities and require the person in control to: submit a safety report to HSE, prepare an on-site emergency plan, ensure the public in the vicinity are provided with specified information and provide information to the local authority to enable them to prepare an off-site emergency plan.

The Dangerous Substances (Notification and Marking of Sites) Regulations come into force in September 1990. Their aim is to ensure that authorities responsible for enforcing health and safety legislation and local fire authorities have information about certain sites with dangerous substances.

The Regulations will ensure that firemen arriving at a site are warned of the presence of dangerous substances and of the need to make use of information previously gathered.

The Regulations will apply to any site with a total quantity of 25 tonnes or more of dangerous substances.

Industrial sites using wood preservatives have a general obligation under the Control of Pesticides Regulations to take all reasonable precautions to protect man and the environment. This is held to include the user's preparation of an emergency plan.

Ports and Harbour Areas are subject to their own specific regulations, the Dangerous Substances in Harbour Area Regulations 1987 (DSHAR), somewhat like the CIMAH regulations for fixed installations (19). People responsible for bringing in hazardous materials must warn the Harbour Master, who may, in some circumstances, prohibit them. Appropriate fire and explosion precautions must be taken by ships berthed in the port: hazardous materials must be appropriately labelled: emergency plans must be prepared by the Harbour Authorities (unless they already exist under CIMAH Regs): the Harbour Master must be informed of dangerous incidents.

2.2.6 Transport Labelling and Packaging

Regulations on this subject are laid in parliament by the Secretary of State for Transport and are generally administered by the Department of Transport; but where hazardous substances are concerned the HSE has published guidance and the HSC has approved ACOPS associated with the Regulations. The main relevance to this study is that, in the event of an incident during transportation, the Emergency Services will need to know what materials are involved and how to treat them. The regulations require certain information to be made available at the scene of any incident.
International Regulation applicable in the UK for cover transport of hazardous materials by rail (RID); road (ADR); air (IATA reg); sea (IMO and other codes) but these are not covered in this review as they are not specific to the UK. However, there is specific legislation to implement the IMDG code in the UK, the Merchant Shipping Act (Dangerous Goods) Regulations 1981 as amended.

Road tankers and tank containers were the first vehicles to be regulated (20). The provisions relating to information on hazardous material require:

- hazard warning panels (HAZCHEM) (see Section 2.4);
- written information, to be carried by the driver, on the materials conveyed, its dangers and the actions to be taken in an emergency (e.g. a TREMCARD, see Section 2.4)

The general subject of packaging and labelling hazardous materials was regulated by the CPL Regulations (21). These provide both for materials in transit and with the purchaser. The packages must be labelled so as to indicate their contents and the hazard.

A third set of regulations (PGR) specifically covers the road transport of hazardous materials in packages (as distinct from tankers) (22). The driver must carry written information on the hazards of the material carried and the emergency actions to be taken: the vehicle must display the appropriate hazard warning plates which indicate that dangerous substances are being carried.

The labelling and road transport of explosive materials are covered in separate regulations and require similar precautions to those for other chemicals (43, 44).

The RIDDOR regulations (17) require that any fire or uncontrolled release from road transport of specified dangerous substances should be notified to the HSE. As should the over-turning or serious damage to the tank of a vehicle covered by the tanker regulations. The Road Traffic (Carriage of Explosives) Regulations 1989 require similar notification.

Under the DSHAR (19), tank barges carrying dangerous substances must carry hazard warning panels. These are similar to those specified for road tankers, but do not include the emergency action (HAZCHEM) code.
2.2.7 Pollution Aspects

Any major chemical emergency is liable to result in air, water or land pollution. This must be recognised when the emergency plans are drawn up and the Emergency Services need to take this into account when dealing with a spillage. For example, some materials should not be allowed to enter drains, run into water courses or allowed to enter aquifers. There are three bodies which have statutory responsibilities regarding pollution, although they would not normally be involved in the immediate response to a chemical emergency response.

The Pollution Inspectorate is a part of the Department of the Environment. The Inspectorate monitors all releases to land, water or air, from industrial sites, to ensure that they do not exceed permitted levels.

The Marine Pollution Control Unit is part of the Department of Transport. It is concerned with releases which might cause sea pollution.

Following the transfer of the water supply industry from public to private ownership, a National Rivers Authority has been set up to check and regulate the quality of watercourses. This also is under the control of the Department of the Environment. They maintain emergency equipment (such as booms etc) and are likely to be called out in an emergency if rivers are threatened with pollution.

2.3 PRE-INCIDENT ADVICE ON EMERGENCY PLANNING

2.3.1 Home Office Guidance

The Home Office has, by tradition, been associated with matters of public safety, including plans for wartime emergencies. This has recently been reinforced by the appointment of the Civil Emergencies adviser, responding to the Home Secretary. Advice is provided to Local Authorities (primarily at county level) on preparing plans for major emergencies of all kinds, "Emergency Planning Guidance to Local Authorities" (23). The Home Office also publish less detailed advice on civil protection from emergencies in peace and war, aimed at the general public (24).

The Home Office also gives guidance to Police and Fire Services, chiefly through training provided at the colleges they maintain. The Fire Officers Training College (FOTC) in particular has for many years provided specialised training in dealing with chemical emergencies. The recently re-named "Emergency Planning College" is also run by the Home Office.
2.3.2 HSE Guidance

HSE provides guidance on emergency planning for installations subject to the CIMAH Regulations (15, 16, 25). It enforces the duty of operators to make on-site plans and that of Local Authorities to make off-site plans.

The NIHHS and CIMAH Regulations also produce much information of importance in emergency planning. Under CIMAH regulation 11(2), the manufacturer shall provide the Local Authority with this information.

The HSE has published guidance on the preparation of emergency plans (25), both on-site and off-site. This is aimed at local authorities and manufacturers. It stresses the need for regular reassessments of plans. The plan should cater in detail for those events which are most likely, but should be sufficiently flexible to allow remedial measures to be extended to extremely adverse conditions. The guidance also highlights the need to co-ordinate specific CIMAH site plans with the "All Hazards" County Emergency plans. The HSE inspectors ensure that manufacturers comply with their duty to provide adequate information. The Local Authorities have a duty to consult HSE when preparing CIMAH off-site plans.

With regard to the transport of hazardous materials, the HSE publish guides to industry on how best to comply with the regulations on labelling, etc which are contained in the Tanker Regulations (20) and the Carriage of Packaged Goods Regulations (22). These guidance notes, however, contain no specific advice on how to respond to transport emergencies.

The HSE guide to DSHAR (19) and ACOP contain advice to harbour authorities on the preparation of emergency plans. The guide to the carriage of Explosives Regulation (46) also contains basic advice on actions in the event of an accident. The Road Traffic (Carriage of Explosives) Regulations 1989 require that the route must be agreed in advance with the appropriate police force where large quantities of the more hazardous explosives are carried.

2.3.3 Medical Information

Regional and District Health Authorities are responsible for the preparation of plans to deal with all hazardous incidents, including chemical and nuclear accidents. The Department of Health have provided guidance on health service arrangements needed for major emergencies (47). These plans cover the provision of specialist services within each area. There is, however, no nationwide co-ordinated information service in the medical field which records the location and availability of specialist medical resources for use in an emergency.
The emergency plans will include:

- a list of the hospitals in the area with accident and emergency departments available on a 24-hour basis, together with their ability to provide medical and nursing teams;

- details of specific installations in the area which might be involved in a major incident, with contact names and telephone numbers, site plans, any special equipment or toxic antidotes held;

- arrangements for liaison with the other emergency services and Local Authorities.

2.3.4 British Rail Guidance

In the case of railway transport, British Rail (BR) publish information to assist emergency services in tackling accidents involving hazardous materials (37); guidance is given on where to look for information at the scene of the incident and how to obtain further details.

For their own staff, BR issue guidance on the handling, labelling and recording of hazardous cargoes (38); these are known as the "Pink Pages". BR have also made byelaws relating to explosives and issue a list of dangerous goods and conditions of acceptance.

As part of their normal operations BR maintain a computerised record of the location of all rolling-stock and cargoes (TOPS system 38). This can be of great value in identifying wagons involved in an incident.

2.3.5 Guidance from Other Organisations

For emergencies involving hazardous chemicals the organisation which has been foremost in publishing advice is the Chemical Industries Association (CIA). This is a body comprising the leading chemical manufacturers in the UK and many of the smaller ones. It has produced general advice on handling major emergencies (26) and on preparing off-site plans (27). It also issues booklets giving specific guidance on emergency planning for chlorine (28) and ammonia (29) installations. These guidelines are primarily directed at the chemical industry, but they have also been useful to Local Authority planners.
The Society of Industrial Emergency Services Officers (SISEO) have published a Guide to Emergency Planning (30). Although directed at Industry, this is a comprehensive, "All Hazard" approach to emergency planning, both on and off the site. It covers liaison and co-operation with Public Bodies and Services and has an Appendix of case studies for several major peacetime emergencies.

Over the past few years several international meetings have been held concerning preparations for major emergencies (31, 32, 33). Papers published for these have included several from UK industry, which give valuable advice on emergency planning (34, 35, 36 among others).

2.3.6 Liaison Between Private Industry and Public Bodies

Most of this Section has been concerned with the provision of information in printed form, by both Governmental and non-governmental bodies. In addition to this, the development of adequate plans and resources to respond to chemical emergencies is greatly assisted by the continuing association between the various organisations concerned: the chemical industry both nationally and locally, the Local Authority emergency planners, the Emergency Services etc. In addition to simply providing information, both sides are able to learn from meeting together and by participating in joint exercises to test their plans, both "table-top" and in the field (39).

2.4 INFORMATION SOURCES AVAILABLE DURING THE INCIDENT

2.4.1 Incidents at Industrial Sites

Many sites handling or storing hazardous chemicals in substantial quantities are notified under the NIHHS Regulations, and information on the material present will have been made available to the Fire Brigade by the HSE. To translate this information into guidance on how to treat a fire or spillage there are several options. The Emergency Plans for the site, which will have involved the Emergency Services, may contain information on preferred means of fire-fighting and dispersal. The material may have a listed HAZCHEM code (see Section 2.4.2 below and Appendix I), which tells the fire-fighter how to tackle the incident and what protective clothing to wear. Most Fire Brigades have access to computerised data-bases such as CHEMDATA or CIRUS (40). CHEMDATA is an information pack, updated twice-yearly, which is run on the user's own micro-computer. It gives the information on the properties of the chemical; on how best to treat the incident; on where to obtain further information and advice. Some Brigades carry in-cab computers able to run the data-base or a portable fax machine to receive hard copy from their headquarters. CIRUS is a similar system, peculiar to the London Fire and Civil Defence Authority.
The Site Marking Regulations (18) will require sites to post up information on the nature of the hazardous materials they contain; they do not require the provision of a HAZCHEM code however. The access route to the area where hazardous materials are stored must be identified and written information must be provided to the enforcing authority and the fire authority.

