DISASTER VICTIM IDENTIFICATION GUIDE

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CHAPTER 1 - GENERAL REMARKS

1.1 Foreword

The first Interpol Disaster Victim Identification Guide was published in 1984 and revised in 1997. The experience gained by the existing international community of DVI Teams (Disaster Victim Identification Teams) in various operations has been taken into account in the current version.

The Guide contains recommendations for the identification of disaster victims. The specific religious and cultural needs and national idiosyncrasies or laws and directives of the Member States must be taken into consideration during an operation, but will not be discussed any further in the explanations of the Guide. It is also not possible to deal with all conceivable operational scenarios.

The use of links provides a means of updating the DVI Guide continually, thereby eliminating the need for a complete revision of the Guide every ten years.

1.2 Goals

The DVI Guide provides guidelines for use by Interpol Member States in the identification of disaster victims. It can serve as a basis for Interpol Member States which do not have their own DVI teams or have never been confronted with such operational situations to set up a DVI Team and to manage DVI operations. It also provides important supplemental information for Interpol Member States which have DVI teams of their own.

The most important requirement for victim identification work is the application of international standards, which are the common basis for the work in multinational DVI operations.



1.3 Guidelines for the identification of disaster victims

All measures are designed to contribute to the positive identification of victims.

The highest possible quality standards must be applied. It is also essential to respond to relatives' need for certainty as soon as possible. Victims are to be treated with dignity and respect.

DVI teams work in an interdisciplinary manner and engage the services of experts in various different fields, as needed.

In order to establish, maintain and review standards and promote effective international co-operation, Interpol calls upon each Member State to make preparations for DVI operations. If a disaster occurs in a country which does not have its own DVI team, support by other DVI teams can be requested through Interpol.

Experience has shown that cooperation with other DVI teams is advantageous when disaster victims of different nationalities are to be expected. If there are victims from other nations, the nation in charge should do its utmost to secure participation from those other nations, at least as liaison officers, particularly from the medical and dental specialties, but also from the police.

re generally, if there are victims from other nations, the nation in charge should do its utmost to secure participation from those other nations, at least as liaison officers, particularly from the medical and dental specialities, and also from the police system in order to facilitate the exchange of information (particularly AM information).

Interpol forms should be used to document victim identification and AM (ante mortem) and PM (post mortem) data. . It is suggested, that IP forms can be used in single cases – to get familiar with theses forms. They can be used as hard copies, as Pdf files download from the IP-homepage and in a software system.

1.4 Disaster classification

A disaster is an unexpected event causing the death or injuring many people. Many different kinds of events can lead to disasters. Thus DVI operations may be required following traffic accidents, natural disasters, technical accidents (fires, explosions), terrorist attacks and events occurring within the context of wars. It is important to distinguish between open and closed forms of disasters. An open disaster is a major catastrophic event resulting in the deaths of a number of unknown individuals for whom no prior records or descriptive data are available. It is difficult to obtain information about the actual number of victims following such events. A closed disaster is a major catastrophic event resulting in the deaths of number of individuals belonging to a fixed, identifiable group (e.g. aircraft crash with passenger list). As a rule, comparative ante mortem data can be obtained more quickly in the case of closed disasters. Combinations of these two forms are also conceivable (e.g. aircraft crash in a residential area).



CHAPTER 2 - DISASTER MANAGEMENT

2.1 Basic principles

The chapter devoted to "Disaster Management" contains recommendations regarding structures and procedures to be followed in the event of a disaster. All recommendations are to be applied in keeping with actual work to be performed and available resources. Special procedures which may be used in national emergencies or during wartime are mentioned but not discussed in detail. However, the standards applicable to these situations are fundamentally the same.

Due to uncertainty with regard to the extent of damage and the lack of reliable information, initial emergency responses immediately following a disaster are often difficult to set up. Coordination at all levels (local, regional, national and/or international) is urgently needed, however. Although disaster response plans often provide for corresponding coordination mechanisms, these may not be in place immediately following a disaster and are ordinarily not designed for the specific case in question. (It is very necessary to take into account during the first emergency response, as soon as possible, an efficient management of the cadavers).

Coordination of the following activities is indispensable for effective disaster response:

- information management and status analysis
- identification of required personnel and material resources
- implementation of operational plans for victim management
- provision of accurate information regarding the identification of previously missing victims to families and local authorities

Effective coordination of a disaster response operation can be ensured only on the basis of a properly functioning structure, as in most cases a number of different agencies and organizations with different functions and responsibilities are required to work together. Chaos can be avoided by implementing a clearly defined command structure and standard channels of communication.

