



THE ROYAL COLLEGE OF PATHOLOGISTS

Deaths in Major Disasters - The Pathologist's Role

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DEATHS IN MAJOR DISASTERS - THE PATHOLOGIST'S ROLE

Second Edition, 2000

INTRODUCTION

This document has been prepared in conjunction with the Forensic Pathology Sub-committee of the Royal College of Pathologists. It details the role of the pathologist:

- (a) in the **preparation of an emergency plan** for dealing with multiple fatalities in a major disaster within the United Kingdom (*this section is printed on blue paper*)
- (b) in the **activation of the plan** when the need arises (*this section is printed on pink paper*).

Definition of a Major Disaster

It is recognised that each major disaster is different from another in scale and variety and, as such, it would be difficult to plan for every possible disaster. However, there are many common underlying basic and fundamental principles which can be followed. Having established these principles, *it is essential that any emergency plan is sufficiently flexible* to meet the individual and specific needs which the particular disaster demands.

Some major disasters will result in injuries to large numbers of people but no fatalities. In this instance the plans drawn up by the Police, Ambulance and Fire Services, and the subsequent Hospital Emergency Plans, will be activated. There will be other disasters in which large numbers of fatalities have occurred. It is for this latter group that this document is designed.

From the pathologist's point of view, therefore, the definition of a Major Disaster is an episode in which the number of fatalities is in excess of that which can be dealt with using the normal mortuary facilities. This will obviously vary in different localities, and intentionally it is a *flexible* definition. Depending on the pathology facilities available locally, and on the actual size of the incident, the level at which a disaster is deemed to be 'major' will vary.

Co-ordination and Co-operation

Emphasis is placed throughout this document on the need for co-operation and co-ordination both in the planning and in the operational phases between the various relevant agencies, in particular, Her Majesty's Coroners/Procurators Fiscal, the Police and other emergency services, including those for which Local Authorities may have a statutory responsibility. Inter-disciplinary and cross-agency communication is essential at all levels and includes the planning, operational and de-briefing phases of any incident. This document should be read in conjunction with the booklet *Dealing with Disaster*, published by the Home Office (see **Further Reading, Appendix II**).

Because of the recent increase in the number and variety of major disasters, it is now generally recognised that the planning of emergency procedures, including training programmes, is a matter of great importance and urgency.

I. THE ROLE OF THE PATHOLOGIST IN MAJOR DISASTERS

The pathologist designated to investigate a particular incident by HM Coroner/Procurator Fiscal in whose jurisdiction the episode has occurred will be required:

1. To assist, liaise with, co-operate with, and supply information to, the other component members of the IDENTIFICATION BUREAU, convened by the POLICE to assist HM Coroner/Procurator Fiscal in establishing the accurate identity of any fatalities.
2. To establish the nature of the injuries and the cause of death in each victim.
3. To collect pathological evidence in order to assist HM Coroner/Procurator Fiscal and the Police in establishing the cause of the particular disaster, and to assist in determining whether it is of criminal, accidental or natural origin, and whether any act of negligence or criminality has caused or contributed to it.
4. To collect pathological material and produce documentary evidence which might be of relevance to an Inquest, to a Fatal Accident Enquiry, to a Public Inquiry, and to Criminal and/or Civil Court proceedings.
5. To collect pathological material and other trace evidence which might be of relevance to the various statutory investigating bodies and other directly interested parties (eg. air carriers, insurers), who will be conducting their own separate and parallel investigations.
6. To complete the pathological investigation with the maximum degree of thoroughness, coupled with the minimum delay, and always maintaining continuity of the chain of evidence. It is a characteristic feature of major disasters for extreme pressure to be imposed upon the Coroner/Procurator Fiscal to release bodies of victims to the bereaved relatives as soon as possible, but this should only be acceded to after all the relevant investigations have been satisfactorily completed.
7. To provide all the documents which will permit movement of bodies, if necessary abroad, and their appropriate disposal according to the wishes of the bereaved.
8. To study and interpret traumatic pathological features relating to the incident which, from a safety aspect, could provide information that might prevent or minimise the occurrence and effects of similar types of incident or injury in the future.
9. To ensure that at all times the rights of the bereaved and their quest for accurate information are respected and complied with, and that, in their contact with the pathological services, they are treated humanely and sensitively.
10. Under the guidance of HM Coroners/Procurators Fiscal to assist the bereaved by answering any questions and requests for information about the pathological findings.

It is important that the Pathologist should plan which specific procedures are appropriate for the particular incident before commencing a major disaster investigation, as they will vary according to its nature. The principal objectives of identification, detailed examination and release for disposal *as soon as possible*, should be pursued.

II. THE SUPERVISING PATHOLOGIST

1. Nomination

Because of the potentially serious and complex medico-legal consequences of major disasters it is essential that the leader of the pathology investigation team is an experienced and specially trained Forensic Pathologist, who is either on the Home Office Register (in England and Wales), or is of equivalent experience and expertise (elsewhere).

For the purpose of this document the leader of the pathology team, with managerial responsibilities, will be designated the SUPERVISING PATHOLOGIST.

HM Coroners/Procurators Fiscal, in consultation with the Police, should appoint a Supervising Pathologist for each jurisdiction. In those counties where the geographical allocation of a particular police force covers the jurisdiction of more than one Coroner, it is essential that a consensus is reached by all Coroners in the area regarding the appointment of a universally acceptable Supervising Pathologist and whose appointment is acceptable to each one of the Coroners in that area. In Scotland the Crown Office has contractual arrangements with the University Departments of Forensic Medicine/Pathology and their arrangements for a Supervising Pathologist would be made through this agreement.

2. Responsibilities

All Police Headquarters should be advised of the identity of the Supervising Pathologist who is to be contacted in their area, and of the nominated deputies. They should also have detailed and *regularly updated* 'call-out' information.

The Supervising Pathologist will be required to be available on 24 hour call-out basis throughout the year. It will be the responsibility of the Supervising Pathologist to arrange appropriate cover for vacations, sickness, etc. and to ensure that all the agencies involved are aware of these arrangements.

Paging devices and/or portable telephones should be available to all Supervising Pathologists, so that immediate communication can be established when their assistance is required.

3. Professional Training

The Royal College of Pathologists, together with the Policy Advisory Board in Forensic Pathology of the Home Office, will collaborate with other agencies (the HM Coroners/Procurators Fiscal, Emergency Services, Local Authorities) in devising and implementing in-service training for Supervising Pathologists and their Deputies. This training should be made available to all Home Office Pathologists (and their equivalents in Scotland and Northern Ireland). This training programme will be supplemented by regular updates based on experience gained from recent episodes.

A more general training programme should also be devised for those NHS pathologists who wish to be considered as members of a Major Disaster Team. This training programme should be broad enough to include active participation by members of the Emergency Services as well as pathologists.

From time to time, Major Incident Exercises are carried out as part of in-service training by the Emergency Services in various parts of the country. In such exercises it is essential that the Supervising Pathologists, their Deputies and all members of the Pathology Teams should be involved. In most areas these will of necessity be mainly 'paper exercises'. However, there is a major

need for testing the contingency plans for dealing with the dead in ‘mock’ exercises whenever this is possible: this should include all the mortuary-based investigations and the documentation that would be used on such occasions. Appropriately weighted ‘bodies’ or human volunteers could be used for this purpose. To save time, and to ensure cost-effectiveness, it would be expedient for a number of Supervising Pathologists from adjacent geographical areas to attend together at such exercises. Following such exercises it would be important to ensure that any obvious modifications that are deemed necessary are made to the relevant plans.

III. PREPARATION OF AN EMERGENCY PLAN

1. **Appointment of Supervising Pathologist**

HM Coroners/Procurators Fiscal may wish to confer with the Police in order to nominate a pathologist of the appropriate expertise and experience to act as the Supervising Pathologist for their area. A Deputy Supervising Pathologist should also be identified. The designation should be made on the basis of geographical area (eg. County Police Force or area of jurisdiction of HM Coroner/Procurator Fiscal). The Supervising Pathologist should thereafter be responsible for covering major disasters in his/her area and should ensure that in his/her absence the trained Deputy is available.

2. **Role of Supervising Pathologist**

The Supervising Pathologist will be responsible for advising the police with regard to planning the mortuary facilities, identifying equipment requirements and personnel related to this, and for the organisation of all matters relating to the dead, in co-ordination with HM Coroners/Procurators Fiscal, Emergency Services, Local Authorities, and any other relevant parties (eg. owners of potential sites for mortuaries, etc.) in relation to potential major incidents.

3. **Area Liaison Planning Team**

Composition of Team

This team, consisting of HM Coroners/Procurators Fiscal, Police, Emergency Services, Local Authorities and Supervising Pathologists, should be convened for each geographical area, in order to prepare those details of the major disaster plan which specifically deal with the dead. As the remit of the Police in Major Disasters covers the majority of aspects, it is suggested that the Police convene the Planning Team. The basic principles, later enumerated in this document, should be followed, but local circumstances will inevitably require substantial variations to be implemented.

Remit of Team

- To identify appropriate sites for a major disaster mortuary
- To plan an operational policy for dealing with the deceased in major incidents
- To implement the policy in the event of a major disaster in their area
- To devise appropriate and regular training/exercises.

Several basic principles need to be considered:

A. Provision of a Major Disaster Mortuary

(a) Single mortuary

Ideally, all the bodies from a major disaster should be taken to ONE mortuary. The reason for this is that if more than one mortuary is being used, the task of identification and evidence collection is made extremely complex and may be open to error and loss of continuity in evidence collection. It would involve multiplying the identification teams, and lead to scattering of information. In addition, unnecessary distress would be caused to the bereaved if in their search for those whom they have lost, they had to visit several mortuaries. The use of multiple mortuaries would also increase the burden on the communications system, which often would inevitably already be under great strain during a major disaster. Containment of the incident and security problems would be multiplied if more than one mortuary was in use simultaneously.

(b) NOT a hospital mortuary

As a general principle it is recommended that hospital mortuaries are NOT used, unless the numbers involved are manageable and well within the capabilities of the particular hospital. In such instances the portion of the mortuary allocated to the disaster investigation should be partitioned away from the rest of the mortuary.

There are many reasons for this:

- (i) During a major disaster when live casualties, as well as dead bodies, are retrieved from the scene it is essential that the approach roads to the hospitals are kept clear. Those traffic routes should not be encumbered by vehicles bringing the dead to the hospital. Further congestion could be caused by relatives and friends visiting the mortuary, and by possible media intrusion.
- (ii) The arrival of large numbers of bodies to a hospital mortuary might not only overwhelm the capacity of the mortuary, thus necessitating the use of a second or third mortuary, but it could seriously disrupt, or bring to a standstill, the routine work of that mortuary for periods of several days or weeks. This is particularly likely to occur in winter and during public holidays.
- (iii) Many of the bodies from a major disaster may be mutilated, burnt, or may have undergone decomposition. Indeed, there may be many more mutilated human remains than intact bodies, thus creating a need for disproportionately large storage facilities. A hospital mortuary is usually ill-equipped and ill-suited to deal with such eventualities.
- (iv) The deceased victims may need to undergo extensive radiological examinations, and this would add further strain on the facilities of a hospital radiology department.