Meteorological information for use in predicting the dispersion pattern of volatile materials is available via "CHEMET", run by the meteorological office.

The Dangerous Substances in Harbour Areas Regulations (19) require the operator of a shipping berth to have information, about the identity, quantity, location and hazards of any dangerous substance being handled on the berth, immediately available for Emergency Services. Reference (19) and the ACOP also give some advice on the information the Harbour Authority should have available under emergency plans.

2.4.2 Incidents in Transport

One of the requirements of the regulations governing the transport of hazardous materials (20, 22) is that vehicles should hold and display information on their hazardous cargoes. The driver must carry a written statement of the materials carried and their hazards. The CIA has published Transport Emergency Cards (TREMCARDS) for a large number of commonly-transported materials, which fulfil the requirement; they can also be made available in several languages.

Road Tankers carrying hazardous materials must be provided with the hazard Warning Panels on each side and at the rear. The panels comprise:

- an emergency action code;
- the substance identification number (normally the UN number);
- a hazard warning symbol indicating the type of hazard involved;
- a telephone number from which specialist advice can be obtained;
- the name of the manufacturer (may be omitted).

The emergency action (HAZCHEM) code does not deal with the specific properties of the material, but gives the Fire Fighter advice about what extinguishing agent to use; how to contain or disperse a spillage; what protective clothing to use and whether to consider evacuation. A copy of the code forms a part of Appendix I of this report.
The substance number identifies the chemical, or assigns it to a general class with similar hazards. It can be used as the entry to a CHEMDATA/CIRIS query.

Vehicles carrying certain hazardous packaged materials must be placarded with two orange rectangles or hazard plates. For the carriage of particular explosives the orange plates plus the bursting bomb diamond is mandatory.

The information made available by British Rail has been mentioned in Section 2.3.4. The train crew carry information on the hazardous materials they are transporting. In addition, individual wagons are provided with hazard warning panels similar to those described for road tankers.

The chemical industry, acting through the CIA, has organised a comprehensive scheme for the provision of information on hazardous chemicals in transit - CHEMSAFE (41). It is a mutual aid scheme, whereby companies will provide advice, and if necessary assistance, for chemical incidents occurring in their locality. The "standard" scheme covers the normal provision of information, labelling and technical advice. When the manufacturer or supplier is not known, the National Chemical Emergency Centre at UKAEA, Harwell maintains a central information source. The location of stocks of neutralising agents and specialist equipment are listed. Transport on roads, railways, through ports and airports are all covered by the scheme.

2.4.3 Medical Information

For incidents involving toxic releases Health Services can obtain clinical toxicological advice from the National Poisons Information Service (NPIS).

As part of the pre-planning for emergencies each Regional and/or Local Health Authority provides a list of hospitals which can receive casualties, together with their specialist facilities. This is of value to the Ambulance Service who have to decide where to send casualties.
2.5 ROLES PLAYED BY CONCERNED BODIES IN AN EMERGENCY

2.5.1 Central Government Departments

As has been made clear in Section 2.2.1, Central Government takes no active part in dealing with an emergency at the site. A Lead Department may be nominated, which will co-ordinate Government assistance and the two-way flow of information, but operational control will be at a local level.

2.5.2 Local Authorities

The Local Authority takes a leading role in pre-incident planning, but when an incident actually occurs its function is the provision of back-up services as requested by the Police, Fire and Ambulance Service. If the incident which occurs is more than trivial it is likely that the Emergency Services (generally the Police) will alert the CEPO or his Assistant. They will put into action appropriate parts of their County Emergency Plan, carrying out actions such as:

- alerting the appropriate County, Borough or Town officials who may in turn alert the relevant Departmental officers;
- stationing the CEPO at the Police Command Room to act as a link with the Local Authority services;
- provide information to the public and news media concerning Local Authority actions;
- obtaining, when necessary, materials or assistance from Central Government or HM Forces;
- activating, coordinating and directing, as and when required, the appropriate Local Authority departments: surveyors, architects and engineers to help with damaged buildings, roads, sewers etc., education and Social Services, to provide emergency shelter and feeding in schools, etc;
- calling out and organising volunteers who may wish to help.

At the conclusion of a chemical emergency incident there will almost always be a considerable amount of clearing-up needed. This also will be the responsibility of the Local Authority. The Environmental Health Department may also be needed to sample air or contaminated sites. These activities may require the protection of council staff from potential hazards.
The Local Authority Social Services Department are likely to be involved, along with the Health Service, in post-incident social work among victims or their relatives.

2.5.3 The Health and Safety Executive

The HSE play no part in controlling the incident. In some cases, particularly for CIMAH sites, they may be able to give advice if this is requested. If HSE representatives attend an incident, their function will be to assist in ensuring people’s safety (including Emergency Services and Local Authority employees) and to instigate an investigation which may lead to enforcement action under the Health and Safety at Work, etc Act. In the case of licensed Nuclear Sites the NII exercise a primary role during an emergency.

2.5.4 The Police

The Police are likely to be the Emergency Service which is first alerted in a chemical Emergency Incident. They have the main responsibility for control and co-ordination. If the Fire or Ambulance Services arrive on the scene first, they would assume control until the Police arrived. The exception to this general rule is that the Fire Service exercise control in the event of a fire, on the 'fire ground'.
The principal functions of the Police during a chemical emergency are:

- to co-ordinate the response of the other Emergency Services with their own;
- to control the general public at the scene of the incident and in the surrounding area;
- to alert the CEPO and other Local Authority Offices;
- to provide communications as necessary for the Emergency Services and others involved in the incident;
- to warn, and if necessary evacuate, those who may be endangered by the incident;
- to plan, and keep free of unnecessary traffic, routes needed by the Emergency Services, evacuation transport, etc;
- request the provision, by the Local Authority, of services such as clothing, food, shelter, transport for those made homeless or evacuated;
- safeguard property;
- deal with casualties and fatalities in co-operation with the medical services; contact next-of-kin where necessary;
- the protection and preservation of life;
- the establishment of a casualty/information bureau;
- provide information on the incident to the news media;
- maintain continuous liaison with the Local Authorities, other Emergency Services, neighbouring Authorities and Central Government if necessary.

It should be noted that the above duties are in addition to their traditional and statutory responsibilities to investigate crime, the preservation of evidence and acting on behalf of HM Coroner.
2.5.5 The Fire Brigade

The Fire Services have the primary responsibility for emergencies involving fire. They exercise control of an incident at the actual site of the fire (the "Fire Ground"). This is true for industrial sites, for road or rail incidents and also in ports or rivers.

As was mentioned in Section 2.4.2, they attend a large number of non-fire incidents involving hazardous materials. Their services are needed for gas dispersion, spillage treatment, rescue, etc. They may make a charge for such duties, which are outside their statutory responsibility.

Fire Brigades vary greatly in their response capability. If they serve an area with a great deal of chemical industry, or a major chemical transport route, they are likely to be very well equipped for chemical emergencies. For incidents in less well-provided areas it is often difficult to transport to the incident the equipment needed.

The functions undertaken by the Fire Brigade at a chemical emergency incident may include:

- carrying out fire fighting, cooling of equipment and rescue operations;
- summoning additional support from Local Authority services at the scene of the incident;
- acting to detect and monitor radio-activity where this is suspected;
- acting to counter toxic substances released and advising the Police on the dangers to workers or public and the possible need for evacuation.
- decontamination and treatment of spillages.

2.5.6 The Health Authority

The response of the Regional Health Authority to an emergency will involve local hospitals, doctors and Ambulance Services. In most cases the facilities required will be alerted by the Police or Fire Service attending the incident.

The Ambulance Service, as the mobile arm of the Health Authority, has the primary role in assessing and coordinating the medical needs at the site of an emergency. It is geared to the immediate medical needs of those directly or indirectly associated with the incident and their subsequent transportation to established medical centres.

Each Ambulance service provides a control centre facility in each district service which will receive the emergency call and dispatch ambulances and crews as required.
All Ambulance services for major incident purposes have mobile control and command vehicles which will be established at the site of the incident, at a safe distance, to provide communications and coordinate all medical resources.

The Ambulance Service are responsible for:

• providing ambulances and crews;

• providing a focal point at the incident, through an Ambulance Control Point, for all NHS/Medical services;

• alerting hospitals that there is a major incident and that they may be required to receive casualties and/or provide medical teams on site;

• transporting the Medical Incident Officer and Mobile Medical Teams to the incident site;

• providing communications from the incident site to hospitals and ambulance control;

• allocating casualties between the various receiving hospitals according to their resources, specialities and ease of access;

• sending an Ambulance Liaison Officer to each Receiving Hospital to supervise the arrival of casualties;

• determining the need for, and calling out of, volunteer ambulance services; these will be supervised by the Ambulance Incident Officer at the site;

• calling out, at the request of the Medical Incident Officer, doctors in immediate medical care schemes and local general practitioners;

• the treatment and care of those injured at the scene of the incident either directly or in conjunction with medical personnel.
The treatment of casualties at the incident site is controlled by the Medical Incident Officer, who is not a member of a Mobile Medical Team. There may also be a Nursing Incident Officer. The Medical Incident Officer is responsible for:

- coordinating the activities of Mobile Medical Teams (who may be from several different hospitals);
- the acquisition of adequate medical supplies and drugs;
- specialist advice on treatment, particularly if unusual toxic materials are involved (the service provided by the NPIS was referred to in Section 2.4.3).

In very large incidents doctors may have to make decisions as to which victims it is most productive to treat. Techniques have been developed to assist in this most difficult procedure, under the name of "Triage" (meaning to sort out and rank according to quality).

After a major incident, the Medical Services are responsible for the provision of post-incident counselling. This can involve a large amount of resources over a long time period.