In order to achieve, maintain and improve standards, and to facilitate international liaison, Interpol recommends that each member country establish one or more permanent Disaster Victim Identification Teams. They should have a responsibility not only for disaster response, but also for the vital functions of preplanning and training of key personnel. They may by virtue of their position suddenly become involved in, or responsible for, one or more of the many aspects of a disaster including victim identification.

The identification procedures described later in this Guide assume that post-disaster intervention will be organized; they are intended to serve as a sound basis upon which to develop disaster victim identification practices and standardize them in many respects. The advice may be of particular help to member countries, which do not have permanent Disaster Victim Identification Teams.

Every disaster response operation begins with emergency measures designed to prevent or reduce further danger:

- First-aid for injured victims
- Personal security measures
- Property security measures.

The protection of life has priority over all other measures. This applies not only to victims but also to personnel assigned to the disaster response operation. An assessment of the disaster is an absolute prerequisite for personal security.

Such assessments must take into account the type of disaster (natural disaster, aircraft crash, railroad accident, etc, see in Chapter 1) and the resulting hazards (fires, biological or nuclear contamination) as well as all other potential sources of danger (e.g. recurring tidal waves, etc.).

In order to prevent and reduce further danger, the disaster site or area must also be secured. The site or area should be sealed off at sufficient distance. This enables disaster response forces to work without disruption, ensures the integrity of evidence and keeps away individuals who have no need or authorization to be present (spectators, reporters, etc.).

Police and fire-fighting units must also be called to the site to provide technical support.

The family assistance and public relations work should also be integrated into the basic operational structure from the outset.

The recommendations contained in this chapter must be adapted in keeping with available personnel and material resources in each individual disaster situation. An effort has also been made to list the procedures in a logical sequence. However, the rule of thumb applicable to all disaster response operations is that the many activities described should be initiated and carried out simultaneously by the various agencies, organizations and individuals involved. The particular circumstances of a given disaster may require changes in the sequence described below.

The names of official agencies and operational units used in the following sections have been selected in a way that describes their respective functions. All Member States should use their own designations wherever appropriate, of course.



2.2 Initial action at the disaster site - obtaining an overview of the situation

Once disaster response forces have arrived at the disaster site, the first priority is to obtain an overview of the scope of the disaster. An official organization or agency must assume command of the operation as a whole in order to ensure effective coordination of personnel and material resources. In most cases of disaster, the police assume command responsibility for the operation as a whole (exceptions: national emergencies in which responsibility is assumed by a government ministry; wartime disasters in which the military/defence ministry has overall responsibility).

An advance team (Head of DVI team, a forensic pathologist and 2 police officers) should as early as possible be present sent at the scene to evaluate the situation:

- Area extent of the scene
- State of the corpses
- Evaluation of the duration of the process
- Medico-legal institute able to respond (Distant or special equipment at the scene)
- Methodology to remove the bodies (Composition and number of teams)
- Transportation of corpses.
- Storage

Organisation of a Pre-operation meeting:

- The objectives, the methodology, the requirement to remove the bodies are not well-known or understood by the other actors.
- The duration of the process must be evaluated.
- Participants (under the responsibility of the DVI team): Investigators (technical, judicial, criminal), firemen, red-cross, magistrates and everybody involved. (Take time to organize it!).

The agency or organization which assumes command responsibility for the disaster response operation makes the following initial assessments:

- Assessment of the scope of damage
- number of casualties
- transportation of injured/dead
- information about the number of other missing persons
- property damage incurred

Identification of assigned operational forces:

- disaster response forces (fire brigades, emergency rescue services, police personnel, etc.) currently at the site; identification and documentation of commanders (to include contact data)
- If rescue and/or recovery measures already been initiated in all relevant areas, how much time are such measures expected to require have to be noted
- Changes having been made at the disaster site should be described Reports from responsible officials are to be requested and/or the questioning of operational personnel is to be initiated.

Measures required restoring safety at the disaster site:

- To find if any information is available on building-related sources of danger
- Have hazardous substance measurements been performed?

Site security assessment:

- Type and scope of external barriers
- Measures have to be taken to block the view of the site to unauthorized persons (curious spectators, representatives of the press, etc.)
- An entrance (beaten path) to the scene of the incident has to be marked.
- Located corresponding access points have to be noticeable.
- If site access control records been maintained they should be turned over to the responsible officer.
- Check of all individuals present at the site to determine purpose of presence and authorization; corresponding data must be recorded; unauthorized persons must leave the secured area.
- Collection points to be set up within the secured area or additional areas must be blocked off and secured for this purpose.

Documentation of the disaster response operation:

- To state what written documentation has been prepared
- To state if photographic/video evidence has been collected
- To find if sketches/maps of the disaster site/area have been prepared or have been ordered.