(c) NOT a public mortuary

For reasons similar to those stated in paragraph (b)(ii), it may be undesirable to use a public mortuary for a major disaster. Clearly this decision will depend on the number of bodies and on the actual capacity of the local public mortuary.

It should be borne in mind that the major disaster could totally monopolise the facilities, including the storage and office space of the public mortuary, for several weeks. This would disrupt the mortuary's routine work during the period of the major disaster investigation. Public mortuaries are usually located centrally in urban areas, posing problems of security, traffic congestion and the potential for intrusion by the media.

(d) Designation

There is great merit in using a specifically designated building to act as a mortuary for major disaster victims. The first task for each Area Liaison Planning Team should be the selection of such a building and the consideration of the facilities that would be required in it.

To avoid surprises on the day of a disaster it is ESSENTIAL that there is visiting and inspecting of the several potential sites being considered before coming to a final decision. This would involve visits and inspections by appropriate persons, including environmental health staff and other local authority officials, as well as the police and the Supervising Pathologist. Those who would be dealing with the bereaved (social workers, ministers of

religion, counsellors) should also be encouraged to visit the chosen premises to ensure that the facilities which would be made available for the bereaved are also appropriate and adequate.

B. Essential Requirements for a Major Disaster Mortuary

Attention should be directed to the following.

(a) Area

A very large water-impervious floor space **at ground level** in a weatherproof building. This should be of sufficient size to allow all the identification, viewing, pathological and ancillary investigations (described below) to be carried out efficiently in an 'open-plan' arrangement. There should also be sufficient space to enable initial storage of the bodies and later of the coffins in which they are placed.

Bodies (and later on coffins) will have to be moved from one part of the temporary mortuary to another; sufficient space should be available to enable trolleys to be used for this purpose.

The essential mortuary facilities can be provided by the use of a hangar, storage shed at an airport, ice rink or similar building, where the support services are readily available or can be easily and readily installed as required. If such a building is not available, consideration should be given to using large tents which are available commercially, or via the Armed Forces.

(b) Security

This mortuary should be sited at a location which allows the imposition of total security and privacy. This is primarily a Police responsibility, but the pathology teams should recognise the necessity for this in their selection of the most appropriate sites and they should respect the instructions of the police when the investigation is in progress.

(c) Access

Easy road/rail/air (helipad) access to this location is essential in order to facilitate transport of bodies to and from the mortuary. Adequate parking space for staff and relatives is also essential.

A discreet (and, ideally, covered) entrance/exit to the mortuary is desirable. Separate access, at an appropriate distance, should be available for relatives and lay personnel.

(d) Office facilities

Adequate office space and facilities for documentation, duplicating machines, stationery, desks and chairs, filing cabinets and notice boards will be required. Portacabins or caravans could be used to provide such accommodation if the building chosen does not have sufficient space.

The mortuary needs to be in constant and direct contact with the police command structure which is co-ordinating the various facets of the investigation, including the Casualty Bureau. A direct line to HM Coroner/Procurator Fiscal is essential. Telephones, computer link-ups and fax machines should be included in the communication system. (*Appendix III*)

(e) Infrastructure

Adequate lighting, heating, ventilation, water supply (if possible hot and cold), drainage and sewerage facilities are essential.

The level of background lighting, not least within the autopsy section of the temporary mortuary, has to be especially satisfactory to ensure that a detailed examination can be carried out and accidents are avoided. This can be provided by portable generators which have to be suitably sited to avoid the ingress of combustion fumes from them into the working areas. Lighting equipment can also be rented from specialised firms.

Background heating may be provided by hot-air blowing machines which can also be leased. Extractors and or fans which ensure a constant change of environmental air and a decrease in the background smell also improve the working environment.

If embalming is considered necessary, the areas where it takes place will require particularly effective ventilation and drainage. Advice from local Water Authorities will be required for the dilution and disposal of formalin and other toxic chemicals in large quantities and high concentrations.

Abundant power points for extra lighting, electric saws and other equipment should be made available and special power points for radiological equipment, as required. Power-breakers would also reduce the potential for accidents.

When a site has been identified, all the services (water, drains, electrical points) can be installed in readiness. These services can then be implemented within a few hours of the major disaster occurring.

(f) Viewing area

There continues to be much criticism of the inadequacy of arrangements for bereaved relatives to view the bodies of those involved in fatal disasters. Many demand the right to do so; the opportunity to physically view the deceased may assist in the initiation of grieving and recovery. While the difficulties for such provision may be immense because of the magnitude of the disasters, it is nevertheless very important to respect, and take a more sensitive view, of this aspect of a major disaster. By giving due consideration to this particular problem, it may be possible by sensitive planning to minimise significantly the distress caused to the bereaved.

In an attempt to acknowledge the issues and rights of the bereaved, the following points should be noted.

- (i) The early and accurate identification of the deceased should be completed without delay.
- (ii) As soon as possible, arrangements should be made for bodies to be viewed singly and in appropriate surroundings, and for the bereaved to be given adequate comfort and professional support before, during and after such viewing. This requires an input from the social welfare services and ministers of religion. A medical team may also need to be at hand, if possible with resuscitation facilities, to deal with clinical emergencies brought about by acute grief.

The viewing accommodation should be within easy reach of the mortuary, but it should be separate from it. Suitable waiting accommodation for the bereaved with adequate lavatory

and refreshment facilities should be provided and the police should co-ordinate with the pathology investigating team when a particular body is to be made available for viewing. Adequate facilities should also be made available for the bereaved to compose themselves and recover from this ordeal of viewing.

Unless there is a risk of loss of evidence or of contamination or the bodies are badly mutilated, the bereaved should be allowed contact with the bodies.

- (iii) Care should be taken to observe and respect individual religious rites and observances, while ensuring that the other religious denominations of other deceased persons are not offended by these practices. A common washing facility for the bodies of Muslims, Jews and Sikhs is usually acceptable to all but the most orthodox observants.
- (iv) It is essential that bereaved relatives are kept fully, accurately and constantly informed on the progress of the investigations so that they understand the reasons for retaining the bodies, and can be informed when they might expect the bodies to be released. HM Coroner or the Procurator Fiscal should be encouraged to organise an early general meeting under their auspices between the Supervising Pathologist and the relatives. A 'long' release date should be given in the first instance. Earlier release is then very welcome. Over-optimistic release dates, which subsequently have to be put back, generate distress and resentment.

Meetings between the individual bereaved families and the pathologists involved are often asked for during and after the completion of the investigation; these should be permitted only at the discretion of the Coroner/Procurator Fiscal.

- (v) Similar information should be available to religious representatives and other social welfare personnel who will be assisting the bereaved, so that they can be reassured and thus enabled to reinforce their support for the bereaved.
- (g) Parking
Adequate parking facilities should be available for all those working in the mortuary. Space for any portable electricity generators, etc. which may be required should be allocated in this area.
- (h) Support facilities
There should be adjacent office, kitchen and rest areas, including lockers, toilets, washrooms and showers. Full facilities for food and drinks should be provided for the workforce.
- (i) Storage
A secure area for storage of victims' clothing and property. Washing machines and driers can be useful to wash items of clothing before showing them to relatives for identification purposes or returning these items to them if required. Jewellery may occasionally be very useful for assisting with identification; expert jewellery cleaners may make this task more effective; a small ultrasound bath is invaluable for this purpose. Detailed records should be made and receipts obtained for any valuable property surrendered to others.
- (j) Refrigeration
Depending on local climatic conditions and on the length of time that bodies have to be retained prior to their release, it may be necessary to provide refrigeration facilities for

the bodies, either before or after post-mortem examinations, or both. This accommodation may be provided by the use of refrigerated inflatable tents, portacabins, rail freight rolling stock or other temporary accommodation. It is important that during storage the bodies are readily accessible for identification purposes or for other possible additional investigations and not simply stacked away. Refrigerated food trailers, trucks or carriers are ideal for this purpose if they can be obtained because the temperature inside them can be maintained at 4 to 6°C; carriers with a tail lift are preferable. Containers are also available in kit form which can be assembled promptly and can be placed close to the body holding area; portable generators supply the power.

- (k) Friends and Relatives Reception Centre
The Police will, as a matter of course, set up a 'Friends and Relatives Reception Centre' for the purpose of interviewing bereaved relatives to gather information concerning identification. Nearby hotels could serve this purpose, and should be identified in advance.

C. **Preparation of A Flow Plan at the Major Disaster Mortuary**

The following activities will take place: (*Appendix IV*)

- (a) Reception and documentation
A reception area for bodies must be provided as they arrive at the mortuary. This will require a large space in which the body bags containing the cadavers can be deposited in lines, together with individually allocated document cases (*see p 21*) which will be attached securely to the body bags.
- (b) Unclothing and external examination
An area for unclothing and external examination to determine and catalogue identifying features is essential. If it is at all possible to transfer the body bag on to a table or trolley, this makes this task less unpleasant and strenuous for the operators - this procedure could immediately precede the autopsy if no radiology is required, or has been carried out at a much earlier phase. Good light and the presence of the appropriate personnel are essential.

Bodies and human remains should be photographed fully before and after undressing takes place; this is a task for the police personnel. This stripping process comprises:

1. The removal - if possible in an intact state and if not, by judicious cutting with scissors - of each item of clothing individually describing each item carefully.

The contents of each pocket are removed and also described fully. This should be done in the presence of trained police officers and a photographer who may be required to photograph certain items. All items of jewellery on the body are similarly described after their removal. A hand lens with a x 10 magnification is invaluable for reading inscriptions, hallmarks, engravings, etc. Hallmark letters show much design variations which must be accurately recorded.

A catalogue of such items should be made and appropriate secure storage must be provided for them.

2. A detailed description of the general identifying characteristics of each of the deceased (eg. length and colour of hair, colour of eyes, distinguishing marks, circumcision, tattoos, scars); it is useful to obtain as accurately as possible the height of the individual. Weights

may have to be estimated, but the physique should be described. Photography of tattoos may be useful to assist with early identification.

3. Once the body is unclothed each injury should be fully described and fully documented on to a body sketch and photographed. This description must conform to the same standards as those which would be expected while performing an autopsy upon a suspicious death.

The body can then be washed in preparation for any viewing that may be required.

(c) Special investigations

(i) **Radiology**

This investigation is essential in all types of explosion or when a gunshot injury is suspected. Bodies from deaths in fires and bodies which are decomposing may also have to be X-rayed before the autopsy.

A separate area for X-ray examination of the bodies will have to be allocated and screened off with protective lead-containing partitions. A dark room will have to be provided for processing the films, and viewing boxes will need to be available for interpreting the X-ray films. Viewing boxes should also be provided in the mortuary area. Portacabins can be readily adapted as processing laboratories and dark rooms.