2.5.7 Factory or Transport Owners and Operators

Detailed statutory requirements for industry include the provision of information (under the CIMAH Regulations and DSHAR), the preparation of emergency plans (under the CIMAH Regulations), tight control of handling hazardous substances (COSHH regulations, 1988 (51)), the correct labelling of vehicles and packages (under the Tanker and CPL Regs.) and observance of the Road Traffic Regulations (44). Regulation 4.2 of CIMAH also requires that a manufacturer should take steps to prevent or limit the consequences of a major accident to man or the environment. In addition, manufacturers have more general duties of care for their employees and others who may be affected by their activities under the Health and Safety at Work etc Act 1974 (11).

Apart from the information they provide in advance, they may be required to give further advice as an incident develops. The COSHH regulations require that employers should inform members of the visiting emergency services of substances which have a health risk. In one area (Grangemouth) major local industries, together with Emergency Services and Local Authorities, have formed a Major Incident Control Committee (MICC). They have developed together an Emergency Plan and in the event of a major incident each industrial member sends a representative to the Main Control Centre to give technical advice and information on the availability of mutual aid (35).
The industrial undertaking involved in an incident will already have provided information to the CEPO on the likely extent of the hazards and may be in a position to assess the extent of the hazard and its consequences in a specific incident. They may be able to advise the Emergency Services on emergency actions such as 'sheltering' or evacuation.

Many large industrial sites have their own Fire Fighting Service, which will act under the control of the Local Authority Brigade.

Most companies will appoint an information officer to provide information about the company, its site and operations, to the public via the news media (see section 3.3.3).

2.5.8 Voluntary Services

The role of voluntary services in the UK has for a long time been recognised as an important back-up to Local Authority provisions in an emergency. At both a national and local level they liaise with the Statutory Authorities to integrate the services they can offer with the publicly - provided ones. Their assistance is normally requested by the Local Authority, Fire Service or Police.

Although such assistance is valuable it is difficult to integrate it into the structure of major incident planning because it cannot always be available as and when required. There are also problems with the control and accountability of voluntary helpers.

2.5.8.1 Medical Services

The British Red Cross Society are able to provide first-aid and welfare at the scene of an incident. When emergency shelter and rest centres have to be set up, the Red Cross provide nursing support to medical staff.

The St John’s Ambulance Brigade (St Andrew’s Ambulance Association in Scotland) provide trained, volunteer, manning for their own ambulances and provide first-aid and welfare at an incident.

A national communications network for both the above services can be provided by radio connections via RAYNET.
2.5.8.2 Welfare

The Women's Royal Voluntary Service (WRVS) is an organisation with great experience in the setting up of rest centres for the homeless or evacuated and providing mass catering facilities at rest centres or in the field. It also provides staffing for enquiry centres and is involved in the issue of clothing.

The Salvation Army volunteers are also experienced in providing food, comfort and general welfare to the homeless and distressed.

2.5.8.3 Communications

Although they are not "voluntary organisations" the news media - local and national newspapers, radio and television stations - play an important part in major emergencies. The local emergency plans will contain arrangements for contacting the news media to communicate information to the public. In the preceding sections on the Local Authorities, Police, Fire Services and Industry, mention has been made of passing information to the news media. This is partly to satisfy the media demand for news, but it also provides a vital means of passing information to the public.

The Radio Amateur Emergency Network (RAYNET) has been mentioned above as providing communications for the Red Cross and St John's Ambulances. The also maintain a nationwide emergency call-out system and can provide mobile stations if needed.

Both Citizen's Band (CB) and amateur (i.e. licensed) radio equipment is normally installed in Local Authority Emergency Centres. Among CB and amateur radio users (HAMS) there are groups willing to give communications support in an emergency (28).

A national CB emergency network, the Radio Emergency Volunteer Communications (REVCOM) has recently been set up. Out of the several channels used by CB, Channel 9 has, by voluntary agreement, been reserved for emergency use.

Arrangements for warning and monitoring in the United Kingdom are chiefly the responsibility of the United Kingdom Warning and Monitoring Organisation (UKWMO) which was established in 1955 and is part of the Home Office. The other Home Departments bear supporting responsibilities for warning arrangements in their respective countries. The current functions are limited to civil defence.
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Part 3
THE LESSONS LEARNT FROM CHEMICAL EMERGENCIES
THE LESSONS LEARNT FROM CHEMICAL EMERGENCIES

An important part of our study has been to select a limited number of incidents for in-depth study. Our purpose was to collect sufficient information of the scale and nature of the response in each case to demonstrate the large number of parties involved, their roles and the effect of pre-planning. The incident itself would only be described in sufficient detail to show how the emergency response that was made was influenced by the type, location and magnitude of the incident. In each case we have also tried to draw out and summarise those lessons which appeared to have been learnt by those who responded, those concerned with planning and those with responsibilities for legislation. This part of the report describes the incidents selected for study, the design of a data collection form and summarises the lesson those incident appear to have taught us about how to respond to similar emergencies in the future.

The incidents were selected in conjunction with the steering committee for this study, in some cases at their suggestion.
3.1 SELECTED INCIDENTS FOR STUDY

We encountered some problems in selecting a suitable range of incidents to study. We aimed to study a balanced selection of recent incidents covering transportation, manufacturing and storage sites. We also attempted to look at incidents involving a range of hazards from toxic gas releases, fires and explosions to thermal decompositions and run-away reactions. Most of the incidents we have selected have occurred recently; this is important as there have been many and considerable improvements and changes in the area of emergency response to chemical incidents and we would not wish to mis-represent the current UK conditions. However, some older incidents have been studied where these have led to significant changes in the law or the manner such incidents would be tackled thereafter.

With a study of this nature, much of the detailed information we needed only exists for a short time after the incident. If no official investigation or report has been carried out, the information 'disappears' as logs are destroyed, peoples memories fade and key personnel move on. For the older incidents, we have been forced to select those for which an official report has been made and published. This has the drawback that normally only a limited number of points of view are given and the report may only consider certain aspects of the incident, normally the causes and may not include sufficient information in detail on the scale and nature of the emergency response. We have also had to use press-cuttings and news reports in some cases as the only information sources available. We recognise that these can be inaccurate and we have only used them where they are the only source of information and accuracy, in our opinion, is not important.

It should be recognised that, by necessity, some of the incidents we have selected are where things have gone wrong and therefore public interest has been aroused which has prompted investigation leading, in some cases to a published report. They do not represent the normal standard of response to most chemical incidents in the UK where such incidents are dealt with successfully and effectively. However, it should be recognised that after every emergency response there are lessons to be learnt for the future and it is for this reason that most now stress the need for some form of post-incident review at which these lesson can be drawn out and documented.

We have received the most useful and accurate information during our meetings and through correspondence with those actually involved with the emergency response to the incidents. Several fire brigades, police forces and companies have provided us with their incident logs and these have proved invaluable. We would like to record here our gratitude to those who have assisted us.
The incidents selected for detailed study are:

3.1.1 Fixed Installations

(a) Warehouse Fire, Salford, 25th September 1982

Vandals started a fire outside the warehouse and it spread into the building through the roof. The flammable liquids stored in the warehouse caused the fire to spread rapidly and at about 23.30 hrs a large explosion involving 9 tonnes of sodium chlorate occurred. It was heard 15 miles away and caused blast damage to flats and houses up to 200 metres away.

The Fire Brigade arrived within a few minutes, but their work was hampered by two further medium explosions and a series of minor explosions which occurred during the next five to six hours. Because of the presence of chemicals whose nature was unknown to the Emergency Services it was decided to evacuate people downwind of the fire. Between 600-700 people were evacuated to centres set up in church halls and schools.

The effects of the initial explosion and fire resulted in over sixty persons, including firemen and police, attending local hospitals within three days of the incident. The majority were suffering from the effects of inhaling smoke and fumes and from shock. By 04.30 hrs the next day the fire had been brought under control by the crews of twenty-four fire appliances.

(b) Fertiliser Fire, Billingham, 26th October 1986

Wet fertiliser mix was being dried when it overheated and caught fire. The fertiliser decomposed and gave off fumes which were oxides of nitrogen with traces of hydrochloric acid and ammonia. Fumes leaked out of the plant and were blown across areas of Middlesborough where local police toured the streets warning people to stay indoors. An worker was killed in the incident and 15 people were taken to hospital (including six workers and five police officers). The company was subsequently prosecuted. The incident was a "Major Incident" and was reported to the CEC under the Seveso Directive.

(c) Brightside Lane Warehouse Fire, Sheffield, 14th December 1984

The fire started around mid-day in a warehouseman’s unattended cabin, but the Fire Brigade did not receive notification of the fire until 30 minutes after it was first observed. The first appliances arrived within a few minutes, but the fire had taken hold.
Inside the warehouse the fire was causing toxic fumes to be released: cyanides, isocyanates and carbon monoxide (from polyurethane foam), hydrochloric acid (from PVC), sulphur dioxide and nitrous fumes.

The fire grew in size and intensity and the number of pumping appliances was increased to 17 at the peak of the incident. Smoke density varied throughout the afternoon and there were periods when pump operators in the yard outside as well as fire crews in the warehouse wore breathing apparatus (BA). However, in the early stages of the fire, fire officers did not consult the FS 1250, a card which contained specific details about the warehouse, such as the need to use BA due to the presence of PVC. In the following days several firemen reported to hospital suffering from the effects of exposure to fumes and smoke.

During the fire the police were concerned about the effects of the dense smoke on residents nearby. They contacted the Environmental Health Department whose officers (EHOs) monitored atmospheric concentrations of asbestos fibre (from the warehouse structure) and toxic gases. The EHOs subsequently ordered the closure of fifty schools until such time as the majority of the asbestos was cleared.

At 04.40 on the 15th December the fire was under control; damping down operations continued until 18th December.

(d) Chemical Works Fire, Poole, 21st June 1988

In the early evening a fire broke out in a single storey building used as a main chemical store at the chemical factory. It took hold rapidly and spread to the adjacent area containing flammable liquids. The Fire Brigade arrived quickly, but shortly after, a series of explosions occurred spreading the fire to a large adjoining open storage area. These explosions caused damage to a number of nearby houses (within a radius of 100 metres) and fire spread to a neighbouring public house. Cars in the area were also ignited. Forty-five gallon drums were hurled hundreds of feet into the air by the explosions but only five landed off-site.