Information released from within the disaster site/area:

- Information what has been released to the press (when and by whom)
- To find if any agreements have been reached with representatives of the media at the disaster site
- To state what other official agencies have been informed
- To find if a single point of contact has been established for information released to mass media

2.3 Organization of a disaster response operation

Once an initial overview of the situation has been obtained at the site of the disaster, distinct operational units must be formed to carry out remaining disaster response measures. These units should be assigned specific duties and responsibilities:

- Central Emergency Rescue unit
- Central Investigation Unit, including Evidence Collection and Scene-of-Crime.
- Victim Identification Unit, including Recovery and Evidence Collection
- Disaster Investigation Unit responsible for determining the cause(s) of the disaster

The Disaster Operations Command must take all action to promote effective communication between all operational units in order to ensure that required information is conveyed to the appropriate recipients.

2.4 Central Emergency Rescue unit

Functions and responsibilities

In most cases emergency rescue measures are immediately initiated at the disaster site, often by survivors of the disaster or other persons in the immediate vicinity. Emergency rescue personnel alarmed by victims or witnesses then arrive somewhat later.

Initial oral reports to emergency rescue units rarely provide detailed information or a clear indication of the scope of the disaster and the number of victims.

Therefore the commander of the emergency rescue units must obtain an overview of the actual situation in cooperation with police units at the site and then initiate the following measures:

- Measures to ensure that medical personnel are readily recognizable
- Rescue and immediate medical treatment of survivors
- Establish emergency stand-by readiness at local hospitals (crisis plans)
- Determine hospital admission capacities; coordinate the transportation of injured victims
- Set up provisional medical treatment stations in the vicinity of the disaster site as needed. Determination of the number of victims having left the site in panic due to shock.
- Prepare documentation on the number, conditions and identities of injured persons as a basis for continuous reporting to the disaster operation command.
- Provision of information to injured victim collection points, hospitals and outpatient clinics
- Establishment of a first-aid station/field hospital staffed with physicians and medical assistants as a transit station for all survivors as needed.
- Responsibilities change once survivors have been removed from the disaster site. Clearing operations continue, but technical experts and victim identification specialists can now perform their respective duties under their own authority.
- If, during rescue operations, it is necessary to move cadavers, it is important to know who moved it and from and to where. Avoid undressing or removal of jewelleries on the bodies.

To be able to prepare the list of missing people (AM), it is a necessity to know exactly where the injured victims have been taken.

2.5 Central Investigation unit

Functions and responsibilities

- Containment of the disaster site/area, as complete security is essential in order to ensure optimum progress of emergency rescue operations and to protect evidence and the public.
- Survey of the disaster site/area as needed (GPS, laser surveying equipment, photographic documentation, photogram metric surveying)
- Securing the disaster site to prevent access by unauthorized persons (fences, barriers, if necessary guards)
- Ensuring safety prior to access to the disaster site
- Procurement of wide-area photographs, maps and/or layouts of the disaster site (numbered building floor plans)
- The preparation of grids is recommended for outdoor disasters (aircraft crashes, railroad accidents and similar), in order to ensure more complete and effective processing of the resulting sectors. The arrangement of sectors in a chessboard pattern will facilitate the subsequent search for evidence and recovery of bodies substantially.
- Establishment of fixed paths with specific entrance and exit points wherever possible. Conduct identity checks of individuals entering or exiting at these points.
- Assignment of specific responsibilities to civilian volunteers as appropriate.
- Individuals without need or authorization to be present at the disaster site must be ordered to leave the site.
- Procurement of personal data from possible witnesses.
- Establishment of transport control stations, parking areas, entry and exit routes, helicopter landing pads, etc.

2.6 Victim Identification unit

Functions and responsibilities

In order to ensure thorough search and photographic documentation, recovery and victim identification teams require accurate maps of the disaster area. As far as possible, the disaster site should be overlaid with a grid in order to facilitate search operations. This method has proven particularly effective for relatively large disaster areas. The grid consists of a base line which proceeds from or runs between identifiable fixed points on the ground as well as parallel lines drawn at intervals for instance of 10 m (but depending of the situation), thus forming square sections in which methodical searches can be conducted. To the extent possible, the grid should cover the entire disaster area.

Explicit descriptions of individual tasks involved in recovery, evidence collection and victim identification are provided in the following chapters of this guide.

Within the context of disaster management, the "Recovery, Evidence Collection and Victim Identification unit" should be structured as follows:

Command:

The command of this operational unit takes all required decisions and issues all necessary orders. The command also represents the unit in relations with other agencies.