Appropriate portable X-ray machines, ideally including a machine for dental pantomography, and the personnel to operate these together with a reliable and continuous supply of film, film cassettes, chemicals, etc. must be provided.

(ii) **Finger printing**

This is carried out by the Scientific Support Services of the Police at an early stage of the identification procedure.

(iii) **Odontology**

Charting of dental configurations is carried out by Forensic Odontologists during the identification process. In some cases it is preferable to delay this procedure until rigor mortis has subsided, making oral access easier. Some odontologists would prefer to have the jaws removed and presented to them. This should only be done with the consent of HM Coroner/Procurator Fiscal and should only be considered if the cadavers are already extensively mutilated or burnt.

- (iv) **Other investigations** such as collection of blood samples and specimens for microbiological studies, etc. can be collected before commencing the autopsy. Vitreous humour should be collected in every case, and the eye-globes refilled immediately thereafter.

(d) Autopsy

In accordance with the instructions of HM Coroner/Procurator Fiscal, a detailed autopsy is carried out on each body, documenting all internal injuries and any pathological abnormalities due to natural disease, evidence of previous surgery, and the presence of any prosthetic devices.

In Scotland, the Procurator Fiscal may authorise a *View and Grant* procedure instead of an autopsy. We regard this as inappropriate in the majority of disaster investigations.

- (e) Collection of specimens
Specimens are collected for serological and toxicological investigations (especially carboxyhaemoglobin saturation, cyanide, alcohol and drugs). In a transport incident, although these investigations apply to all passengers, they are especially relevant for members of the crew.

In all cases tissue samples for histology are collected, special attention being directed to the possibility of smoke inhalation and drowning. If it is important to identify the presence of fat embolism, the appropriate tissue samples should also be collected, and frozen rather than fixed in formalin.

Samples of blood, spleen, muscle or bone marrow should be retained for DNA analysis, if this is deemed to be necessary. Appropriate deep freeze facilities would be required for their storage.

Any specimens retained should be **CAREFULLY AND FULLY LABELLED** and then securely sealed.

- (f) Disposal of bodies
After autopsy has been completed and the body cavities examined, embalming takes place with appropriate cosmetic attention to the external appearances of the deceased. This is followed by placing the bodies into coffins which are duly labelled.
NB: embalming is a mandatory requirement if bodies are subsequently to be transported overseas.

The bodies will only be released on the instructions of HM Coroner/Procurator Fiscal. Depending on the nature of the incident involved, it may be expedient to retain all the bodies until each and every one has been identified, or bodies can be released immediately after they have been satisfactorily identified. The simultaneous release of all victims is, on the whole, preferable.

- (g) Storage of property and specimens
A secure room with a safe for documents (eg. passports) and valuables, is required for storage of property.

Refrigeration and deep freeze facilities will be required for the specimens of tissues and body fluids. Specimen containers with appropriate preservatives and fixatives must be provided. A properly ventilated separate area for the use and storage of formalin is a mandatory requirement.

- (h) Disposal of waste materials
Much of the waste materials from the mortuary, such as gloves, aprons, body fluids, etc. should be designated as potentially high risk biological waste. Disposal should be carried out in accordance with Health & Safety hygiene procedures. These will accumulate in large quantities from the very initial operational phases of the disaster mortuary, and appropriate holding and disposal facilities must be provided, usually by the Local Authority. A good general rule is, "if in doubt, 'yellow bag'"! Sharps containers must be provided and correctly used.

Because the infective status of the bodies is unknown at the time of autopsy, it is prudent (especially in the case of international airline disasters) to assume that there is a high risk

of infection, and that the relevant precautions should be taken by all who participate in the mortuary procedures (*See Appendix VIII*). Advice on Health & Safety can be provided by the Consultants in Communicable Diseases attached to the local Health Authority/ Board or the Local Authority's Environmental Health Department. A senior pathologist or APT (anatomic pathology technician) should be nominated Mortuary Safety Officer.

IV. PERSONNEL INVOLVED IN PATHOLOGICAL INVESTIGATION

Personnel from a variety of disciplines will be required to be available during the pathology investigation.

The Supervising Pathologist will organise the assembly of the autopsy teams, the number of which can only be determined when the magnitude of the disaster is known.

1. Pathology Teams

Each team should consist of:

- An experienced pathologist, preferably one with forensic training
- Mortuary technician
- 'Scribe', if possible familiar with medical terminology (eg. medical secretary, medical student or doctor).

Tape recorders should not be used. Tapes have a habit of being mislaid, erased or dictated over, and valuable information may be irretrievably lost, if this is the only method of documentation used. All descriptions and comments should be written down contemporaneously.

The use of standard forms (eg. Interpol documents) is a matter for the local police. Forms and charts to be used should be acceptable to the Supervising Pathologist. The Interpol forms are currently being modified, and so are not reproduced in the appendices.

The final reports will in due course be carefully scrutinised by many authorities and care should be taken to record in them all the appropriate and relevant details (eg. of height, weight, organ weights, etc.). Arrangements should be made to ensure that such reports are typed to a standard protocol, and carefully checked before release.

- Photographer - Member of Police Scientific Support Service.
- Exhibits/ Productions Officer - Member of CID (to liaise with Police identification team and to co-ordinate documentation and specimen collection).

Specimens to be collected

For **histology** - formalin-fixed tissues from all major organs. A pre-agreed protocol should be used: unfixed tissues for frozen section (eg. for fat embolism). Trachea, bronchi, lung for inhaled smoke/diatoms, etc.

For **toxicology** - blood, urine, liver, bile, vitreous fluid, gastric contents, retroperitoneal fat. The preservatives used should have been agreed in advance with the local Toxicology laboratory.

Muscle, Spleen and Bone Marrow - deep frozen for DNA.

All samples should be **CAREFULLY** labelled with the identification number of the victim and sealed securely against potential allegations of tampering and to prevent any risk of spillage.

In Scotland, where legal procedure dictates, the pathologists, police, etc. may have to work in pairs. Duplicate samples may also be required, especially within Scotland.

2. Forensic Odontologist

An experienced odontologist should be designated to be available for each geographical area. He, like the Supervising Pathologist, should be responsible for assembling a team of odontologists, who would operate under his guidance.

Local dental practitioners could form part of the odontology team and may require some training and certainly a full briefing prior to the commencement of their involvement in the investigation.

3. **Bearers**

Non-medical personnel, possibly provided by the Police and Armed Forces, or local volunteers, depending on the size of the disaster, need to assist with the moving of bodies within the mortuary so that the various procedures (identification, radiology, odontology, autopsy, embalming) can be carried out by the various experts at different locations within the mortuary. They should only work short shifts, with appropriate breaks, taken away from the immediate scene, for rest, refreshment and maintenance of morale. In hot and inclement weather conditions, the breaks have to be more frequent.

It should be borne in mind that many of the above personnel may be young and/or quite unprepared for the experience - most of them will not even have observed a dead body or have witnessed an autopsy, let alone victims of severe trauma. Sensitivity to their welfare should be practised, and should any undue distress be identified they should be treated sympathetically and, if necessary, withdrawn from their duties. Care should be taken to avoid open or overt criticism when such withdrawals are made.

4. **Ancillary Staff**

Catering staff, joiners, electricians, handymen or cleaners may be required at different stages of the operation. Help may be forthcoming from the Local Authority/Council, Environmental Health Department and from local voluntary organisations. These arrangements should also have been agreed in advance.

5. **Liaison with Armed Forces**

It is often of benefit to secure the co-operation of the military. They willingly provide vehicles for transport of the dead, thus freeing civilian ambulances for the living. Furthermore, the exposure to death and casualty evacuation techniques under field conditions is a welcome and invaluable training exercise for all ranks.

V. PROCUREMENT OF EQUIPMENT

The investigation at the scene and at the Major Disaster Mortuary will be unable to function without certain essential items of equipment, which need to be previously identified and perhaps stockpiled. Their location and access should be established. *A list of essential items is provided in Appendix V.*

1. At the Scene

(a) Body bags

Bodies at the scene should be transferred as soon as possible into body bags. These should be made of strong plastic material with a zip aperture on the upper surface which, when closed, renders the bag waterproof. They should be strong enough for the transport and carriage of bodies from the scene by their carrying handles, thereby dispensing with the need for stretchers.

It is essential that a number of these body bags are immediately available to the Emergency Services as they will be required in the very immediate aftermath of any incident. A number of these body bags should be stockpiled and replenished on a regular basis (their shelf life is about two years) perhaps through the local hospital mortuaries or funeral parlours, ambulance or fire services. Failing this, the local hospital mortuaries or public mortuaries may have a small supply; local undertakers and commercial firms who specialise in large-scale mortuary provisions will also be able to supply these.

If body bags of the appropriate specifications are not available, heavy duty polythene bags or 3 metre roll sheet, cut to appropriate lengths, should be used and their ends tied securely with stout twine. There will also be serious difficulty with placing very obese, badly burned and rigid bodies, and cadavers showing advanced decomposition, into body bags, and for these, sheet is often more suitable.

(b) Scene labels (and indelible pens)

The Police have now devised and agreed on a national scheme for labelling of deceased in a major incident. These labels have been designed to contain details of the site where the body was found, with the relevant time, as well as the name of the doctor pronouncing life extinct and the timing of this (*Appendix VI*).

(c) Personal protection

Personnel retrieving bodies from the scene will be required to wear protective clothing (*Appendix V*). In addition to protection against microbiological hazards - which will always be required - it may also be necessary to wear special protective clothing to take account of additional hazards such as radioactive or chemical contamination. If any of these potential hazards are suspected, the investigative teams must be guided by the experts in radiation and chemical protection who will have been called in by the Senior Police officer in charge of the incident.

Similarly, all personnel at the scene will submit absolutely to the command of the Police and Fire Brigade with respect to the risk of fire contamination and structural damage. When appropriate, hard hats, protective clothing and respiratory protection will be provided by the Emergency Services at the scene.

2. Document Cases

A document case will be required for each body. It will be used to file all the documentary information relating to any individual body. It should be made of stout waterproof material with a transparent pocket on its front. Each case should contain a standard set of forms. The cases and documents should be provided by the Police.

3. At the Major Disaster Mortuary

The efficient functioning of the mortuary will, in the first instance, depend on the orderly receipt of bodies and human remains from the scene which have been bagged and properly labelled.

In all major disasters full autopsies on all victims will almost invariably have to be carried out.

The following equipment will be required (*Appendix V*):

A. **Autopsy**

(a) Trolleys

These will have a dual purpose - to move the bodies within the mortuary, and to act as autopsy tables; (suitable [wooden] wedges should be provided to act as brakes). Wooden trestles or others made from welded piping can also be used.

(b) Mortuary labels

These will be provided by the local police force.