Company managers were soon in attendance advising the fire officers as to the chemicals involved and, in particular, of the presence of cyanide in the north-west compartment of the burning store. A large yellow-brown smoke cloud spread over Poole and due to concerns about potential toxic effects the County Emergency Plan was put into action co-ordinated by police in liaison with the Ambulance Service.
Approximately 3,000 people were evacuated in one and a half hours to a local arts centre and to two schools, where the WRVS, Red Cross volunteers and medical staff looked after the evacuees. This constituted the U.K.'s biggest evacuation since the Second World War. An emergency control centre was set up in the civic centre to manage the District Council's response to the accident. The County Emergency Planning Officer alerted by the police went to Police H.Q. to act as a link between the District Council and the County should County resources be needed. The Police arranged loudspeaker announcements and local radio broadcasts to warn residents to stay indoors away from the smoke.

At 05.20 the next morning the area was declared safe and the evacuees were returned by local buses and by ambulances.

(e) Hydrocracker Explosion and Fire, Grangemouth, 22nd March 1987

In the hydrocracker unit there were two separators, one at 155 bar and one at 9 bar, connected by a valve system. On the morning of the 22nd the liquid in the high pressure separator was allowed to drain away and high pressure gas entered the low pressure separator causing it to explode. The explosion was heard 30 km away and fragments up to 1 tonne were thrown out of the refinery. A plant contractor worker was killed by the explosion.

There followed an intense fire. The Grangemouth "Major Incident" Plan was put into operation and its Control Committee comprising representatives of the Police, Fire Brigade, District and Regional Councils and experts from the refinery and other petroleum companies, co-ordinated the provision of emergency services. It was decided that the fire and smoke did not warrant the evacuation of nearby houses. The incident on-site was dealt with by the Police and Fire Brigade assisted by refinery staff.

All roads into Grangemouth were sealed to the public by the Police and local hospitals were put on full stand-by. Twelve units of the Central Scotland Fire Brigade and the refinery fire brigade fought the fire. Difficulties arose because waxy material from ruptured pipework blocked drains causing firewater to accumulate. Leaking petroleum spirit spread over an area of about 35,000 square metres increasing the risk of flashover. Five hours after the explosion a serious flashover did occur enveloping neighbouring process units in flames. The Fire Brigade regained control and that evening the fire was finally extinguished.

The refinery came under the CIMAH regulations and this Major Incident was reported to the CEC in accordance with the Seveso Directive.
3.1.2 Transportation

(a) Petrol Tanker Spillage, Walton-on-Thames, 11th April 1988

A 38-tonne petrol tanker overturned while pulling into a filling station to make a delivery. All five compartments of the fully laden tanker ruptured spilling the entire load of 26,000 litres of petrol and 7,000 litres of diesel. The overturned tanker crushed a car trapping its driver; unable to use cutting equipment because of the fire risk, the emergency services took forty minutes to free the driver.

All roads surrounding the accident were blocked and homes and offices within 100 metres were evacuated as police toured the area warning the public. The fire brigade spread a waist high blanket of foam along 100 metres of road in an effort to reduce the vapour which could be smelled a mile away. They also tried to dam the free-flowing petrol; however, much liquid ran into the drainage system and vapour caused an explosion in a pub basement a quarter of a mile away.

A local community day centre became a temporary rest centre for evacuated residents. The River Thames was closed for 24 hours. The owners of the tanker were alerted immediately the accident occurred and had pollution control personnel at the scene within 45 minutes. They worked with the Thames Water Authority over the next five days in mopping up the residual petrol.

(b) Toluene Tanker Crash, Cleveland, 19th November 1986

Shortly after 08.00 hrs an articulated road tanker carrying about 22,000 litres of toluene was travelling south on the A19, a main arterial road which runs north/south through Cleveland. A car pulled into the path of the tanker and as the driver took evasive action the tanker overturned. The manlids of all five compartments sprang open and toluene spilled onto the roadway and ignited. Five cars travelling on the northbound carriageway were involved in the fire, but all the occupants escaped. The Fire Brigade was called at 08.14 and arrived within a few minutes. Burning liquid had entered the drains and drain fires were evident approximately 400 metres from the main incident.

Cleveland’s County Emergency Plan was put into action with social services and public transport put on alert in case an evacuation was needed. Initial action by the Fire Brigade concentrated on extinguishing car fires and searching for occupants. A member of the ICI Chemsafe team arrived and liaised with the Police Divisional Commander and the Chief Fire Officer.
Following this consultation it was decided to leave the leaking toluene to burn rather than extinguish it and have the toluene emitting vapours. Also in attendance were people from the Ambulance Service, Environmental Health Department and the Water Board.

The fire caused thick black smoke to blanket houses within four kilometres of the crash and caused anxiety among the public. Police put out warnings for four hours over national and local radio telling people to stay indoors and to close their windows. The A19 was closed for eight hours. When the toluene fell below the level of the manlids the fire was extinguished and the remaining toluene removed from the tanker. The incident was concluded at 20.43.

(c) Summit Tunnel Fire, 20th December 1984

A freight train consisting of a diesel locomotive and thirteen wagons was conveying 835 tonnes of petrol from Teeside to Manchester. Shortly after entering the Summit Tunnel it became derailed between the third and forth wagons. Some of the tanks were damaged, petrol leaked out and was almost immediately ignited. The train's crew rapidly evacuated the tunnel and raised the alarm from a signal post telephone. The first fire appliances arrived at 06.16 hours. Under the supervision of the Fire Brigade the train's crew re-entered the tunnel and withdrew the three leading wagons using the locomotive.

Although there was some initial confusion concerning the tankers’ contents the Fire Brigade appeared to have brought the situation under control when there was a sudden emission of fire (09.40 hrs) probably caused by the opening of pressure relief valves on Tanker 6. The fire developed rapidly and the tunnel was evacuated. Fire shot up two ventilation shafts 100 feet into the air. A "Major Incident" was declared and residents evacuated from the area. It was not until 24 hours later that the Fire Brigade personnel were able to re-enter the tunnel. The situation was not considered under control until the evening of the 24th December.

(d) Portswood Road Tanker Spillage, Southampton, 15th January 1987

A road tanker arrived at a factory near Southampton to deliver a consignment of pharmaceutical wastes for incineration. The waste included isopropyl alcohol, methanol and acetone. A fault was noticed during unloading and the tanker (still containing a large amount of waste) was driven to Portswood for repairs. During the repairs the lower discharge valve failed and there was a gross discharge of waste.
1,700 gallons flooded onto the ground and a substantial amount ran out of the premises onto a public highway and from there onto nearby commercial property.

The presence of mercaptans and other sulphur compounds in the waste rapidly resulted in the formation over a considerable area of an extremely strong smelling, unpleasant vapour cloud. When the Police saw the HAZCHEM label on the tanker they decided to evacuate the nearby residential and industrial population and set a one-mile exclusion zone around the tanker. The evacuation was continued by Hampshire Fire Brigade who had Breathing Apparatus and could walk around the whole affected area.

A Major Civil Emergency was declared and emergency reception centres were set up in two schools. All rail movements between Southampton and London were stopped because of the danger of the electrified line igniting the gas cloud. The gas dispersed and about five hours after the initial spill the hazardous area had been reduced to the immediate vicinity of the incident. The road by the tanker remained closed overnight while spilled waste was recovered by absorption into large quantities of sand. The road and the cars parked nearby were thoroughly washed down.

(e) Epichlorohydrin Incident, Cleveland, 5th January 1984

A tanker containing epichlorohydrin (a material capable of runaway, exothermic polymerisation) arrived at a site venting hot material. Almost 1500 people were evacuated from the surrounding neighbourhood while the fire brigade attempted to cool the tanker with water sprays. This proved difficult due to the thermal insulation on the tanker.
3.2 DATA COLLECTION FORM

Our intention in designing this form was to provide a means of coherently and succinctly displaying the information about an incident. The form has also provided us with a useful prompt in the collection of information.

The information displayed seeks to show the range of organisations involved, the main activities of each and the sources of information available and those which were used. Information to the public, pre-emergency planning and post-incident reviews are all important components of an emergency response strategy, these are also covered. We have tried to separate that information that can be displayed simply by numbers or by ticking a box from that which benefits from textual presentation. In this way, the form is a hybrid and some of the information may be duplicated.

The form was discussed with the steering group and revised following their suggestions. A blank form can be found at Appendix IV.

The completed forms for the incidents we have selected can be found as annexes to this report.

3.3 SUMMARY OF THE LESSONS LEARNT

We feel it is useful to draw out the lessons learnt from each of the selected incidents and summarise them here, in the main body of the report. Our conversations with emergency responders, company and government officials have also yielded some more general views on the lessons that have been learnt in the UK and where change or action may be necessary in the future; these are also included here.

3.3.1 Overall UK Strategy

In the Introduction (1.3), we summarised the basic tenants of the UK approach to planning for chemical, or any other civil emergency. That is a flexible, all hazards approach where the planning is carried out at a local level with thorough consultation and involvement of all the agencies involved, at that local level. It is appropriate that we report here that we find that, in general, that approach has proved very effective. It is not clear why it works so well, and those involved in this work have differing views on the reasons it has proved successful. We have had suggested to us that the 'local' approach to planning builds close professional relationships between the individuals who may subsequently be involved in tackling an incident. The officers in the emergency services and their contacts in industry, voluntary organisations etc., all know one another and share a mutual trust and respect.

The flexibility and all hazards characteristics allow the actual response during an incident to be quickly and effectively tailored to cope. This encourages imaginative solutions within the overall framework of the plan rather that a strict adherence to a
set response which may not be quite appropriate. The pre-planning only lays down 'ground rules' in those areas such as communications where consistency and lack of ambiguity are essential.

3.3.2 Emergency Pre-planning

All the incidents showed the value of thorough pre-planning. In those areas where chemical incidents have occurred before and/or where there is a concentration of chemical industry, the emergency services seemed better prepared. They had already gone through a learning process and had planned how to cope with a range of contingencies in the future. In some areas, the need to prepare emergencies plans under the CIMA regulations or because of the proximity of a nuclear facility seem to have stimulated the writing of 'all hazards' plans for all civil emergencies. All 'experienced' planners, however, stressed that a written plan was likely to be of little practical use unless the participants practised regularly and often. A combination of table top and 'real-life' simulations involving all agencies seemed desirable. All stressed the need for post exercise and post incident reviews that 'fed-back' into the plan making process to prevent a recurrence of problems in the future. There was however a concern that this was essentially a local exercise and that these lessons learnt were not widely promulgated by any recognised, reliable means to those in other areas of the country.