It maintains contact with the overall disaster management command and other agencies/organizations involved in the investigation into the causes of the disaster (and to diplomatic missions in operations abroad) and can also be responsible for the release of information to the media. The command of the Recovery, Evidence Collection and Victim Identification unit specifies the number of operational personnel required by the unit and takes all necessary decisions regarding material resources.

Management and communication staff:

The management and communication staff carries out all required emergency measures in accordance with a prepared catalogue and serves as the central information collection point for Recovery, Evidence Collection and Disaster Victim Identification unit.

Specific duties and responsibilities:

- ldentification and provision of personnel resources for the unit
- Maintenance of an operational timetable
- Organization of communication channels, coordination of the flow of information
- Procurement of information regarding the disaster
- Reporting to relevant operational authorities
- Procurement of vehicles for operational personnel
- Establishment and maintenance of contacts with other involved domestic and foreign agencies and other organizations (e.g. travel agencies, airlines)
- Public and press relations (press office)
- Determination of the flow of information from victim identification to issuance of a death certificate
- Technical support for identification and documentation
- Liaison with embassies, inter-agency organizations, international organizations, etc.

Recovery and Evidence Collection Team

The Recovery and Evidence Collection Team is responsible for the recovery of bodies at the disaster site and the collection and preservation of evidence and property at the site as well as the personal effects of victims within the extended area around the disaster site (e.g. suit-cases in hotels, etc.). Further details are provided in Chapter 3.

AM Team

The AM Team collects ante mortem data required for the identification of victims, prepares corresponding missing-persons files and notifies the relevant authorities regarding completed identifications. Further details are provided in Chapter 5.

PM Team

The PM Team collects all relevant dental medical and forensic data obtained from the bodies of deceased victims for the purpose of identifying said victims.

The team consists of experts in the fields of fingerprint analysis, forensic pathology, forensic odontology and DNA analysis.

Further details are provided in Chapter 6.

Reconciliation Team

The Reconciliation Team is responsible for matching AM and PM data records, which ultimately leads to victim identification. In cases in which matches are identified, the Reconciliation Team submits the corresponding documents to the Identification Conference for review and final decision. Further details are provided in Chapter 7.

Care and Counselling Team

The Care and Counselling Team provides medical and psychological care and counselling for personnel in the Recovery, Evidence collection and Victim Identification unit.

The team is also the point of contact for relatives of disaster victims within the context of family assistance. The team receives professional support for this difficult work from physicians and trained psychologists. Further details are provided in Chapter 8.

Identification Board

The Identification Board is a group of experts which meets at regular intervals to discuss and verify proposals submitted by the Analysis/Reconciliation Team. The Board makes final decisions regarding the identification of given victims and certifies these decisions on the DVI form.

2.7 Disaster Investigation Unit

Following the completion of evidence collection and scene-of-crime work, emergency rescue measures and the identification of victims, investigation into the cause or causes of the disaster is the last step in the disaster response operation. However, investigation of the causes of the disaster begins at the beginning of the operation within the framework of central investigations and is therefore relevant to disaster management.

The investigation into the causes of a disaster is not only a police responsibility, nor do the findings of the investigation have a direct impact on the overall disaster response process. Therefore, this guide contains no further discussion of this topic.

CHAPTER 3 - RECOVERY AND EVIDENCE COLLECTION

As a rule, the search for the bodies of victims of a disaster cannot begin until all survivors have been rescued. The emergency rescue units which arrived at the disaster site ahead of the recovery teams must be informed accordingly that, while life-preserving rescue measures and medical care take precedence, care must be taken during these emergency measures to ensure that as many bodies and body parts as possible as well as other evidence, personnel effects, etc., are left untouched.

The recovery of bodies/body parts and the preservation of evidence/personal effects found at the disaster site represent the first steps in the victim identification process, and these operations are initially chaotic and disorganized in most cases. Due to the large number of often very different organizational units involved in this process, communication and coordination of functions and responsibilities is very difficult.

In order to overcome this initial chaos to the extent possible, a structured search and discovery phase should be prepared in cooperation with the Evidence Collection Team, the Disaster Investigation Team and the Access Control and Security Team. This phase includes the search for bodies, property and evidence (which may also be used in the subsequent investigation into the causes of the disaster).

In cases of disasters with large numbers of victims, the establishment of an operational section for recovery and evidence collection is an absolute necessity. This operational section is responsible for:

- the recovery of all bodies and body parts at the disaster site;
- the collection and preservation of property found at the disaster site which does not correspond directly to the recovery of a body or body part;
- collection and preservation of other personal effects of disaster victims found in the extended surroundings of the disaster area (e.g. personal belongings of victims in hotels, etc.).