(c) Check lists and folders

This document should accompany each body from the time of admission to the mortuary, to the time of its release. It will need to be displayed prominently in the transparent pocket on the front of the document case. This check list will itemise the various procedures through which the body has passed. (*Appendix VIII*)

(d) Protective clothing

Adequate supplies of protective clothing, *listed in Appendix V*, must be provided. Replenishments will be necessary at intervals. Every person in the mortuary must wear protective clothing.

(e) Instruments

Ordinary sets of autopsy instruments, including measuring equipment will be required (*see Appendix V*).

(f) Specimen containers

Specimens will need to be collected for serology, toxicology, histopathology and other purposes.

(g) Disposal bags

These should be colour coded in accordance with Health and Safety practice.

Labels for these specimens will also be required. (*Appendix V*)

B. Disposal of Bodies

Equipment required for embalming, sanitisation and cosmetisation of the bodies and encoffining will normally be provided by the undertakers contracted to deal with the major disaster. In smaller and 'local' disasters, the funeral directors retained by the relatives may prefer to remove the bodies to their own premises for preparation. In large scale disasters HM Coroner/Procurator Fiscal may wish to instruct specialist firms, but the wishes of individual relatives must be respected.

C. Other Investigations

In those circumstances where radiological investigations are required, equipment will need to be provided, and all the statutory protective precautions will have to be observed.

One or more portable X-ray machines will be required. These will have to be borrowed from hospitals or clinics. They are extremely heavy and will require special lifting gear to transport them to the mortuary. Lighter, hand portable sets are now available, but are of limited versatility.

Special electrical power points may need to be provided.

Cassettes and dark room facilities for developing the exposed films on site will be required. The latter could possibly be a mobile radiology unit, which would include a film processing machine, chemicals and viewing equipment.

Protective lead screens, aprons and gloves are essential. (*Appendix V*)

D. Provision of Equipment

It may prove impossible for the finances to be identified enabling the purchase and storage of the equipment which will be required in the event of a major disaster. It would, however, be reasonably more achievable if a data bank (as a card index or on a computer) were compiled enabling the immediate location of the following.

- (a) List of companies or stores (eg. hospital stores, local authority stores) where certain items of equipment may be obtained if and when required, together with a list of appropriate personnel and contact telephone numbers. Health Regions and Health Authorities may also have their own purchasing and storage organisations.
- (b) List of companies which provide such requirements as protective clothing, disinfectants, portable generators, lights, etc., together with a list of emergency contact telephone numbers.
- (c) Major firms of undertakers and funeral directors often have in their stores a large quantity of this equipment. 'Resting contracts' can be negotiated with them by the Local Authorities or the Police, ensuring the supply of the appropriate equipment as and when this is required.

E. Regular Staff Meetings

To ensure the continued smooth running of the mortuary and to identify any interim problems which may surface, it will be necessary to have regular meetings after the first day of commissioning of the mortuary. To these should be invited all the pathologists, odontologists, undertakers and police officers involved in the running of the mortuary. They should be chaired by the Supervising Pathologist. Minutes of these meetings should be kept and made available to any subsequent statutory inquiry.

VI. ACTIVATION OF THE PLAN FOR A MAJOR DISASTER

1. Definition

From the Pathologist's point of view, a major disaster can be defined as "an incident involving multiple fatalities of such magnitude as to require special arrangements to be made". No attempt is made to specify the actual numbers of bodies in this definition as facilities in different localities are extremely variable. What constitutes a major disaster in one area would not necessarily be regarded as such in another, where more extensive facilities may already exist.

2. Declaration

For each individual incident it will be incumbent on the senior Police Officer in command at the scene of the incident - after consulting with the members of the Area Liaison Planning Team - to declare it a 'Major Disaster', requiring the implementation of the Major Disaster Plan. In Scotland the Procurator Fiscal will liaise with the police on this matter at an early phase and will direct the operation.

3. Major Disaster Plan

The part of the Plan which involves the dead should be activated by the Supervising Pathologist in close co-operation with the Police. This involves the following:

A. **Commissioning of the Major Disaster Mortuary**

This will be primarily the responsibility of the Police but the Supervising Pathologist will be closely involved in bringing the organisation and the temporary mortuary to a state of readiness.

B. **Attendance of Supervising Pathologist at The Scene**

(a) Reporting to Medical Incident Officer and Police Incident Officer

The Supervising Pathologist should attend the scene as promptly as possible and should report to the Site Medical Officer and the senior Police Officer designated as the Incident Officer who will be co-ordinating the emergency services. The Supervising Pathologist should be readily identifiable to the emergency teams by a tabard or similar garment. If there are no survivors, the Supervising Pathologist assumes the role of Site Medical Officer. The pathologist or a nominated colleague should remain at the scene until all human remains and bodies have been cleared from it or until all the requisite arrangements for the above have been made and installed.

At the scene the first priority will always be the evacuation of all living casualties as rapidly as possible. It is recommended in terms of the eventual reconstruction of the incident that the dead should be left *in situ* unless they have to be moved to reach the living or if a body would otherwise be lost completely (eg. overboard) or further damaged or mutilated (eg. in a fire) if this is not done.

Bodies should be suitably covered against the elements with a tarpaulin or similar waterproof sheet.

If any bodies are exposed to the public view, arrangements should be made to remove them as quickly as possible or to have them covered.

(b) Organising teams to confirm death

Although there is no statutory obligation for a doctor to confirm the fact of death, particularly in a major incident, it is essential that a doctor examines bodies at the scene as soon as possible after live casualties have been evacuated, in order to formally pronounce life extinct. The time and the location of the body should be recorded, together with the doctor's name on the appropriate labels, attached securely to the body bags. If, because of the nature of the incident or terrain, this is not possible, a doctor should attend at the site where the bodies are being collected from the scene and these formalities carried out there.

Police Force Clinical Forensic (Medical) Examiners (police surgeons) and local General Practitioners should be briefed fully and instructed by the Police and by the Supervising Pathologist in this procedure before this is put into action.

All human remains should also be collected. In addition to the obvious aesthetic considerations, they may be valuable in identification of victims (eg. fingerprints, tattoos etc.). Each large body part eg. torso, limb, hand, foot should be separately labelled and bagged. The label should bear the identification of the retrieval site, time and date of collection and the name of the retriever. This is all part of the pathology process of identification.

Difficulties are sometimes experienced as to what should be called a 'body' in a disaster where there is gross mutilation of the deceased. If a part, eg. a head or torso, as compared to a limb, can be considered as vital for survival, each such part should be called a body initially. As the investigation progresses it may be possible by a variety of means to match a separated part to a body or other part of a body and thus the actual numbers of bodies would decrease. When it comes to internal organs or portions of muscle, this is a more difficult decision and one which would have to be addressed *ad hoc* in the mortuary when the body parts are being examined and reassembled. All recovered tissues will have to be fully examined pathologically.

Once a body has been placed inside a body bag and the bag sealed, the bag should remain unopened until it reaches the mortuary. Any clothing, jewellery or personal property found in the very immediate vicinity of a body should not be put into the body bag. It should be placed in a separate bag, the label of which should identify its exact location.

It should always be remembered that the scene of a major disaster is a potential scene of crime and it should be treated as such. Thus, all bodies should be photographed *in situ*, if possible before any movement, although it is appropriate for Scene of Crime Officers to collect potential evidential material.

Trained 'body sniffer' dogs are invaluable in locating bodies and the last few small scattered human remains.

The body bags must be robust, impervious to body fluids and be capable of being lifted easily.

(c) Labelling and bagging of bodies

The bodies will be labelled on site with the appropriate labels and their location matched to and noted on a grid reference chart. These have been largely standardised for all police forces.

Large disaster sites will be mapped at an early stage using Satellite Navigation Systems. The Royal Air Force and police helicopters have access to this facility. Local Authority Highways and Survey Departments and many universities also possess these facilities.

The bodies should *not* be undressed or searched at the scene, nor should apparently connected personal effects eg. passports, Civil Aviation documents, be slipped into the pockets of the deceased.

Once the body has been photographed *in situ* it should be placed in the body bag, and the bags not opened again till they reach the mortuary.

It is, of course, essential for there to be adequate lighting in order to carry out a thorough search for bodies and especially in the process of trying to identify human remains. This exercise should, if possible, be accomplished during daylight hours. This also avoids unnecessary injuries and accidents to the search teams. Absence of adequate lighting may result not only in injury to the search teams but also in the loss of evidential material.

(d) Health and safety

At the scene and throughout the rest of the investigation it is essential to observe the appropriate health and safety regulations with regard to the protection of the investigative teams. The retrieval of bodies at the scene can only take place after the senior Police and Fire Brigade officers have declared the site to be safe.

In incidents involving spillage of fuel, toxic substances and radioactive material, specialist advice will be given to the Police as to the precautions to be taken. These must be observed by the pathology teams. (*See Appendix I*)

C. Alerting Pathology Teams

In accordance with the number of fatalities, the Supervising Pathologist will alert the other pathologists who will be required to lead the teams and who should be put on standby to await further instructions. HM Coroner/Procurator Fiscal should be previously informed of this and asked to approve this arrangement. Local plans will have been drawn up relating to the provision of equipment for postmortem examination; the supervising pathologist should ensure that these plans have been activated.

D. Temporary Repository or Body Holding Area

When the Supervising Pathologist is satisfied that the arrangements for the dead at the scene are proceeding, he should assist the Police in establishing a Temporary Repository for the bodies or temporary bodyholding area. This is the site to which the scene-tagged and bagged bodies are taken and accumulated, before they are conveyed to the Major Disaster Mortuary. In the appropriate climatic conditions the Temporary Repository may simply be a space in a field, or an area by the roadside or railway track. Other possibilities are an inflatable tent, a marquee which may be provided by the Armed Forces, or from a previously identified commercial source, or a nearby building such as a gymnasium or school hall. Its siting obviously cannot be planned in advance, since it needs to be in close proximity to the scene. However a decision on its location will have to be taken as soon as possible after the disaster has occurred.

If the climate is warm, or if the commissioning of the major disaster mortuary is delayed, it may be necessary to provide an inflatable refrigerated tent to store the bodies at the Temporary Repository.

At the repository it may be appropriate for the 'last rites' to be administered to the victims by ministers of religion. While every consideration possible should be made to observe the religious practices appropriate to the dead, it is essential from the point of view of the statutory investigation that the sealed body bags are not disturbed in any way. When an incident involves many denominations nothing should be done at this stage which would upset or alienate other denominations. Unless the religious denomination of the specific deceased had been fully established - and this in most instances will be unlikely - no religious rites of any denomination should be permitted.

At this stage the Supervising Pathologist should make an appraisal of the scale of the disaster, and report to the Area Liaison Planning Team, outlining the expected requirements at the Major Disaster Mortuary. He can also update the pathologists and their teams who are on standby.

E. Identification

Having seen the type of injuries sustained by the victims, the Supervising Pathologist can advise HM Coroner/Procurator Fiscal and the Police on the type of identification that is feasible.