3.3.3 Communications Between the Emergency Services

This has emerged as the most critical factor that determine the success or not of an emergency response. In the UK many different agencies and organisations are involved at the scene of an incident, with, no one service having total control, good communications between the emergency and rescue services is essential to prevent confusion and conflict. Each service will have its own role and its own (perceived) priorities. Sometimes these aims will conflict or the services will need to act in a concerted manner for the overall action to be effective and to prevent danger to their own personnel. Good, reliable communications are essential and many of the systems of communication now employed have come about because of earlier problems during incidents or exercises.

At a senior level, officers of the primary agencies at the incident site, the Police, Fire Brigade and Ambulance Service, need to be able to speak to one another throughout the emergency. There is also a need to be able to contact other experts and sources of information, from the incident ground via the public telephone system. The specific lessons learnt have been:
a all emergency agencies should be able to use the same radio channel (UHF) for communications between themselves during the incident, but that a single channel for all communications is likely to become swamped;

b the accuracy and speed of the initial reports by the first attending emergency team (whatever agency) or company are critical in determining the initial scale of the response by the services. If those initial reports underestimate the scale of the incident, it takes some time to subsequently scale up the response;

c on the incident ground, it is essential for the officers in control of each service and the overall incident controller to be agreed beforehand (during the pre-planning stage) and to be clearly identifiable;

d 'cell-net' portable phones are an essential to allow the emergency services, at the incident, to contact external agencies for advice and information. A mechanism now exists (ACCALC) whereby, at the request of the emergency services, other users can be removed from the cell-net system leaving it clear for emergency communications;

e reliance should not at all be placed on the public telephone system for communications between the emergency services. Calls from members of the public, alarmed by an incident can quickly overload a switch board or telephone system;

f there is concern over the safety of radio communication equipment at the scene of an incident where there is a risk of igniting a flammable vapour cloud. During some incidents, communications have been stopped because of the perceived risk and some fire brigades now have intrinsically safe radio equipment. Further advice or research seems necessary;

3.3.4 Information to the Public and Media

Communications with the public and control of the media are becoming as critical to the success of an emergency operation as communications between the emergency services. The public have a right to be kept informed and, more importantly appropriate information before and during an incident can be very effective in preventing unnecessary injury and trauma.

The duty under the CIMAH regulations to provide information to members of the public before an incident occurs, has acted as a stimulus to other sites not subject to the regulations to adopt the 'spirit' of the regulations. In some cases a similar
approach has been applied to other potential chemical hazards such as transportation of hazardous materials and drums washed up on beaches. Several companies are now reviewing the effectiveness of the 'pre-information' they provide and the best mode of communication. ICI in Cleveland now supply a safety calendar once a year to all local residents.

Most agencies now recognise the difficulty of providing information to the public during an emergency. Sending policeman or company loud-speaker vans out into the streets is a slow and not very effective means of communication. Different forms of public warning systems are currently under review. The primary means of communication with the public during an incident seems to be the local radio station. Those companies and agencies with some experience of this stress the need for access to be prearranged with the radio companies, for statements to be prepared in advance and ready at the stations and for the statements to be read-out often. All this needs to be considered and agreed at the planning stage to be effective when needed.

The Press can be considered a major problem during an emergency. Unless they are 'managed' they can impede the emergency services, place themselves at risk and can unnecessarily alarm the public by their reports. There seems to be a growing acceptance that effective information management are important aspects of emergency planning and that this needs to be resolved at the planning stage.

The specific lessons that have been learnt on information and media management are:

a that companies and the emergency services need to plan in advance how they will inform members of the public and how they will control the media;

b there must be pre-arranged access to local radio stations to broadcast messages;

c the statements must be prepared, as much as possible, in advance;

d any press statements made are preferable 'joint' statements from all those involved to prevent the Press 'picking off' one service or the company concerned;

e industry needs to recognise that information management is a form of damage control and that an industry spokesman should be briefed and made available for the Press to interview;

f that the establishment of a Press Centre facilitates control of the press;
g that at the scene of the incident the Press need to be controlled but that exclusion of all can lead to unnecessarily alarmist reporting. Where a large number of Press ask for access to a site, it is reasonable for the Press to provide a representative team that can share information;

h communication with the local community should not stop once the acute phase of the incident has passed. Time spent in meeting the public and their representatives through a local 'liaison' committee after the incident, to inform and reassure, can help to allay the inevitable public concern and is an investment for the future.
3.3.5 Evacuation of the Public or Shielding

The actions necessary to protect the public during an emergency continue to be contentious. In many parts of the UK it is now accepted that whatever the hazard, often the safest option is to allow and encourage members of the public to seek shelter in their own home. They are advised to further protect themselves by shutting windows and doors in order to minimise the ingress of smoke or fumes. They are also told to tune into a local radio station which will keep them informed about the progress of the incident, what to do and what not to do. When it is appropriate to do so, they are then told to come out of doors and to ventilate their home to clear any fumes that may have built up. Those who advocate the sheltering policy point to the problems of evacuation:

i that evacuation involves moving large numbers of people into the open air where they are most vulnerable;

ii quite often, the toxic gas cloud or hazard has passed the public who may be affected before an evacuation can be started;

iii communicating with the public and getting them to evacuate is a slow process involving door to door visits by the police. The evacuation in Cleveland in 1984 of 1700 members of the public took 6 hours;

iv transporting the evacuees to a safe place is a major problem. It places a large amount of traffic on the roads which need to be kept clear for the emergency services and requires the requisition of public transport. Busses have to be contacted, have to eject their normal passengers and return, through road blocks and the inevitable traffic congestion;

v the process of evacuation itself is not without risks. People can injure themselves and are worried and frightened. This can lead to trauma and post-incident medical conditions. At Poole several members of the public required hospital treatment as a consequence of the evacuation. They were the only members of the public injured;

vi people are reluctant to leave their homes and pets. When they reach the evacuation centre they and their pets need to be cared for, in some cases by medical staff, for example, to dispense medicines left behind;

vii evacuated areas have to be patrolled by the police to prevent looting, diverting valuable manpower.
Evacuation is recognised by some companies and emergency services as an appropriate policy under specific, defined circumstances: when the start of the potentially hazardous event can be accurately predicted and that allows sufficient time for an evacuation. Examples include an anticipated change in the direction of the wind and where a fire is burning towards a tank containing hazardous material at a constant rate.

Where evacuation has been attempted in the past, the above drawbacks have usually led the bodies concerned to change their plans to a policy of sheltering. Where evacuations are still carried out, they are initiated on the basis of the best information that is available at the time and are justified on precautionary grounds. In some cases access to specialist and authoritative advice in the early stages of the incident may have reversed this decision.

Recent evacuations appear to have occurred to protect members of the public from the effect of inhaling smoke and products of combustion from a fire involving chemicals. The presence of 'Cyanide', normally potassium cyanide, is often cited as a reason. Chemical fires generate dense clouds of black smoke that billow out and hang in a pall over the surrounding areas. The smoke is perceived as a hazard to people indoors and often it appears that the decision to evacuate members of the public is taken without specialist advice. There seems to be a need for research into the potential harm from such smoke to members of the public who are in their homes so that informed decisions can be made in the future.

There is a growing concern that the threat of litigation (as in USA) may complicate these decisions. The emergency services may find themselves liable if they did not attempt evacuation, while the company who owns the factory or transport vehicle may be liable to compensate those suffering disruption and trauma caused by any evacuation initiated by the emergency services.

3.3.6 Information for the Emergency Services

All emergency services stress the need for full accurate information to be made available at the scene of the incident before decisions can be made on how to tackle the incident and protect members of the public and their own personnel. Immediate information about the name and properties of the substance involved can normally be obtained from a representative of the company on a site or from the driver, 'Tremcard' or 'HAZCHEM' label at the scene of a transport incident. Further information is normally available from computer databases at fire-brigade headquarters or more remotely from The National Chemicals Emergency Centre at Harwell and other companies under the Chemical Industries Association mutual aid schemes. The presence of chemical experts at the scene of an incident is viewed as essential by many in the emergency services and the larger chemical companies have response teams available to travel to the scene of an incident.
Of particular mention is the recently instituted 'Chemnet' scheme by the Meteorological Office. A 'phone call to one of their regional centres will yield information on the current weather conditions at the incident and possible changes such as a shift in the wind or rain in the near future. The Met Office will also provide information on the likely dispersion of a plume of gas or vapour under the present weather conditions. Those who have used the scheme welcome this additional advice but warn that although predictions of changes in the weather can be very accurate, local wind direction is difficult to predict, especially for coastal sites and where there is an influence from large buildings.

Within the emergency services and chemical industry there is concern that the steps being taken towards the standardisation of transport, labelling and packaging regulations throughout Europe will lead to the demise of the UK HAZCHEM labelling system and its replacement with the 'Kemmler' system used in continental Europe. They regard the extent of the information given by HAZCHEM to be superior to that on Kemmler panels, in that it includes a hazard classification symbol, an action code and a contact telephone number for further advice. Adoption of Kemmler in the UK would, in their view, make it more difficult to respond effectively to a road tanker incident and would therefore be a backwards step.

The United Kingdom Fire Services are so concerned over this matter that a concerted campaign has been launched to lobby British MP's and British Transport Ministers in an attempt to heighten their awareness of the possible problems the Fire Services believe they could face. We understand that a delegation of Senior fire Officers have also met British MEP's and the President of the European Parliament to further emphasise the dangers that could occur throughout the Community. Details of the two schemes and the Fire Services suggested composite scheme are given in Appendix 1.1

Some of the specific lessons learnt in this respect are:

a. that companies with several sites should establish a single contact point to give advice on transportation incidents to prevent confusion when the emergency services, the public or their driver contact more than one site;

b. there is some pressure for industry to inform the emergency services where and how often loads of hazardous materials pass through their areas. At present this only occurs for explosives. This would also include overnight parking in lorry parks or rail marshalling yards. However there is no consensus on this;

c. the products of combustion or decomposition (for example, from fertilisers) are not classified as such in some of the databases used. When faced with such a hazard, the emergency services have to know the chemical constituents of the fumes inorder to look them up;
d the hazard presented from smoke from a chemical fire is not understood by the emergency services and they have difficulty finding consistent expert advice on which to base their decisions on how to protect their own men and members of the public;

e where a company response team attempts to attend a transport incident, it is important that they and their vehicle can be easily recognised so that they can pass through road blocks and so that the police can escort them through any traffic congestion;

f some companies are now considering having a plane or helicopter available to get their specialist response team to the incident quicker;

g the availability of portable 'cell-net' telephones allow the emergency services tackling the incident to contact external 'experts' easily;

h there is some pressure for government agencies to set 'emergency exposure limits' to allow the emergency services to base any decisions on the concentration of a hazardous substance in the air;

i there is complementary pressure to provide more monitoring, air sampling and dispersion prediction facilities to the emergency services to allow them to assess the degree of danger to their own men and the public.