Wherever possible, responsibility for recovery and evidence collection operations should be placed in the hands of the police who might call on various specialists, such as odontologists and pathologists that are trained to recognize and differentiate human tissues as needed.

3.1 Recovery and evidence collection/preservation procedure

Prior to the commencement of operations, operational personnel must be briefed on the overall situation. This briefing process also includes the final assignment of responsibilities to be carried out with the assistance of subordinate external helpers and the issuance of required sketches and maps of the disaster area.

The disaster site is searched and processed methodically on a sector-by-sector basis. Each individual team should be assigned a specific sector of the disaster area defined by the sector operations commander. Before entering the disaster area, operational personnel must be equipped with appropriate safety gear and clothing (helmets, overalls, boots, rubber gloves, etc.) and provided by the Recovery Command Centre with the necessary recovery documents for each body/body part and item of evidence.

These teams are responsible for ensuring that a thorough search of the assigned sector is conducted.

In order to perform the following tasks in a responsible manner, the following principles must be observed:

- The matching of separate body parts should be performed only by authorized forensic medical experts, and not by recovery personnel. More generally, it has to be avoided and each body part should be labelled. Medical and dental experts should be at the scene to assist the police in collecting body parts and particularly bones and teeth.
- During recovery operations, personnel should not search for evidence of identity or remove objects from victims' clothing (exception: evidence collection teams; here a thorough documentation is to be carried out) or place such objects in victims' clothing.
- Should it become evident during the recovery operation that the condition of bodies may change rapidly due to external influences (weather, etc.); a DNA sample (from whole blood) should be obtained from the victims prior to commencement of the recovery operation. (A corresponding order must be issued by the commander of the Recovery and Evidence Collection Team.)

The Recovery and Evidence Collection Team performs the following tasks relating to the recovery of bodies:

- Localization of all bodies/body parts
- Exposure of the body, if necessary (with the aid of appropriate support personnel and suitable equipment)
- Marking of bodies/body parts with an evidence plate or numbered post on which the recovery number is clearly readable and cannot be erased.
- Assignment of a separate, unique number to each body/body part
- Documentation of the discovery site (description, photos, sketch or survey of the position of the body with the aid of GPS and/or crime scene surveying instrument)
- Photographic documentation of the body for recovery files and forensic medical examination
- Attachment of the recovery number to the body/body part. This number is used as the body reference number and remains affixed to the body/body part during the entire identification process.
- Completion of the Interpol DVI Post Mortem Form (pink), Part B, (Recovery Data), with reference to the recovery number
- Placement of the body/body part in a body bag; attachment of the recovery number to the outside of the body bag; sealing of the body bag
- Removal of the body/body part and transport to the Recovery Command Centre
- Preparation and compilation of recovery documents and submission of documentation to the Recovery Command Centre; procurement of new recovery documents as needed
- Transfer of the body/body part and recovery documents to the Recovery Command Centre

Methodology to remove the bodies

- Search plan adapted to the area
- Controlled access (remains and belongings not removed or disturbed)
- Enough stakes, body bags and tags
- Grid and exact location of bodies and fragments (especially burned and fragmented remains) (according to other remains, evidences).
- Remains and belongings placed in the same bag
- Parts of remains in separate bags
- Photographs and written documents of everything
- Remains and body bag with the same number.

The following tasks must be performed with respect to property and personal effects:

- Localization of property at the disaster site as well as personal effects within the extended area of the disaster
- Marking and documentation of the situation in which property is found
- Completion of the evidence list in the recovery documentation, including entry of the body recovery number
- Labelling and packing of property; evidence-preserving packing of large objects (e.g. luggage items) is not required. Evidence tags can be used to identify such objects.
- Once objects have been documented and roughly prepared as evidence, property should be transferred without delay to the Evidence/Property Collection Centre, accompanied by the corresponding evidence list. If the Evidence/Property Collection Centre is not located in the immediate vicinity of the site, a site evidence administrator should be appointed and tasked with collecting/forwarding property/personal effects to the Evidence/Property Collection Centre.
- Personal effects of victims in the extended surroundings of the disaster site (e.g. hotel rooms, etc.) should also be localized and collected.
- These items must also be listed in an evidence list provided with the recovery documents.
- The receipt/transfer of personal effects is recorded in a receipt/transfer record signed by the receiving and transferring parties (preservation of the "chain of custody").
- Received personal effects are also forwarded to the Evidence/Property Collection Centre, accompanied by the evidence list and the receipt/transfer record.

Both property and personal effects often serve as a) useful aids in the identification of victims and b) their importance to surviving relatives in their efforts to come to terms with their grief cannot be overestimated.