- Formal visual identification is fraught with possible errors, enhanced by the distressed state of the bereaved. Identification by direct visual means should therefore not be carried out as a routine, but should perhaps be reserved for those cases in which the relatives positively wish to view the body. Bodies exhibiting substantial facial trauma should not be identified visually.
- Finger-printing and odontological comparisons are particularly useful. If these methods are to be used, the appropriate experts will need to be involved, and arrangements made for the appropriate material to be collected and retrieved for matching purposes.
- Radiological methods may be used to identify certain skeletal characteristics, prostheses, old fractures, etc.

In all cases detailed data of the physical characteristics of the deceased, including deformities, scars and tattoos will need to be documented by the team who are interviewing relatives, together with details of clothing, jewellery, etc. Distinctive property, marks or scars should be photographed.

These factors when taken together will all form the basis of positive identification. The ultimate decision in terms of a definitive positive individual identification rests with HM Coroner/Procurator Fiscal who will be advised by a Committee referred to as the Identification Commission.

If the chosen Temporary Repository has appropriate facilities, consideration should be given to use it for the initial photography of the faces of the victims, if they are in a suitable state. These photographs could then be shown to the relatives or friends for early identification and exclusion. This would enable those bodies which had been pre-identified from the photographs to be taken singly into a Viewing Area for confirmatory visual identification, either at the Temporary Repository or at a later stage, at the Major Disaster Mortuary. These arrangements will mean that the bereaved will only have to view one body.

The use of a Temporary Repository for the initial stages of identification will only be appropriate in exceptional circumstances. The removal of property and clothing should under no circumstances take place in the Temporary Repository.

When it is deemed that DNA profiling might be required for identification purposes, an early opportunity should be found to apprise the relatives of this and arrangements made for collecting the control blood samples or oral mucosal scrapings from the appropriate family members. If fingerprinting of domestic premises is required for identification purposes the relatives must also be fully apprised of this requirement.

F. Objectives of Examination at the Major Disaster Mortuary

Having agreed on the mode of identification that is to be adopted, the Supervising Pathologist will need to consult with HM Coroner/Procurator Fiscal and the Police on the extent of pathological examination which will be required. With the exception of disasters due to natural phenomena, it should initially be assumed that major disasters are of criminal origin. Each body must be considered to be a homicide victim, and examined accordingly in great detail. In Scotland if post mortem examinations on each body have been instructed they will have to be carried out by two pathologists. In all events it is essential that detailed evidence is collected so that it may be presented at Inquests, Public Inquiries, Civil and Criminal Court proceedings.

(a) Radiology

It should be the general rule that radiology is carried out on all victims of a major disaster unless there are exceptional circumstances which make it unnecessary.

Radiology is essential if the disaster might be related to an episode of explosion. Pieces of shrapnel or disintegrated particles from the explosive device or secondary missiles may be present in some of the victims, and their location and directional tracks of entry may be so identified. The localisation of these particles also facilitates their retrieval from the bodies for further forensic scientific examination.

Information gained from the use of radiology can also be of help in identifying victims eg. by demonstrating the presence of old fractures or deformities, of orthopaedic pins, screws, wires and prostheses. Occasionally pieces of identifiable metal jewellery can be found embedded in soft tissues.

Radiology is also of great value in identifying injuries, eg. compression and displacement fractures of the vertebral column which are not necessarily easily detected in gross post mortem examination.

However, radiology is very time-consuming and expensive. It requires special personnel (radiographers, radiologists and dark room technicians). It involves obtaining portable X-ray machines which are very heavy and which will require special transport and lifting gear. Special power points may be required in the mortuary and a separate area isolated by lead screens will need to be provided. Protective lead aprons and gloves will have to be worn by those working within the radiological area. Dark room facilities for developing films, and viewing boxes will have to be provided.

It should be understood that the use of radiology will appreciably increase the time as well as the expense of the investigation, but it should be seriously considered in all episodes.

- (b) Forensic odontology
An early decision will need to be made by HM Coroner/Procurator Fiscal in consultation with the Police and Supervising Pathologist as to whether or not examination by Forensic Odontologists will be required. Their role in the identification of victims may be crucial, especially if there is severe disfigurement caused by fire, decomposition or disintegration. Usually, the Odontological Teams bring their own equipment. It may be necessary, however, for odontological radiographs to be taken, and this will require more specialised equipment and facilities to be provided. These techniques are invaluable for comparing the site, size and shape of fillings, crowns and dental prostheses with ante mortem radiographs and records provided by the victims' own dental practitioners.

A good communications system, including fax machines, will be needed for liaison between the victims' dental practitioners and the Forensic Odontologists at the mortuary.

- (c) Autopsy
Apart from a very detailed external and internal examination of each body, a decision will have to be made by the Supervising Pathologist in consultation with HM Coroner/Procurator Fiscal and the Police as to any special investigations which might need to be pursued because of the nature of the disaster. The collection of specific specimens, the provision of the appropriate containers and the identification of the scientific laboratories where these tests can be performed, should be planned at an early stage of the investigation.

G. Floor Plan at the Major Disaster Mortuary

- (a) Admission of bodies
On arrival at the Major Disaster Mortuary each body will be in a body bag bearing its scene label and scene number. There should be only one portal of entry into the mortuary.
- (b) Mortuary labels and numbers
There are two alternative systems for numbering the bodies. Each has advantages and disadvantages. Once a particular system has been decided upon it must be adhered to throughout the investigation.

The alternatives in this respect are as follows:

- (i) The site/scene number allocated to each body at the scene is also adhered to as the mortuary identification number, and no other number is allocated.
- (ii) In addition to the site/scene number, each body is given a specific mortuary number, in sequence, as the bodies are admitted to the mortuary.

The advantage of scheme (ii) is that it only records designated bodies, as opposed to body bags some of which may only contain mutilated remnants which will have been retrieved from the scene.

At the mortuary it is possible to be selective as to what constitutes a body, whereas this cannot be done at the scene. Some of the body bags packed at the scene will contain only parts of a body and yet they will have been allocated an identification number at the scene. Scheme (ii) also enables running totals of bodies to be assessed in the mortuary - information required by the Police and media - as the pattern of the disaster emerges. This scheme of giving sequential numbers on admission of bodies to the mortuary was

found to be satisfactory in the Flixborough, Kegworth, Hillsborough, Lockerbie and Amsterdam disasters. The drawback of the scheme is that bodies have two identity numbers (one given at the scene, the other at the mortuary). Therefore there has to be a system in place which ensures that the cross-referencing system is fool-proof. However, provided it is absolutely clear which scheme is being used, and it is adhered to throughout the investigation, there should be no confusion.

The mortuary label bearing the scene number and mortuary number is attached to a limb of each body (preferably an ankle or wrist) and a duplicate label is attached to the handle, or other designated site, of the body bag. A register is kept at the mortuary entrance, logging in the scene and mortuary numbers as each body bag is admitted. At the same time a **DOCUMENT CASE**, bearing both the scene and mortuary numbers, as appropriate, is allocated to each body.

(c) Documentation

All the documents relating to the identification procedures, external and internal examinations and any other investigations are kept in the document case, and each document should bear the scene and mortuary numbers of the individual body. In the transparent pocket on the outside of the document case, there will be a check list of procedures to be followed. These procedures will have been agreed by the Supervising Pathologist with HM Coroner/Procurator Fiscal and the Police. The easy visualisation of the check list will enable it to be seen by the various investigators without it becoming soiled. As each procedure is completed the check list is initialled with time and date by the investigator as each phase in the processing has been completed. In this way the different examinations of the body can be carried out in a variable sequence, so that the time and skills of the investigators are used to best advantage.

It is essential that as each document is completed it is returned to the document case, bearing the scene and mortuary numbers, and that the document case accompanies the body through the various procedures in the mortuary. The documents are completed by the secretaries/scribes and exhibit officers. The contents of each document case should include:

- the scene (and mortuary) numbers
- details of identification
- dental charting
- fingerprinting
- written transcription of the external and internal findings of the post mortem examination
- chart depicting injuries
- details of all the property collected
- details of all the specimens collected.
- details of radiological examination (if relevant)
- other relevant investigations.

The responsibility for all documentation at the mortuary will be that of the Mortuary Documentation Officer, nominated by the Police.

(d) Investigations

(i) **Photography**

Facial photography and also a general view of the clothed body. Special items for identification should have close-up photographs against a scale, where appropriate. After

unclothing the body, photographs of tattoos, identifying scars or deformities, and of *all recent injuries* should be taken. Every photograph should include the scene (and mortuary) numbers.

(ii) **External features**

These should be recorded on body charts by the Pathology team. Identifying features such as height, weight (if possible), colour of hair, eyes, general physique, tattoos, scars, deformities etc., description of clothing and jewellery should be recorded. This information should be conveyed as soon as possible to the mortuary documentation officer for onward transmission to the Identification Commission.

Detailed descriptions, charting and photography of all recent injuries should be carried out.

(iii) **Odontology**

Details of teeth present, or absent, prostheses, fillings, crowns and any dental deformities or characteristics should be carefully recorded, preferably by a trained odontologist.

(iv) **Radiology**

Detailed observations regarding identifying features and injuries will be made after studying X-ray films as well as the presence of any radio-opaque foreign bodies including prostheses.

(v) **Internal post mortem examination**

Details of natural disease and previous surgical operations should be recorded. Specimens for histological, toxicological, serological and any other investigations should be collected, labelled with the mortuary number and presented to the exhibits officer. In general it will be necessary to collect blood samples from all victims for ethanol estimation, cyanide, carboxyhaemoglobin, DNA typing and a screening for drugs.

Additional detailed toxicological tests for drivers, all flight deck crew and essential crew members - if they can be identified - should be carried out in collaboration with the Triservice (formerly the RAF) Pathology Investigative Branch, based at the Royal Naval Hospital, Haslar, Hants.

An especially meticulous examination for the presence of natural disease amongst crew members should also be carried out.

Observations should be recorded which may make possible an estimate of the time interval between the occurrence of the disaster and death. This factor could be of great importance if families are travelling together, as the order in which they die could be of relevance to death duty payments and inheritance procedures - both of which vary in different countries. It is also important to assess the time factor between the occurrence of the disaster and death in order to provide information for the extent of 'pain and suffering' for insurance claim purposes.

The autopsy findings should be charted and a detailed description dictated contemporaneously to a secretary/scribe. The pathologist should check these notes immediately after the conclusion of each autopsy.

The Supervising Pathologist will need to ensure that containers, labels, plastic bags and refrigeration facilities are available for the collection and storage of specimens. Deep

freeze facilities - sometimes of different temperatures - may be required for some samples.

(e) **Health and safety**

Health and safety precautions will need to be taken by all members of the investigating teams who come in to contact with body fluids. These will include protective clothing, aprons, gloves, boots, and sufficient overshoes and gowns for visitors. Disinfectants and cleaning equipment will need to be available.