3.3.7 Practical Problems

Every time an incident takes place which involves the emergency services and other agencies, practical lessons are learnt. Experience has shown that often, an emergency response can falter because of a minor problem that had not been anticipated at the planning stage. Post-incident and post-exercise reviews generate many such points that are then built into emergency plans to prevent their recurrence. This process is effective at local level, but outside the county, company or district involved, there is no formal way of communication these lessons learnt to all in the UK with an interest. As a consequence, in those areas without much experience of chemical emergencies, problems occur that could have been anticipated on the basis of experience elsewhere. Some of the practical lessons learnt in connection with the incidents studied in this report are:
a in some cases it may be better for the fire brigade not to automatically put out a fire. In some cases the fire can prevent a build up of flammable vapours that could spread and then ignite causing a flash-fire or explosion. In other cases, the fire can vaporise or destroy a hazardous material, carrying the smoke and products up in the thermal uplift, away from nearby populations. Burning of a spill of material can also prevent it entering the drainage system where it may cause environmental damage or explosions and fires remote from the incident;

b when tackling a spill of hazardous material, the fire brigade has to consider the effect on the environment of its actions. If the material is washed down the drains to disperse it this can cause severe environmental damage. There is a dichotomy about flammable spills, should they be contained with a risk of explosion or dispersed in to the drainage system;

c that problems of fire-water run-off also need to be considered when the fire brigade tackles a fire. Too much fire water can wash harmful substances into nearby water courses creating a much greater environmental major accident than allowing the original fire to burn out;

d when tackling fire on the public highway, fire brigades often find that there is no easily available water supply. Their tenders only contain limited supplies and often the brigades have to run long lengths of hose to a nearby stream. pond or other supply;

e where a fire brigade may be called upon to internally cool a vessel, for example to suppress a run away exothermic reaction, a range of standard fittings make the successful connection of a fire hose more likely;

f companies find that often, the detector vans they send out to sample a released hazardous gas arrive too late. In the case of products of combustion, it is difficult to devise specific and reliable tests;

g in coastal areas, the wind can change direction very rapidly placing control centres and emergency personnel at risk;

h early response from British Gas engineers to isolate the gas supply to a burning factory can prevent escalation, a prolonged fire and reduce the risk of an explosion;
during a major incident, it is important that the emergency services maintain a log of their own men involved. Otherwise, there is a problem of accounting for responders;

if fireman have to wear Breathing Apparatus (BA), this can only be for 30 minutes before resting. At least 3 men are needed to support one in BA. There is some advice that Fire Brigades should institute blood-sugar monitoring for those men who have worn BA;

if a specific antidote exists for a hazardous substance, it has been suggested that supplies of it should be kept available at the chemical site or in the vehicle that transports the hazardous substance. At least, the hospital in the vicinity of the factory should be informed so that they can keep a sufficient stock of the antidote.

3.3.8 Post-incident Actions

The incident does not end once the fire has been put out or the leak stopped. Most companies and emergency forces recognise that there are still many more essential actions to prevent further hazards at the incident ground and to learn lessons for the future. At the scene of the incident, all contaminated plant and equipment needs to be adequately decontaminated. Care needs to be taken to prevent hazardous materials from the decontamination being washed into drainage systems or into water courses.

There is increasing awareness that the health of emergency responders can be monitored after an incident to pick-up any delayed effects of exposure to chemicals or smoke. Where the incident has involved loss of life, there is a growing interest in treatment for 'post-incident trauma' for emergency responders to prevent longer term psychological and emotion problems. This may also be necessary for members of the public who were alarmed by the incident or affected by any evacuation.

Most now recognise the benefits of early and thorough debriefing of all those involved in the incident so that the problems encountered can be discussed and documented. These reviews take place within each of the involved organisations and emergency services. It is important that a full review is held which is attended by all so that experiences can be shared and problems of coordination and communication are aired. All the lessons learnt should go forward to allow their incorporation in the written plans to prevent a recurrence in the event of a future incident.

Many companies recognise the need to involve members of the public and their representatives in the post-incident review process.
They need to be informed the cause of the incident and the steps being taken to prevent it happening again. They will also be interested in the lessons learnt from the emergency operation and how these are being acted upon. This process should seek to reassure the public and can act as an investment towards their confidence in the company, that in the future it will conduct its undertakings in a safe manner with minimal risk to the public. They should also be reassured that the emergency services have learnt from the incident and have taken steps to ensure that their own actions to protect the public will be more effective in the future.
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Epichlorohydrin Incident


Part 4

CONCLUSIONS
CONCLUSIONS

In a study of this nature it is sometimes difficult to see broad conclusions emerging. The lessons that have been learnt from the incidents we have studied lead to many specific and practical suggestions that could be adopted by emergency services and companies throughout the UK. These are drawn together in Part 3. However, while carrying out this study, Technica has become aware of two broader issues raised by many of the people we spoke to. These require action at a national or even European level.

Better Decision Support Systems

It has become clear that when dealing with a major chemical incident, the emergency services have to make very difficult decisions on the extent on the possible hazard and the degree of risk in order to take the most appropriate action to safeguard members of the public, their men and property.

While there are many sources of information available to the emergency services, most of these only provide information which allow a decision to be made on whether a situation is potentially hazardous or not. For example, information is available that a particular material has harmful properties but not what is the extent of the hazard or the likelihood of harm under the conditions being experienced at the incident.

The remedies the emergency services adopt and their effectiveness very much depends on the decisions made by the senior officers at the incident. Most decisions in this area are compromises where factors such as safety, cost, environmental damage and disruption have to be taken into account. Each incident is different and no overall prescriptions are possible. What appears to be needed is a flexible decision support system that brings expertise to the incident ground. The emergency services cannot be expected to have this degree of specialist knowledge for such rare events.

In the case of incidents at fixed installations, in some cases the company can provide the necessary expertise; for example they can predict how far a cloud of gas will drift and what will be the concentration. Some companies can also provide that information for transportation incidents, but with some inevitable delay.

With the recent advances in computer systems and mobile methods of telecommunication, some form of computerised decision support system, an Expert System, seems feasible. This could be available on a 'lap-top' or portable microcomputer in the emergency services vehicle or at the headquarters or control centre.
It would enable the emergency services to develop the best strategy to control for a particular incident, taking into account site conditions and their variation with time. The system could include:

- a hazardous properties database;
- a means of assessing unknown materials;
- simple models for assessing the dispersion of plume, gases and smoke;
- simple means of deciding the appropriate local weather conditions and the effects they will have;
- a means of calculating response times, critical paths and durations;
- a means of making decisions on the best ways to tackle a particular spill of fire and the best protection strategy for the public; etc.

Dissemination of the Lessons Learnt

We have found in this study that there is a growing acceptance of the need for post incident and exercise reviews to draw conclusions about what went wrong and how plans and arrangements can be changed for the future. This should take place not only within each of the organisations involved, but at a meeting attended by all of them. However, this learning process is essentially a local process and there appears to be no recognised, national agency responsible for wider dissemination. As a consequence, we have found that errors are repeated in different parts of the country and a very wide range exists in the extent of preparedness between the emergency services and local agencies in different parts of the UK. While conferences and symposia allow some interchange of information, this is not structured and will be unreliable.

It would seem that there needs to be a mechanism to collect information about incidents and the lessons learnt from all parts of the UK, to pool it and then disseminate general conclusions out again. In that way, the experience and knowledge of areas such as Cleveland could be shared with the rest of the UK. It would seem natural to extend such a system across Europe.
APPENDIX
APPENDIX I: CODES, ABBREVIATIONS AND ACRONYMS

I.1 United Kingdom Hazard Information System

EMERGENCY ACTION CODE

2 YE

E.A.C. assigned by the Joint Committee on Fire Brigade Operations and agreed with the Health and Safety Executive.

Figure 1

By reference to a pocket sized card published by H.M.S.O and issued to all fire service personnel the code is interpreted to give:

1. What extinguishing media should be used.
2. What level of protection should be worn by the fire service.
3. If the substance can be diluted with water or should be contained by bunding.
4. If the substance can be violently or even explosively reactive.
5. Consider evacuation of area.

SUBSTANCE IDENTIFICATION NUMBER

1193

S.I.N. allocated by the United Nations and contained in the "Authorised and Approved List" issued by the Health and Safety Executive under the "Dangerous Substances (Conveyance by Road in Tankers and Tank Contained) Regulations, 1981". Every dangerous substance is allocated a substance identification number.

Figure 2
SPECIALIST ADVICE TELEPHONE NUMBER

Where specialist advice can be obtained at all times when the substance is being conveyed by road.

Figure 3

COMPANY LOGO

The name of the manufacturer or owner of the substance, his house symbol, or both.

Figure 4

HAZARD WARNING DIAMOND

The hazard warning diamond allocated to the substance under the "Classification and Labelling of Dangerous Substances Regulations", 1984 and The Dangerous Substances (Conveyance by Road in Road Tanker and Tank Container) Regulations 1981.

Figure 5
EUROPEAN MARKING SYSTEM (ADR)

KEMLER CODE

3 3

Figure 6

The first figure indicates the primary hazard i.e. flammable, toxic, corrosive etc. The second figure indicates the secondary hazard. If the first number is preceded by the letter 'x' no water should be used. The hazards are 2 GAS 3 FLAMMABLE LIQUID 4 FLAMMABLE SOLID 5 OXIDISING SUBSTANCE OR ORGANIC PEROXIDES 6 TOXIC 8 CORROSIVE. If the first and second figures are the same the hazard is intensified. If 9 is the third figure there is a risk of a violent reaction.

UNITED NATIONS NUMBER

1 1 9 3

Figure 7

Has the same meaning as Substance Identification Number in the U.K. and is allocated by the European Agreement concerning the international carriage of dangerous goods by road (ADR).
HAZARD DIAMOND

Figure 8

Has the same meaning as in the UK and allocated by the European Agreement concerning the International carriage of dangerous goods by road (ADR).
COMBINATION LABEL

This combination label incorporates both the United Kingdom Hazard Information System and the European marking system in full.

The placard is the same size as the current UKHIS label and the ADR information is the same dimension as currently used in Europe.

Therefore, satisfying both European and U.K. legislation in full.