3.2 Collection points

3.2.1 Recovery Command Centre

In consultation with the operations sector commander, the Recovery Command Centre is to be set up in the immediate vicinity of the disaster site. It can serve as a morgue station – in any case it serves as a body collection centre (site) for bodies and body parts delivered by the Recovery and Evidence Collection Teams. The Command Centre ensures proper temporary storage of bodies/body parts and maintains victim recovery lists on the basis of data obtained from recovery reports.

The Recovery Command Centre also provides for the issue of recovery documents/materials to the Recovery and Evidence Collection Teams:

- Recovery report (Interpol DVI Post Mortem Form (pink), Part B)
- Evidence lists
- Number plates
- Body bags
- Seals

The recovery documents are reviewed by the Recovery Command Centre to ensure completeness both at issue and on return.

3.2.2 Evidence/Property Collection Centre

The Evidence/Property Collection Centre should also be established in the vicinity of the disaster site in consultation with the Commander of the Recovery and Evidence Collection Team. Evidence/property found at the disaster site is collected at the Collection Centre along with personal effects of disaster victims.

On the basis of the large number of evidence lists reviewed for completeness and correctness by the Collection Centre, a master evidence list of all found and registered objects is prepared. Collection Centre staff is responsible for deciding which incoming objects are relevant and suitable for identification purposes and which should be handled as items of property.

Objects of relevance to identification are identified and listed accordingly. Information relating to personal identity derived from these objects is forwarded to the Victim Identification Team.

The Evidence/Property Collection Centre also performs the following functions:

- Assurance of proper packing and storage of collected objects
- Preparation of hand-over records for items of evidence which must undergo further examination for purposes of identification or forensic analysis before completion of scene-of-crime operations.
- Examination of property items for information of relevance to identification and classification as evidence, as required (e.g. items of value/personal documents, etc.) Separate storage of objects identified as property and notation as "property" in the "Remarks" section of the evidence list
- Preparation of photographs of items of property as required for purposes of identification/matching
- Arrangement for return of property to owners/entitled recipients

CHAPTER 4 - METHODS OF IDENTIFICATION

Victims of a large-scale disaster are identified on the basis of an assessment of multiple factors. The degree to which bodies are damaged, the time bodies have been left exposed and the associated changes in the condition of bodies influence the nature and quality of post mortem data and the applicability of specific methods of identification.

Methods of identification used in cases of disasters must be scientifically sound, reliable, applicable under field conditions and capable of being implemented within a reasonable period of time.

The primary and most reliable means of identification are fingerprint analysis, comparative dental analysis and DNA analysis.

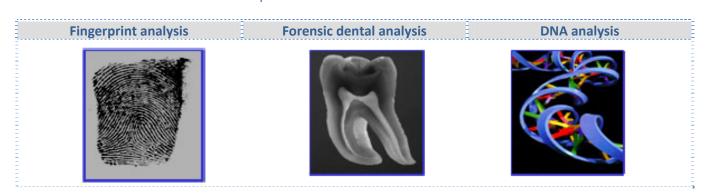
Secondary means of identification include personal description, medical findings as well as evidence and clothing found on the body. These means of identification serve to support identification by other means and are ordinarily not sufficient as a sole means of identification.

All possible methods should be employed. Identification based solely on photographs is notoriously unreliable and should be avoided at all costs. Visual identification by a witness may provide an indication of identity but is not sufficient for positive identification of victims of large-scale disaster, as the victims are often so traumatised that visual comparison is impossible and because relatives are frequently unable to cope with the psychological stress involved in confrontation with deceased victims. Identification based solely on photographs is notoriously unreliable and should be avoided.

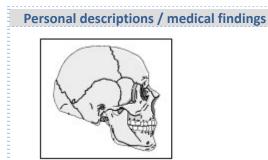
All post mortem data obtained from bodies are evaluated with reference to information obtained on missing persons. As it is impossible to know in advance what data can be obtained from bodies and what information can be obtained for purposes of comparison at the victim's place of residence, all available information (both AM and PM) must be collected and documented.

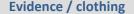
The following symbols are used in reference to the individual methods of identification (These appear throughout this guide):

Primary methods of identification



Secondary methods of identification







4.1 Individual methods of identification:

Fingerprint analysis:

There are three reasons why fingerprints are reliable indicators of identity:

- Fingerprints are unique:
 Absolute congruence between the papillary ridges in the fingers of two different individuals or in different fingers of the same persons does not exist.
- Fingerprints do not change:
 Papillary ridges are formed in the fourth month of gestation and remain unchanged even be-yond death.
 They grow back in the same pattern following minor injuries. More severe injuries result in permanent scarring.
- Fingerprints can be classified:
 Because fingerprints can be classified, they can be identified and registered systematically and thus subsequently retrieved easily for purposes of comparison.