Because of the unknown potential microbiological hazards (eg. HIV, hepatitis, tuberculosis etc.) among victims (especially those involved in an international airline disaster) it is important to protect all members of the investigative teams from the risk of infection. This can only be done by taking full precautions recommended by the current health and safety regulations based on the assumption that every victim is a potential hazard.

It is important to bear in mind that a number of non-medical personnel in the mortuary are seeing death and mutilation for the first time. This particularly applies to young police officers and members of the Armed Forces who are acting as bearers. They may find the spectacle a horrifying and stressful experience and develop features of acute post-traumatic stress. Any signs of emotional stress should be attended to immediately. Rest, reassurance and refreshment are often all that are needed.

Adequate rest and relaxation periods should be mandatory. Shift working should be introduced; the scheme of eight hours on, four hours off and then four hours on and eight hours off in rotation, is one system which has been well tested by the Armed Forces and Emergency Services.

Professional counselling should be available, but should not be forced on any person who declines it. The quality, qualifications and motives of would-be counsellors should be carefully scrutinised.

(f) **Embalming, etc.**

After the autopsies have been completed the bodies are passed to the special teams of undertakers for embalming, cosmetic restoration and encoffining. The Supervising Pathologist should ensure that adequate space is provided for these procedures. The embalming area must be well-ventilated because of the high concentration of formaldehyde fumes that are introduced into the atmosphere. Discharge of embalming fluid into the main sewerage system can cause problems due to the destruction of bacteria in the filter beds by the embalming fluid. Advice needs to be sought from the local council and water authority officials to overcome this problem. The Fire Brigade will, if requested, provide a tender for drain flushing and dilution purposes.

Facilities for the bereaved to spend a little time in privacy with the deceased may need to be provided at the Major Disaster Mortuary. Alternatively, undertakers may provide these viewing facilities for the bereaved after removing the bodies from the mortuary. This latter option is preferable in the majority of incidents.

(g) **Disintegrated remains**

In order to maintain a dignified and thorough approach to the investigation all steps, including the use of trained dogs, should be taken to retrieve all the human remains from the scene of a major disaster. Difficulties may be encountered especially when the incident

involves an explosion, a high impact collision or a disintegration in the air. Larger portions of tissue (eg. limbs, torsos, etc.) should be dealt with in the same way as intact bodies. They should be confirmed as such at the scene by a doctor as being of human origin, photographed *in situ*, charted, scene-labelled with scene numbers, bagged and if possible, taken directly to the Major Disaster Mortuary, as this would avoid confusion and additional distress at the temporary repository.

In order to maintain decency, even the small fragments of human remains which are quite unidentifiable should be collected and placed in correctly colour-coded and labelled, heavy-duty, plastic bags, labelled with the area of the site from which they had been recovered. These may yield vital evidence and will also have to be stored and fully examined.

Those remnants which are potentially identifiable should be examined at the Major Disaster Mortuary when all the autopsies have been completed. Each portion of tissue should be described and examined by a pathologist. The details of tissue should be recorded. It may be possible to make further victim identifications eg. from scars, fingerprinting, tattoos, jewellery, joint prostheses, etc. If disintegrated fragments can be matched with a particular body, their combined disposal can ultimately take place. If no such matching is possible, the unidentified remains should be disposed of *en masse* at the end of the investigation after consultation with the local Environmental Health Department. The time and manner of disposal of these remains would be the responsibility of HM Coroner/Procurator Fiscal after consultation with the bereaved.

(h) **Disposal of waste materials from the mortuary**

Attention will need to be paid to the removal of disposable items such as gloves, aprons, paper towels, etc. from the mortuary. The Supervising Pathologist should arrange with the Police Officer in charge of the mortuary for these items to be sealed in correctly colour coded plastic sacks and disposed of by incineration. Sharp needles and scalpel blades will require special disposal containers, which are to be placed in a designated holding area pending collection. Arrangements for regular and final cleaning and disinfection of the mortuary should be made by the Police Officer in charge, the Supervising Pathologist and the senior Anatomic Pathology Technician.

(i) **First aid**

Facilities should be available for first aid treatment to be given to the personnel who are working in the Major Disaster Mortuary. In practice this facility has been required on numerous occasions. Particular attention needs to be paid to cuts and needle puncture injuries, especially when suffered by those who are in contact with body fluids. General Practitioners supported by trained first aid workers (such as the Red Cross, St John's Ambulance Brigade) could provide these facilities.

An accident/incident book must be kept and a nominated member of the mortuary team must be responsible for its maintenance.

The onset of psychological stress in any of the personnel working in the mortuary should be detected at an early stage. They should be removed from the mortuary and given appropriate support and counselling. Some may need to be persuaded to leave; a few must be ordered to stand down.

(j) **Closing down the mortuary**

A joint decision by HM Coroner/Procurator Fiscal, the Police and the Supervising Pathologist should be taken to close down the mortuary when all the bodies have been identified, examined, embalmed and encoffined and all the other necessary pathological investigations have been completed.

Those victims who die in hospital whilst the mortuary is still in operation should be taken to the Major Disaster Mortuary rather than have their autopsies performed in the hospital mortuary. This avoids confusion, and maintains the chain of collection of evidence and documentation.

Those who die after the Major Disaster Mortuary has been closed down should have their autopsies performed at the hospital mortuary by one of the designated Pathology Teams, thus maintaining the pattern and continuity of evidence collection.

After appropriate cleansing and refurbishment, it may be decided to convert the mortuary reception area into a large 'Resting Area' where the coffins can be laid out for collection prior to the funerals.

Advice will need to be obtained from the local Environmental Health Department with regard to the cleaning and disinfecting the mortuary so that the normal functions of the building or site chosen can be resumed.

(k) **Reports**

The Supervising Pathologist, in co-ordination with the Mortuary Documentation Officer, should be responsible for the preparation and collection of the autopsy documents from the various Pathology Teams and for conveying these together with each cause of death to HM Coroner/Procurator Fiscal.

Determination of the cause of death remains the prime responsibility of the pathologist who conducts the autopsy and it will be up to him/her to issue a cause of death in appropriate form.

In order to standardise the mode of reporting, a unified method should be used. This, in basic terms, consists of a factual description, including identifying features, the cause of death and a section for opinion and comments.

When all the investigations have been completed the Supervising Pathologist should confer with HM Coroner/ Procurator Fiscal and Police, checking the evidence for identification of each victim (clothing, property, visual identifying features, odontological and radiological features) and confirming the cause of death in each case. This information will allow the Inquests to be opened and disposal documents to be issued.

A 'Freedom from Infection' certificate will be required if a body is to be transported overseas. The issue of this document will be the responsibility of the pathologist who has carried out the autopsy who in theory may be entitled to a fee. This is usually waived.

(l) **Communications**

(i) Identification Commission

Immediately on being notified of a major disaster the Police will set up an Identification Commission. From the earliest phases of the investigation this Office will receive

information from the hospitals and 'first aid stations' (where the victims are initially being looked after) concerning the identity and injuries.

The Office will also have an 'ante mortem' team to receive incoming enquiries from persons seeking information about possible victims. The trained personnel manning the telephones of this Office will take detailed descriptions of the missing persons.

Within a few hours, information about the numbers of fatalities and their identification will also be accumulating from the Temporary Repository, and later, from the Major Disaster Mortuary. The responsibility for collating this information and passing it on to the Identification Commission will rest with the Mortuary Documentation Officer who will be sited at the Major Disaster Mortuary.

Computerised data collection programmes such as CRISIS and HOLMES have been used in a number of major disasters; these should always be used in conjunction with conventional 'picture, pen and ink' methods. The Identification Commission act as the only channel of communication with relatives and friends of the deceased, with official agencies and with undertakers.

Specific information will be sought by the 'ante mortem' team concerning physical characteristics of the victims. Their medical and dental records will be traced and any other identifying data, such as fingerprints will be obtained. It may be helpful for medical or nursing personnel to speak with those providing medical information, thus avoiding misunderstandings and communication errors.

The identifying features of the victims which have been recorded in the Major Disaster Mortuary by the pathologists, odontologists, radiologists and fingerprint experts, will also be transmitted to the Identification Commission.

(ii) Interdisciplinary communication

The investigation into the circumstances and cause of the disaster will be carried out by the Police Criminal Investigation Department in collaboration with other agencies. The Supervising Pathologist should immediately pass on to them any information from the Pathology Teams which may be relevant to their enquiries. This will be communicated via the Mortuary Documentation Officer. He should likewise maintain contacts between the mortuary, the Police Command and Control Unit and with the Identification Commission. Continual communication between the Supervising Pathologist and HM Coroner/Procurator Fiscal will be effected. He will also liaise with the Mortuary Duty Officer whose task is to maintain the general management of the mortuary.

The installation of an efficient and comprehensive communication system between the Major Disaster Mortuary and the above agencies will be an early priority in the commissioning process.

(iii) Internal communication

Internal communication within the Major Disaster Mortuary should be effected by briefing and de-briefing session at the beginning and end of each shift. Progress will be evaluated and any internal operational and technical problems can be discussed. Time needs to be allocated for regular joint meetings between the various specialist teams (eg. pathology, odontology, photography, radiology, fingerprinting, property, etc.). These should be chaired by the Supervising Pathologist. Minutes should be taken in order to establish continuity

and to refute subsequent criticisms. These minutes should be retained until all legal processes have been completed.

A public address system may be of great help in communicating information within the Major Disaster Mortuary; this should be inaudible to those outside it.

(m) **The Media**

It should be borne in mind that when a major disaster occurs, the most persistent and intensive pressure will be exerted by the media in trying to monitor and report all the details of the incident. The Supervising Pathologist should ensure that neither he, nor any members of the Pathology Teams, communicate in any way with the Media. The confidentiality of the investigation and of the victims' identities should be preserved throughout the investigation.

Any information which is to be disclosed to the media concerning the activities in the Major Disaster Mortuary should be channelled exclusively through the Press Office of the Police.

(n) **De-briefing**

When all the investigations have been completed, the Supervising Pathologist should prepare a general report giving a summary of the pathological findings and putting them in the general context of the entire investigation of the incident. Any particular aspects which might be helpful in establishing the cause of the disaster or factors which can prevent a future similar disaster should be emphasised.

The Supervising Pathologist should also attend de-briefing conferences with the Emergency Services, Local Authorities and other statutory bodies, eg. The Civil Aviation Authority. He may also be required to prepare statements in relation to criminal and civil litigation proceedings, but should only do this with the consent of HM Coroner/Procurator Fiscal.

4. Finance for a Major Disaster investigation

In the present climate of tight budgetary controls of the hospitals, police and local authority services it is regrettably unrealistic to expect equipment to be provided by these authorities on a 'grace and favour' basis as in the past. Whoever is identified as bearing the responsibility for servicing a Major Disaster should have available to them a regularly updated list of suppliers who can provide the materials that will be required at short notice on a 24 hour availability basis. This information could be stored in a computerised data base. Certain items however (such as protective clothing, body bags, labels, etc.) should be permanently available in a central store.