Figure 9
I.2 Abbreviations and Acronyms in Use in This Study

ACDS  Advisory Committee on Dangerous Substances
ACTS  Advisory Committee on Toxic Substances
BA  Breathing Apparatus
BNFL  British Nuclear Fuel Limited
BR  British Rail
CANUTEC  Canadian National Dangerous Goods Information System
CB  Citizen's Band Radio
CEPO  County Emergency Planning Officer
CHEMDATA  Database of the properties of hazardous materials as used by Fire Brigades
CHEMET  Chemical Meteorological Advice Service
CHEMSAFE  See p18 and Ref 41
CIA  Chemical Industries Association
CIRUS  Computerised Hazardous Substance Database run by London Fire and Civil Defence Authority. (cf CHEMDATA)
CIMAH  Control of Industrial Major Hazards (Regs)
COSHH  Control of Substances Hazardous to Health (Regs)
CPL  Conveyance, Packaging and Labelling (Regs)
DSHAR  Dangerous Substances in Harbour Areas (Regs)
EHO  Environmental Health Officer
FOTC  Fire Officer's Training College
HAMS  Amateur Radio Operators
HAZCHEM  Hazardous Chemical Emergency Action Code see p18
HMIP  Her Majesty's Industrial Pollution Inspectorate
HSC  Health and Safety Commission
HSE  Health and Safety Executive
HSW  Health and Safety at Work etc Act 1974
IMDG  International Maritime Dangerous Goods Code
IMO  International Maritime Organisation
LAU  Local Authority Unit (Part of HSE)
LFCDCA  London Fire and Civil Defence Authority
LITTS  Large Inventory Top Tier Sites (under CIMAH)
MACC  Military Aid to the Civilian Community
MACM  Military Aid to Civil Ministries
MAFF  Ministry of Agriculture, Fisheries and Food
MICC  Major Incident Control Committee (Grangemouth)
NADOR  Notification of Accidents and Dangerous Occurrences Regs
NII  Nuclear Installations Inspectorate
NIHHS  Notification of Installations Handling Hazardous Substances (regs)
NPIS  National Poisons Information Service
NRPB  National Radiological Protection Board
NRT  National Response Team (in USA)
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAYNET</td>
<td>Radio Amateur Emergency Network</td>
</tr>
<tr>
<td>RCI</td>
<td>Radiochemical Inspectorate</td>
</tr>
<tr>
<td>REVCOM</td>
<td>Radio Emergency Volunteer Communication</td>
</tr>
<tr>
<td>RIDDOR</td>
<td>Reporting of Injuries, Disease and Dangerous Occurrences Regs</td>
</tr>
<tr>
<td>SIESO</td>
<td>Society of Industrial Emergency Service Officers</td>
</tr>
<tr>
<td>SITTS</td>
<td>Small Inventory Top Tier Sites (under CIMAH)</td>
</tr>
<tr>
<td>TOPS</td>
<td>Total Operation Processing System (British Rail)</td>
</tr>
<tr>
<td>TREMCARDS</td>
<td>Transport Emergency Cards</td>
</tr>
<tr>
<td>UKAEA</td>
<td>United Kingdom Atomic Energy Authority</td>
</tr>
<tr>
<td>UKWMO</td>
<td>United Kingdom Warning and Monitoring Organisation</td>
</tr>
<tr>
<td>WATCH</td>
<td>Working Group on the Assessment of Toxic Chemicals</td>
</tr>
<tr>
<td>WRVS</td>
<td>Women's Royal Voluntary Service</td>
</tr>
</tbody>
</table>
APPENDIX II : CHEMICAL INCIDENT OCCURRENCES IN THE UNITED KINGDOM

II.1 Incidents, Attended by Local Authority Fire Brigades, Involving Hazardous Substances (Ref. 42)

The following data are from the Report of HM Inspectorate of Fire Services

Figures given are for both 1987 and 1986. All call-outs are recorded, most were for minor spillages, or incidents where there was no spillage but a dangerous release was anticipated.

<table>
<thead>
<tr>
<th>Total Incidents</th>
<th>1986</th>
<th>1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static</td>
<td>949</td>
<td>1117</td>
</tr>
<tr>
<td>In Transit</td>
<td>613</td>
<td>523</td>
</tr>
<tr>
<td></td>
<td>1562</td>
<td>1640</td>
</tr>
</tbody>
</table>

Incidents Not Involving Fires

| Static          | 649  | 777  |
| In Transit      | 584  | 496  |

Incidents Involving Fires

| Static          | 300  | 340  |
| In Transit      | 29   | 27   |

Material Involved

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPG</td>
<td>67</td>
<td>116</td>
</tr>
<tr>
<td>Strong Acids</td>
<td>227</td>
<td>209</td>
</tr>
<tr>
<td>Strong Alkalis (including ammonia)</td>
<td>106</td>
<td>86</td>
</tr>
<tr>
<td>Petroleum Spirit</td>
<td>42</td>
<td>31</td>
</tr>
<tr>
<td>Other Organic Liquids</td>
<td>97</td>
<td>163</td>
</tr>
<tr>
<td>Chlorine and Hypochlorite</td>
<td>34</td>
<td>58</td>
</tr>
</tbody>
</table>
II.2 Fatalities and Injuries in the Chemical Industry

The 1987/88 Annual Report of the HSC/HSE contains casualty statistics for the Chemical Industry (class 25). The following reports were made for that year under RIDDOR:

- Fatal Injuries to employees: 4
- Non-fatal Major Injuries: 538
- "Over 3-day" Injuries: 3527
- Rate per 100,000 employed for all above injuries: 1213
- Fatal injuries to non-employed people: NIL
- Non-fatal Major injuries to non-employed: 48

Note that the great majority of these injuries will be from effects independent of the use of chemicals.

The "Manufacturing and Service Industries" Report 1984 from the HSE contains the following accounts of fires and explosions involving chemicals:

- 9 cases involving some off-site damage
- 2 cases involving off-site effects from unloading road tankers
- 2 cases involving off-site effects from road tankers
APPENDIX III: CONCLUSIONS OF THE HOME OFFICE REVIEW OF PEACETIME EMERGENCIES

15. Taking account of all the views expressed at the seminar, the ideas put forward in the course of the review, and the experience of recent incidents, The Home Secretary has reached the following conclusions.

16. The basis of the response to particular disasters should remain at the local level: it is here that expertise and knowledge exists, that the best information is available and it is at this level that co-ordination between the various agencies or individuals involved can provide the most effective response. There had been no support from the practitioners for a "national disaster squad": it was felt that a dedicated unit of this type would not assist in making the existing response more effective and could in fact cause problems in co-ordination and control. Such a squad would of necessity be inactive for most of the time and in many instances not be able to arrive on scene until the immediate response was well underway. As the UK has emergency services with considerable resources dispersed throughout the country, able to call on colleagues for general or specialist assistance, there is no operational need for an additional body.

17. Although some local authority representatives had argued for a statutory duty to plan for peacetime emergencies, the Home Secretary is not convinced of the need for it at present. Local authorities are able to plan for peacetime emergencies using their own resources under s.138 of the Local Government Act 1972 (and the equivalent legislation for Scotland and Northern Ireland) and there was no evidence to suggest that local authorities were not generally already undertaking a planning function (in former metropolitan countries it is the boroughs/districts which have the necessary s.138 powers, and can either plan individually or arrange for the joint Fire and Civil Defence Authority to carry out such planning collectively as their agent). While this position will be kept under review it is clear that much can be done without legislation and this should be pursued as far as possible as the immediate priority.

18. A clear need has been identified for new arrangements to give national oversight to the development of co-ordinated emergency planning, and to address specific practical issues raised by recent disasters. Additionally more needs to be done to encourage and develop co-ordination between the various services at the local level.

19. Co-ordination of the central Government response can most effectively be carried out by the lead department, supported where necessary by arrangements for collective discussion organised under Cabinet Office auspices in the normal way. But the linkages between this machinery, the various inspectorates and the operational emergency services are not well understood and need to be more clearly explained.
20. To meet these needs the Home Secretary has decided to appoint a Civil Emergencies Advisor, to work closely with senior representatives of all the groups which have operational or administrative responsibilities in this field. In addition there will be an enhanced role for the Civil Defence College (to be renamed the Emergency Planning College).

CIVIL EMERGENCIES ADVISOR

21. The Civil Emergencies Adviser will be charged with the oversight of the whole area and will be reporting directly to the Home Secretary. He will draw together the wide range of administrative, operational and inspectorate interests involved with major disasters, and encourage and promote co-ordinated planning both locally and centrally. He will be likely to travel widely to assess the state of civil emergency planning on the ground and to recommend changes where this will lead to increased effectiveness of the response as a whole. He will not have operational responsibilities in the event of a major emergency, but would be closely involved in scrutinising the lessons to be learnt and ensuring they are disseminated and applied.

22. He will work closely with senior representatives of the emergency services, local authorities, voluntary bodies, safety inspectorates, Government Departments and others directly concerned, and will be assisted by a Secretariat within the Home Office working in association with the Cabinet Office. His task will be:

To consider matters of current concern in the field of civil emergency planning in peacetime, with a view to helping those with operational responsibilities achieve the highest standards of co-ordination and compatibility between their contingency arrangements.

23. The Advisor will not be empowered to override existing statutory or other formal responsibilities, but will explore relevant issues with all those concerned, to establish the most effective way of resolving problems. His particular concerns will be with:

1. the development and dissemination of good practice and information, in particular about local co-ordination;

2. ensuring that the lessons of recent and past experience are learnt and applied;

3. assistance with exercises and training;

4. liaison with all inspectorates concerned with public safety;

5. liaison across central Government Departments, local government, the emergency services, the voluntary bodies and others with a direct interest;
6. development of technical arrangements in conjunction with users and suppliers.

24. A number of specific issues have been identified in the course of the review to which he will be asked to give priority. These include the handling of casualty enquiries, psychological damage to survivors and relatives, assistance for foreign disasters, and training and exercises. In a number of cases work on particular issues is already taking place and this will continue.

The Advisor may wish to consult the bodies concerned and draw on the results of their work to ensure that the maximum benefit can be drawn from current studies. In other cases he may wish to convene groups of experts to assist him in the examination of detailed questions.