Forensic Odontology:

The unique structures and traits of human teeth and jaws readily lend themselves to use in the identification of living and deceased victims. Dental data can be recovered and recorded at the time of post-mortem examination and compared to ante mortem data that are supplied by generalist and/or specialist dentists who treated the victim during their lifetime. The teeth are well protected in the oral cavity and are able to withstand many external influences at, near or after the time of death. Teeth comprise the hardest and most resilient substances in the body, so as the body's soft tissues deteriorate, the dental characteristics that are so valuable for identification purposes remain accessible. This is especially true of treatments in the teeth, such as restorative and aesthetic fillings and crowns, root canal procedures and dentures since these are custommade as unique treatments for each individual. But other anatomical and morphological traits can also be compared even when no dental treatments are present, and these also provide useful data for identification purposes.

Conclusions that are available to the DVI odontologists following comparison of post-mortem and ante mortem dental records include:

- ldentification (There is absolute certainty the PM and AM records are from the same per-son)
- Identification probable (specific characteristics correspond between PM and AM but either PM or AM data or both are minimal)

- ldentification possible (there is nothing that excludes the identity but either PM or AM data or both are minimal)
- Identity excluded (PM and AM records are from different persons)
- No comparison can be made

In addition to comparing post-mortem and ante mortem records to establish identification, odontologists are also able to provide conclusions about certain aspects of a person's life or lifestyle by examining the teeth. These can be valuable when searching ante mortem data-bases for potential matches. For example, if the victim is estimated to be a young adult, this might limit the search criteria to certain aspects of ante mortem database. Human teeth progress through various stages of development from in utero to adult life and these stages of development and eruption can be used to estimate the chronological age of body at the time of death. Teeth and jaws may contain congenital and/or acquired traits that are useful in estimating a person's racial background, dietary and eating habits, and oral hygiene practices. It might be possible based on the type of dental treatment present to estimate the country or region of origin for a given victim. These can then be used to limit or restrict the population to search for possible antemortem data for a given body.

DNA analysis:

DNA is a proven source of material to use for identification, as a significant portion of the genetic information contained in a cell is unique to a specific individual and thus differs – except in identical twins - from one person to the next.

DNA testing can be performed even on cases involving partial, severely decomposed remains.

DNA matching is the best way to identify body parts.

DNA analysis can be automated with a high throughput.

DNA matching can be based on profiles from relatives, self-samples or belongings.

DNA analysis can be automated enabling a high quality and high throughput setting.

DNA matching can be based on profiles from relatives, self-samples or belongings being the only method for primary identification independent from direct comparison (fingerprint record, dental record).

For a DNA profile you need a sample taken from the deceased body or body parts and from the references. The samples will be sent to a laboratory and analyzed according to international standards and the profiles matched with respect to the source of reference.

Personal descriptions/medical findings:

A personal description consists of basic data (age, gender, height, ethnic affiliation) and specific peculiarities. Medical findings, such as scars and surgical removal of organs may pro-vide crucial information about a victim's medical history. Common types of surgery which exhibit few individual characteristics (e.g. appendectomy) must be taken into account in this context. Unique numbers found on heart pace-makers and prosthetic devices are reliable identifying features. Tattoos, moles and disfiguration may also serve as indicators of identity.

Evidence/ Evidence/clothing:

This category includes all effects found on the bodies of victims (e.g. jewellery, articles of clothing, personal identification documents, etc.).

Engraved items of jewellery may provide important clues to the identity of a victim. It is important to consider, however, that certain items of evidence may not actually belong to a given body (e.g. identity papers may be carried by a different person; items of jewellery or clothing may have been lent intentionally to another individual; during retrieval, items may have inadvertently been placed in one body bag). Items of jewellery have a higher identification value if they are firmly attached to a victim's body (e.g. piercing plugs or "ingrown" wedding rings).

CHAPTER 5 - AM DATA COLLECTION

5.1 Development of missing persons cases - Preparation of victim lists

In the aftermath of a disaster with a significant number of causalities, it is especially important to collect, record and process information regarding injured, missing and deceased per-sons as well as individuals otherwise affected by the disaster in order to obtain an overview of the scope of the disaster as quickly as possible.

The AM Team integrated within the chain of command is initially tasked with collecting and recording all information relating to individuals who may be regarded as potential disaster victims. Experience gained in previous disaster response operations has shown that the number of reported presumed victims varies and substantially exceeds the number of actual victims involved (the ratio was 10:1 in the case of the Tsunami disaster in Southeast Asia). Therefore, it is essential that further decentralized police action be carried out on the basis of the presumed victim data pool for the purpose of verifying or disproving the actual total number of missing persons. Continuous comparison with the lists kept by the Search and Rescue Team (list of injured and uninjured survivors) can result in a systematic reduction of the presumed number of victims.