Equipping the Major Disaster Mortuary with tables and instruments also needs to be pre-planned. It may be possible to construct temporary mortuary tables from scaffolding or water pipes and metal trays. Surgical instruments will need to be acquired urgently for the pathology teams. Many pathologists/APTs can provide loan equipment from their own institutions.

Similarly, radiological equipment (portable machines, lead partitions etc.) will need to be earmarked for rapid mobilisation.

Lists of personnel (additional pathologists, dentists, mortuary technicians, medical secretaries) who would be willing to be mobilised should be drawn up, together with contact numbers. These lists will need to be continually updated. These lists should be held by the police, but the wise pathologist will also maintain his own!

APPENDICES

APPENDIX I	Chemical nuclear and biological hazards
APPENDIX II	Further Reading
APPENDIX III	Communications Plan
APPENDIX IV	Master Plan/Flow Plan for Pathological Investigation of a Major Disaster
APPENDIX V	List of Equipment required: At the scene At the Major Disaster Mortuary
APPENDIX VI	Scene Labels
APPENDIX VII	Mortuary Labels
APPENDIX VIII	Mortuary Check List
APPENDIX IX	Disposal of Waste Materials from the Major Disaster Mortuary

APPENDIX I

INCIDENT in which CONTAMINATION BY RADIOACTIVE MATERIAL may be present

In such a major incident plans are already in place in Britain which enable a MULTI-AGENCY EMERGENCY NUCLEAR RESPONSE, referred to as NAIR (National Arrangements for Incidents involving Radioactivity). In more minor and easily contained incidents there is a scheme through which physicists attached to hospital Department of Medical Physics, Nuclear Medicine or of Radioisotopes are contacted for advice. Only if the incident exceeds the capacity of this initial response would further assistance on a national scale be sought.

In the investigation and management of any major incident involving contamination with radioactive material appropriate *'Lead Departments'* have been nominated by central Government to deal with this particular type of emergency; these have been chosen specifically to ensure a rapid and accurate relay of accurate information about the requirements for such an incident and to provide the necessary management resources. These departments are expected to co-ordinate the responses of central Government and to provide a framework within which all the emergency and other departments which have to be involved can carry out their responsibilities.

The Department of Transport and Industry is the designated lead department in England and in Wales for incidents involving civil nuclear installations and transport accidents and the Scottish Office in Scotland. The Northern Ireland Office is the lead department for transport incidents in Northern Ireland. The Ministry of Defence will deal with accidents involving military materials and military establishments. The latter has recently issued to every local authority in England, Scotland and Wales the document entitled LAESI (Local Authority and Emergency Service Information) on Nuclear Weapon Transport Contingency Plans. This details the counties through which nuclear weapons are transported, the safety measures taken in transporting them, the nature of the hazardous substances and the military capabilities and responses to accident.

These lead departments will participate in regular emergency exercises and chair the Nuclear Emergency Planning Liaison Group. In an emergency they would set up the Nuclear Emergency Briefing Room which would brief Ministers, provide information to the media, co-ordinate any necessary action by the various government departments that have to become involved and the notification of the European Commission and the International Atomic Energy Agency. They would send a Senior Government Liaison Representative to the Local Emergency Group who would act at the link with Central Government. They would appoint the Government Technical Adviser whose principal role would be to provide authoritative and independent advice to the emergency services for dealing with the incident and for protecting the public.

The Department of Health and the Scottish Office has ensured that all Local Health Authorities and Health Boards have designated hospitals for decontamination and for the isolation and treatment of contaminated casualties and for decontamination of the deceased, and also for monitoring levels of radioactivity in the public.

Prior to the retrieval of casualties, and more so of the bodies of any fatalities, advice will be provided by the National Radiological Protection Board whose remit is to advise the governmental departments and other bodies on radiological protection matters in such an emergency. Only when it is thought to be safe to allow the emergency services to enter contaminated premises, will this take place. Strict instructions will be issued as to health and safety measures. Decontamination facilities will be provided on site by the fire and rescue services. This is a slow and laborious procedure and in addition to the use of neutralising agents would also require thorough washing with soap and water and the use of soft scrubbing brushes.

Prior to any post-mortem examinations and investigations, there also needs to be clearance that it is indeed safe to do so. Special protective clothing may be required. In such instances the prime emphasis would be on safety rather than the collection of evidence in relation to the incident. The disposal of hazardous wastes must be very carefully controlled and monitored.

CHEMICAL CONTAMINATION IN A MAJOR DISASTER

In peace-time this is more likely to take place in an industrial complex or in the process of transporting chemicals in bulk. Lorries and railway carriages which are carrying dangerous chemicals are clearly labelled with the name of the manufacturer, their address and telephone number on a HAZCHEM board attached to the vehicle (see example over). This sign also includes an emergency action code which is composed of a number band and two letters. The number is a code informing the fire and rescue services about the agent that should be used to combat the fire resulting from any spillage: (1 = water jet, 2 = water fog, 3 = foam and 4 = a dry agent). The first letter gives information about the explosive risk of that chemical, the method for its disposal and the protective apparatus to be used. If the letter 'E' is appended as a second letter this means that evacuation of the area would have to be considered. AUN (United Nations identification code) is also present; this is an internationally recognised and agreed coding system for all chemicals which is regularly updated. In the cab of the vehicle a copy of the transport emergency card (TREM CARD) is carried; this is issued by the European Council of Chemical Manufacturers Federation.

Nationwide regulations have been in force, referred to as CIMAH (Control of Industrial Major Accident Hazards) since 1984. These regulations are enforced by the Health and Safety Executive and are concerned with off-site hazards and risks to both population and the environment. In addition, in areas where there is a conglomeration of industrial complexes voluntary committees meet regularly to discuss and update the organisation of any systems and methods to control a major emergency incident. For example, in the Grangemouth area of Scotland, where seven companies dealing with the petrochemical industry are located, a Major Incident Control Committee meets regularly. It has long recognised the need for an overall co-ordinated response to a major incident and for a number of years has agreed procedures with the emergency services for controlling a major incident. The Commission of European Communities considered a revised EC Directive for the Control of Major Accident Hazards (COMAH) to streamline and help enforcing regulations.

Guidelines, issued a few years ago, have placed on the Consultants in Communicable Diseases (CCDC), attached to Health Authorities and Boards, a formal requirement to ensure that there is access to the necessary advice and expertise on public health hazards arising from chemical contamination and to assist with the preparation of plans to respond to such emergencies. In minor incidents which involve a very small number of people in a limited location, the CCDC will ensure that all the cases receive the necessary hospital care; they will consult with the other agencies, as a matter of urgency, to determine the size and sort of the local control team which is needed. There will also be a need for environmental and biological samples to be collected and for preparation of a register of those affected or exposed for follow-up. The CCDC will also liaise with (a) the appropriate authorities; (b) with the Accident and Emergency Departments dealing with the victims regarding the best advice to be given to the public, particularly if there has been any contamination of drinking water and foodstuffs, and the information that would be divulged to the media, and (c) produce the criteria for deciding when the episode is over. The National Poisons Information Service (NPIS) Centres are an invaluable source of authoritative and up-to-date advice on the recognition, diagnosis, investigation and treatment following exposure to chemicals. These are located at Belfast, Birmingham, Cardiff, Edinburgh, Leeds, London and Newcastle.

These aspects would require to be addressed in major incidents which would be classified according to their complexity, the number of casualties and fatalities, the toxicity of the chemical substances involved

and their potential for dispersal and dissemination as a gas, vapour or particulate cloud and on clothing, livestock, equipment and vehicles. The CCDC will co-ordinate all the activities concerned with epidemiological investigations and the collection of samples, health risk assessment and the preventative actions to be taken. The surveillance and monitoring of the affected population also have to be co-ordinated by the CCDC. Detailed clinical records of those affected will be created along with a register of those who have been exposed but who apparently have not suffered from any illness. The Department of Health also has an Advisory Group on Chemical Contamination Incidents (HAGCCI) and this group would advise and assist with these procedures.

Only after any fire is under control and the casualties have been removed from the site will attention then be directed towards the fatalities. At the scene the fire service is responsible for identifying and containing the hazard. Particularly in the case of an industrial concern, the need to establish the cause of the accident would be paramount, particularly in terms of avoiding similar episodes in the future and excluding any form of culpable negligence.

The health and safety of the personnel retrieving the deceased would also be a high priority and this will be closely monitored and directed by the emergency services. Rescue attempts will only be made when the incident site has been declared safe. Safety equipment, such as breathing apparatus and special protective clothing, may have to be worn.

Once the bodies are retrieved they will be swabbed and other appropriate external samples taken to prove that there has been contact with the chemical. Then they are carefully washed and any clothing on them removed and retained. This decontamination may require the use of other chemicals and, almost certainly, large quantities of water.

Once the bodies have been declared safe to work on by the appropriate knowledgeable personnel, the pathologist will be allowed access to them. Special protective clothing, including breathing apparatus as necessary, may be required in the process of conducting the autopsy. The retrieval of appropriate samples for toxicological studies forms an essential part of the autopsy and guidance as to which specific specimens would be required will have to be taken from the appropriate toxicologists.