Emergency Planning College

25. To support the Advisor's work the Civil Defence College at Easingwold will be given a wider remit and will be expected to address questions of peacetime emergency planning, irrespective of any wartime connections. This will be reflected in a change of name to "Emergency Planning College". The College will particularly focus on inter-disciplinary needs and will work in conjunction with the Police Staff College at Bramshill and the Fire Service College at Moreton-in-Marsh. It will act as a centre for studies, exercises and seminars, and as a focus for the development of an understanding of the wide issues involved. Further seminars, such as the one held in the course of the review, will be arranged to provide senior personnel with an opportunity to focus on the major issues collectively. In some respects the College will act as a study facility for issues identified by the Civil Emergencies Advisor. The necessary skills and expertise to develop this additional role for the College will have to be developed over a period of time.

OVERALL STRUCTURE

26. Under the proposed new arrangements this country's response to major emergencies will continue to have two main elements, each with distinct responsibilities. These are:

The emergency services, local authorities and others with operational responsibilities at local level.

The "lead" Government department, supported through Cabinet Office machinery where necessary.

Both will be assisted and supported by the Civil Emergencies Advisor.
27. The emergency services and others at the scene of a disaster are responsible for dealing with the immediate effects, deciding on the need for additional resources and asking for them, and keeping relevant Government departments and the public in the surrounding area informed about progress in dealing with the effects of the emergency and any measures necessary for public safety.

28. The "lead" Government department is, whenever possible, identified in advance and is responsible for co-ordinating both the necessary central contingency planning and the implementation of the plan should a disaster occur. The "lead" department is also responsible for keeping Parliament, other departments and the general public fully informed on measures for dealing with the effects of the disaster. Any problems which cannot be resolved under "lead" department auspices are referred to the Cabinet Office. Should a disaster occur for which no "lead" department has been nominated the Prime Minister, as Chairman of the Cabinet, can decide quickly which department should take up this role.

29. The Cabinet Office is responsible for supporting the Cabinet and Cabinet Committees in the conduct of Government business. Arrangements for dealing with civil emergencies are, like any other business, organised within this framework. Specifically the Cabinet Office provides the machinery within which Ministers can collectively discuss and reach decisions on issues that need to be settled, eg the priority for allocation of resources or matters that have not been resolved by the "lead" department.

30. The Civil Emergencies Advisor will review the effectiveness of the co-ordinated local response. He will consider any practical or inter-disciplinary problems raised and arrange further study or research as necessary. He will review the broad lessons to be learnt from incidents at home and overseas and will help in the development and dissemination of guidance on best practice in association with the Departments or services concerned.
**APPENDIX IV:** BLANK DATA COLLECTION FORM FOR INCIDENTS SELECTED FOR STUDY

**DATA COLLECTION FORM FOR THE RESPONSE TO DANGEROUS SUBSTANCE INCIDENTS**

- **Date of Incident:** ________
- **Time of Incident:** ________
- **Location of Incident:** __________________

**Type of Activity**

<table>
<thead>
<tr>
<th>Processing Plant</th>
<th>Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Only</th>
<th>Loading/Unloading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Type of Incident**

1. **Explosions**

<table>
<thead>
<tr>
<th>Inherent unstable</th>
<th>VCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Solid/dust</th>
<th>CVE</th>
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</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Rapid Phase Change</th>
<th>Runaway Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>High Pressure Gas</th>
<th>BLEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **Fire**

<table>
<thead>
<tr>
<th>Pool Fire</th>
<th>Flashfire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Jet Fire</th>
<th>Solid Fire</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th></th>
<th>Decomposition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
3. Release

Toxic __ Flammable __

Environmental __ Product of Combustion __

Substances Involved

Names: ____________________________

______________________________

CAS Nos: _______________________

EEC Nos: _________________________

UN Nos: _________________________

Kemler Nos: _____________________

HAZCHEM: _______________________

Masses Involved: ________________ kg/te

Masses Released: ________________ kg/te

Regulations Involved

CIMAH __ CIMAH Reg 7 - 12 __

CPL __ Tanker __

Signs __ NIHHS __
Potential Harm

To Man

Overpressure   Thermal Radiation
Fragments      Missiles
Acute Toxic    Chronic Toxic

To the Environment

Air Pollution  Water Pollution
Soil Pollution

Economic Damage

Building Damage  Traffic Delays
Crop/Livestock Loss  Production Loss

Actual Harm

To Man

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injuries:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evacuation:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**To the Environment**

<table>
<thead>
<tr>
<th>Extent</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None/Slight/Noticeable/Major</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air Pollution</th>
<th></th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Soil Pollution</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Water Pollution</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

**Economic Harm**

<table>
<thead>
<tr>
<th>Extent</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None/Slight/Noticeable/Major</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building Damage</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Crop/Livestock Loss</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Traffic Delays</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Production Loss</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# EMERGENCY ACTION

<table>
<thead>
<tr>
<th></th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Started at:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Ended at:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**On Site (for fixed installations)**

- Did on-site plan exist? [Y/N]  
- Was it activated?  
  - When?  
- On-site Emergency team?  
  - How many people?  
- Dispersion Prediction?  
- Concentration measurement?  
- Was a Mutual Aid Scheme in Operation?  

**Transportation**

- Did a company plan exist?  
- Was it activated?  
  - When?  
- Did a company Team attend?  
  - How many people?  
- Was HAZCHEM used?  
- Dispersion Prediction?  
- Concentration measurement?  
- Was a Mutual Aid Scheme in Operation?
Off-Site Plan

Did it exist? 

Was it activated? 

Off-site Control centre? 

How many people? 

What organisations were represented? 

Dispersion Prediction? 

Concentration measurement?
**Emergency Services Who Were Involved**

**Fire Brigade**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **When informed?**
- **When stood down?**
- **How many appliances?**
- **How many men?**
- **Was CHEMDATA used?**

**Major Actions:**

- **Fire Fighting**
- **Cooling Plant**
- **Rescue**
- **Dispersion**
- **Spillage Retention**
- **Washing down**
- **Foaming**
- **Evacuation**

**Police**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **When informed?**
- **How many officers?**

**Major Actions:**

- **Traffic Direction**
- **Evacuation**
- **Warning public**
- **Rescue**
- **Security**
- **Press Control**
- **Assisting Casualties**
<table>
<thead>
<tr>
<th><strong>Health Service</strong></th>
<th>Date</th>
<th>Time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>When informed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When stood down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of ambulances?</td>
<td></td>
<td></td>
<td>No. of Medical Staff at scene?</td>
</tr>
<tr>
<td>No. of Hospitals involved?</td>
<td></td>
<td></td>
<td>No. of hospital admissions?</td>
</tr>
<tr>
<td>No. of Hospital attendees</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>County Emergency Planner</strong></th>
<th>Date</th>
<th>Time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>When informed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When stood down?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Major Actions**

<table>
<thead>
<tr>
<th>Co-ordination</th>
<th>Communications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Welfare Services</td>
<td>Press Control</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>District Council</strong></th>
<th>Date</th>
<th>Time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>When informed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When stood down?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Major Actions**

<table>
<thead>
<tr>
<th>EHO Services</th>
<th>Building Opening</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>Control Centre</td>
<td></td>
</tr>
<tr>
<td>Social Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voluntary Services Involved</td>
<td></td>
<td>St John's</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>WRVS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INFORMATION TO THE PUBLIC

Pre-incident?  

How were they informed:

Letter/booklet  
Meeting  
Other  

During incident?  

How were they informed:

Alarms  
Loudspeakers  
Radio  
By mouth  

Information given:

What to do  Type  
Evacuate  Location  
Stay indoors  Duration  
All clear  

When were they informed?  Date  Time

---

97
ACTIONS IN THE AFTERMATH OF THE INCIDENT

What actions were taken by the:

Fire Brigade: ____________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________

Police: _________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________

Did a formal review of the emergency take place? _______

By whom? ______________________________________________

What Victim and Community Aftercare was available? ________________
CHRONOLOGICAL ACCOUNT OF EMERGENCY
CONCLUSIONS DRAWN
By Emergency Services and Relevant Authorities
APPENDIX V: ORGANISATIONS AND INDIVIDUALS WHO SUPPLIED INFORMATION FOR THE STUDY

Chief Superintendent Pallet, Hampshire Constabulary

Mr. R. Gainsford, Dorset County Emergency Planning Officer

Mr. T. Bassett, Dorset County Council

Inspector Bishop, Dorset Police

Mr. R.D. Fere, Dorset Ambulance Service

Mr. M. Thomas, Poole Borough Council

Mr. A. Smith, Assistant Chief Constable, Cleveland Constabulary

Mr. G.L. Essery, ICI Safety and Environment Manager

Mr. W. Cooney, Chief Fire Officer, Cleveland Fire Brigade

Chief Superintendent Peter May, Surrey Constabulary

Wing Commander N. Nugent, Surrey County Emergency Planning Officer

Chief Superintendent, South Yorkshire Police

Mr. J.A. Costley, Trent Regional Emergency Planning Officer

Mr. J. Wardrope, Consultant, Northern General Hospital, Sheffield

Mr. A.C. Crosby, Consultant, Sheffield Health Authority

Mr. A. Page, Chief Metropolitan Ambulance Officer, South Yorkshire

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Mr. J.M. Watson, ICI Distribution Services Manager

Mr. M.F. Dennett, Assistant Chief Fire Officer, West Yorkshire Fire Service

Inspector Ingber, British Transport Police, Manchester
Mr. D. Nutting, Principal Emergency Planning Officer, West Yorkshire

Mr. J. Tait, Emergency Planning Officer, West Yorkshire Metropolitan Ambulance Service

Mr. S.J. Turney, Director of Emergency Planning, South Yorkshire

Mr. B.M. Smith, Regional Emergency Planning Officer, Central Region Council

Mr. H.E. Wright, Chief Fire Officer, South Yorkshire County Fire Service
APPENDIX VI: MEMBERS OF THE WORKING GROUP OF INTERESTED AUTHORITIES

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The Community Documentation Centre on Industrial Risk (CDIR) mainly aims at a systematic diffusion of information and knowledge in process industry safety related issues.

Emergency planning is a necessary step in parallel to a loss prevention active policy for mitigating consequences and minimizing casualties of major accidents.

A better insight in the national approaches to emergency planning based on the collection and review of the experience gained in handling emergencies is necessary for achieving a mutual understanding, for promoting a common learning process and for tackling the complex problem of emergency response to major accidents.

For this reason, a series of studies on lessons learnt from emergencies after accidents involving dangerous substances in various Member States has been promoted by the JRC. This volume describes the results of such a study for the United Kingdom performed by Technica Ltd.
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