HAZCHEM identification

3PE	NATURE OF HAZARD LOGO	
U.N. IDENTIFICATION CODE		
TELEPHONE NUMBER FOR ADVICE		MAKER'S LOGO

APPENDIX II

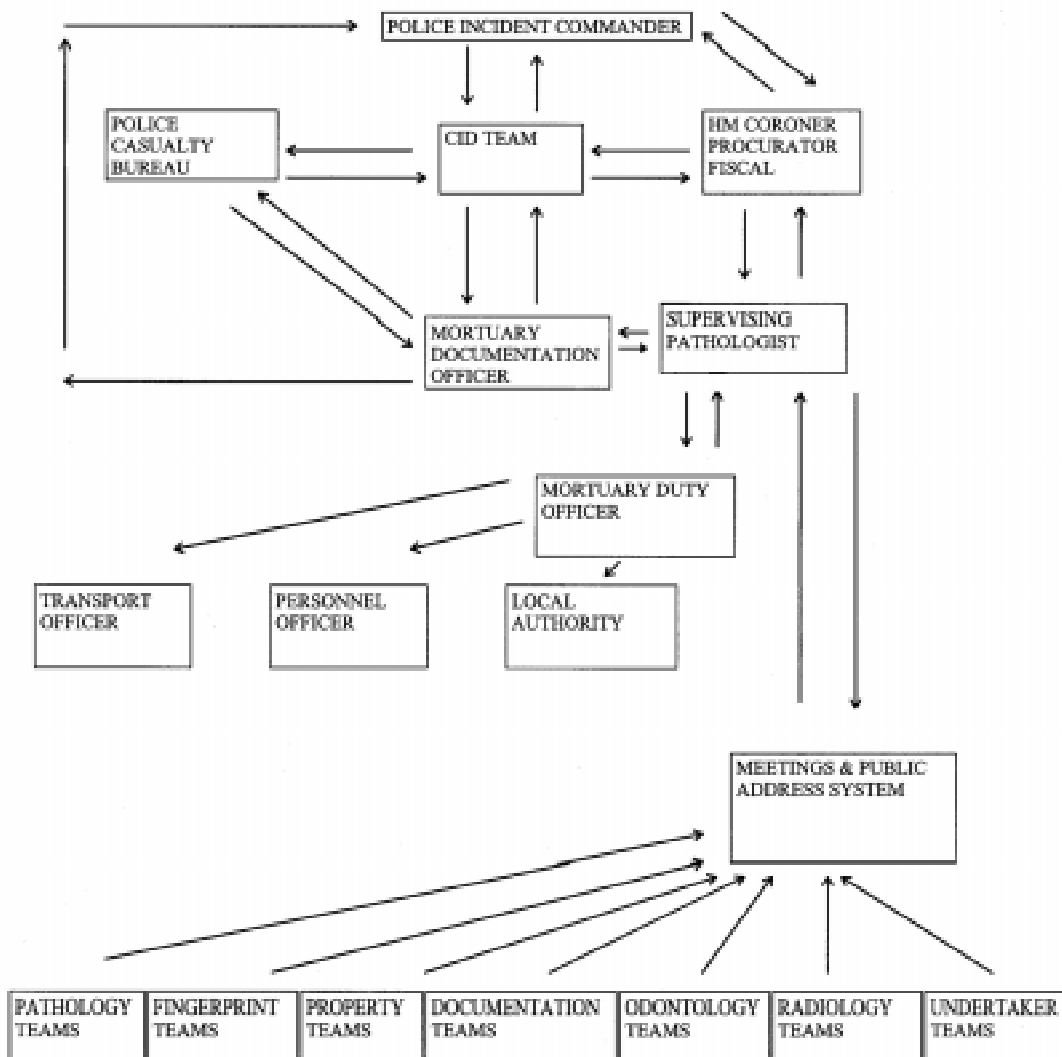
FURTHER READING

- Dealing with Disaster; (Home Office Guidance) 1997 ISBN 185-893 9208 ¹
- Deaths in Major Disasters - the Pathologist's Role (1st Edition); Royal College of Pathologists 1990, 2 Carlton House Terrace, London SW1Y 5AF (out of print)
- Dealing with Fatalities During Disasters; Report of the National Working Party October 1994 (Civil Emergencies Adviser to Home Secretary)
- The Identification of the Deceased following Mass Disaster; Metropolitan Police, T020 Branch, Room 728, New Scotland Yard, London SW1H 0BG
- Disasters: Planning for a Caring Response; 1991 report of a working party set up by Dept of Health: HMSO ISBN 0 11 321370 0
- Responding to a Disaster - the human aspects; produced by the Emergency Planning Society c/o Pyramid House, Fourth Way, Wembley HA9 0LG
- Weedu VW Post mortem identification of remains
Clinics in Laboratory Medicine 16 (1) 115-37 1996

¹ Available through Brodie Publishing, 110 Duke Street, Liverpool L1 5AG (tel: 0151 707 2323)

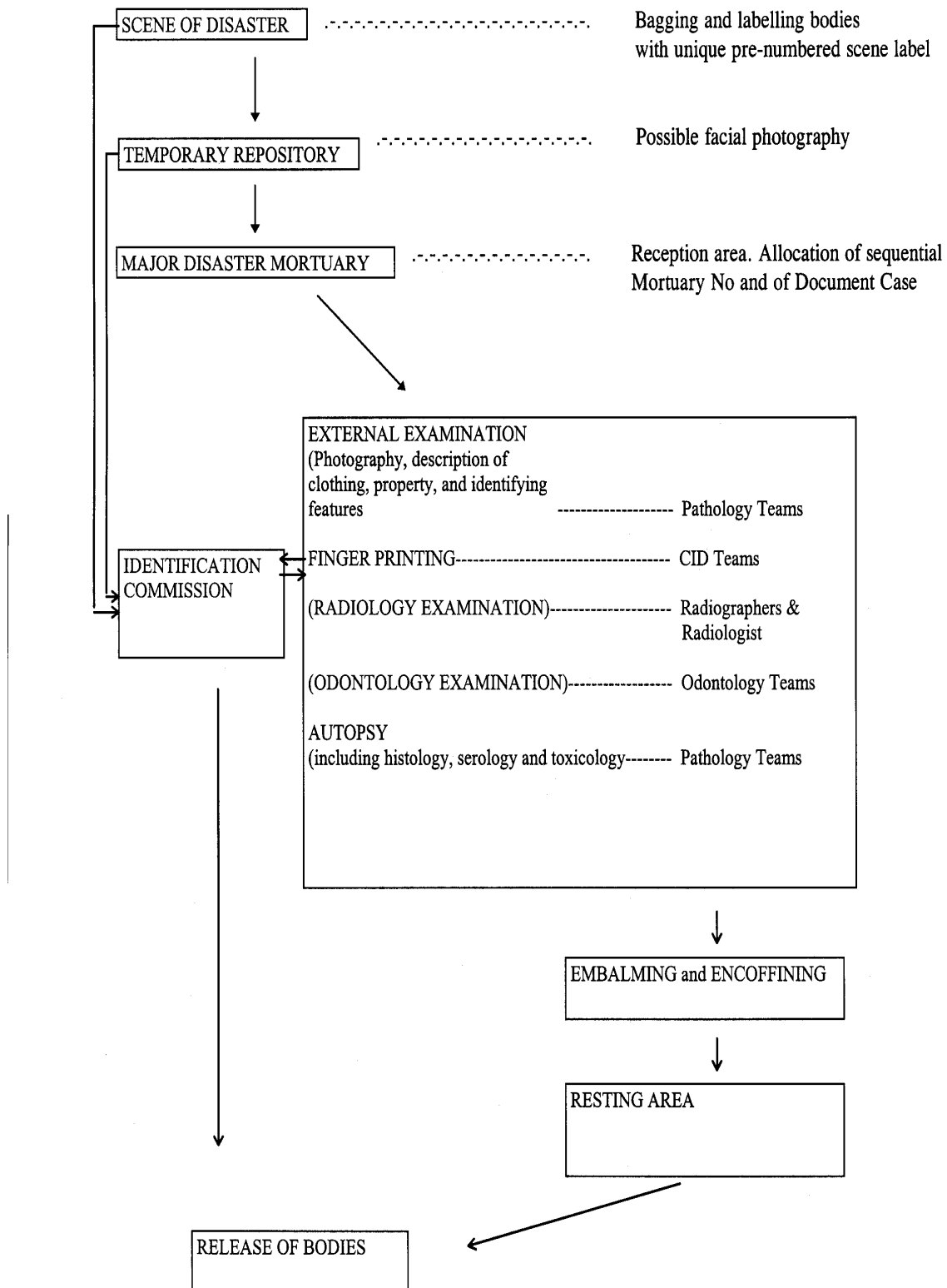
APPENDIX III

COMMUNICATIONS PLAN



APPENDIX IV

MASTER PLAN/FLOW PLAN FOR PATHOLOGICAL INVESTIGATION OF A MAJOR DISASTER



APPENDIX V

LIST OF EQUIPMENT REQUIRED:

At the scene

Body bags
Pre-numbered scene labels and indelible pens (Appendix VI)
Protective clothing: Overalls
 Gloves
 Boots
 Masks
 Helmets

Torches
Tabard

At the Major Disaster Mortuary

Document cases
Trolleys
Mortuary labels (Appendix VII)
Protective clothing: Overalls
 Aprons
 Gloves
 Masks
 Boots

Check List (Appendix VIII)
Instruments: Scalpels (large and small)
 Scissors (large and small)
 Brain cutting knives
 Saws (hand and electric)
 Forceps
 Probes
 Rulers and tape measures
 Metal 'T' keys and dural strippers
 Syringes
 Sewing-up needles
 Head blocks
 Cut-up boards

Other materials: Tow, cotton wool
 Twine
 Towels
 Paper tissues
 Wedges for trolley wheels
 Buckets
 Bowls
 Sponges
 Plastic bags for refuse disposal (Appendix IX)
 Plastic bags for property and clothing
 Specimen pots, various sizes
 Toxicology and DNA kits

Labels for specimen pots
Formalin

Radiology Equipment: X-ray equipment, including lead screens, protective aprons
& gloves
X-ray developing facilities, including dark room equipment
X-ray reading facilities, including illuminated boxes

If necessary: Washing machines and driers
Refrigerators for specimens

APPENDIX VI

SCENE LABELS

(2 per pre-numbered Scene Number)

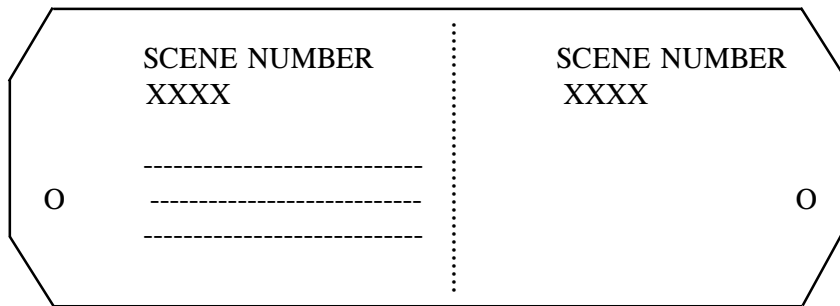
(1 plastic plaque bearing the same Scene Number for staking at the site of retrieval)

Date and time life pronounced extinct.....

Name and initials (printed) of certifying doctor.....

Location of body/or part.....

Scene Number.....



tied to body

tied to body bag

(not to scale)

APPENDIX VII

MORTUARY LABELS

Scene Number.....

Mortuary Number.....

Date and time of admission to mortuary

.....

APPENDIX VIII

MORTUARY CHECK LIST

MORTUARY No.....

<u>Procedure</u>	<u>Time & Date</u>	<u>Initials of Examiner</u>
Photography of face		
Finger printing		
Description of clothing, jewellery		
Photography of identifying features		
External description		
Dental examination		
Radiology examination		
Autopsy		
Toxicology		
Histology		
Embalming		
Encoffining		

APPENDIX IX

DISPOSAL OF WASTE MATERIALS FROM THE MAJOR DISASTER MORTUARY

Plastic bags should be provided as follows:

BLACK	for uncontaminated “household” waste. Exclude all material contaminated with body fluid or tissues. Exclude all aerosol cans.
YELLOW	for clinical and potentially hazardous material which may have been contaminated with body fluid or tissues. Exclude aerosol cans.
RED	for radioactive waste materials.
SPECIAL CONTAINERS	for disposal of “clinical sharps” - needles, syringes, broken glass or other sharp instruments.

All bags should be sealed when 2/3rds full, with adhesive tape. They should be clearly labelled. Disposal should be arranged with the Local Authority to comply with the Health and Safety at Work Act (1974).