The goal of this approach is twofold: to ensure that actual cases of missing persons are not overlooked and to list all actual missing persons in order to facilitate the collection of AM data from relatives on the basis of the corresponding victim lists.

The AM Team should not begin collecting AM data from relatives, friends, etc. until a reliable list of actual victims is available.

5.2 Documentation / archiving of AM data

All AM data obtained by the AM Teams are to be documented. In this way, it will be possible to determine even at a later date what data was obtained by which team from which relatives, friends, etc. A corresponding personal file should therefore be set up for every potential missing person for use in documenting all incoming and outgoing information relating to the individual in question. This personal file should contain a cover sheet with a checklist ("to-do list") of all measures required to obtain AM data. On this checklist, the assigned AM Team keeps a progressive record of measures taken, measures still to be carried out and information that cannot be obtained despite intensive investigative efforts.

5.3 Collection of victim AM data

AM Teams should ensure that all victim identification data is collected solely on the basis of the Interpol DVI Ante Mortem Form (yellow). It is also important to ensure that AM data are collected by the respective assigned specialists as completely as possible and are granted equal value. The non-availability of specific AM data is basically also to be documented. For the purpose of collecting primary identification features, both the domicile and the personal workplace of each missing person and other areas in which the presumed missing person has been should be treated like crime-scenes.

5.4 Collection of personal victim data through interview with relatives, friends, etc.

Personnel collecting ante mortem data should be experienced in obtaining detailed reports and must have a thorough knowledge of the layout and purpose of the appropriate forms.

Police officers unfamiliar with the yellow Interpol DVI Ante Mortem Form will need thorough briefings.

Wherever possible, personal (face-to-face) interviews are to be conducted. However, exceptional circumstances may require telephone interviews. The location and timing of the inter-view will be dependent upon the location of the families of the missing persons/potential victims, as well as the facilities available.

The following issues should be considered by the DVI Ante Mortem Interview Teams when conducting interviews:

- The interview should commence as soon as possible after the victim's next-of-kin have been officially notified of the incident.
- Prior to the interview, the police officer leading the DVI Ante Mortem Interview Team should endeavour to contact the next-of-kin or the friends of the missing person/potential victim to advise them of the need for an interview, and to arrange a time and location.
- The place for interview can be and should be distant of the morgue.
- If an interview cannot be conducted at the home of the next-of-kin or friend, the preferred location is an area that can be closed to the public and/or the media, and that ensures that the individuals interviewed are provided with private and comfortable surroundings.
- Upon arriving at the interview, the police officer leading the DVI Ante Mortem Interview Team should introduce each team member to the relatives and friends present. If a speaker-phone is used (telephone interviews), each member of the interview team should be introduced to the persons being interviewed.
- If a time is set for an interview, the DVI Ante Mortem Interview Team should be sure to arrive at the appointed time.
- The DVI Ante Mortem Interview Team should ensure that relatives and/or friends are willing to take part in the interview and that they are aware they may request a break at any time during the interview.
- Interviewers should ensure that they always refer to the missing person/potential victim in the present tense and not in the past tense.
- When requesting specific information relating to the missing persons/potential victims, the interviewer should refrain from asking personal and intimate specific questions (e.g. "What colour is your spouse's pubic hair?"), but instead encourage the interviewee to answer general questions (e.g. "Is blonde your wife's natural colour?") or refer to the diagrams on the yellow Interpol DVI Ante Mortem Form D4.
- The members of the interview team should make a consistent effort to answer any specific questions asked by interviewees immediately and to the best of their ability through-out the interview. When questions cannot be answered, interviewees should be informed that the information in question will be obtained, if possible, and provided to them at a later date. No question should be ignored.
- Officers should make sure to collect information and materials needed within one single visit if possible in order to avoid further disturbance... or "Visits should be kept to a mini-mum"

- In case more than one visit is required, it should be carried out by the same team.
- The following information and/or material should be gathered prior to the conclusion of the interview. If the interview is conducted by telephone, the police officer leading the DVI Ante Mortem Interview Team must arrange for materials to be collected by the nearest police officer and forwarded to the DVI Ante Mortem Coordination Centre:
 - any original medical and/or odontological records, charts, treatment records, x-rays and mouth guards in the relative's or friend's possession;
 - names and addresses of any medical practitioners consulted by the missing person/potential victim (e.g. Guthrie card data);
 - names and addresses of dentists consulted by the missing person/potential victim;
 - descriptions of jewellery and property worn by the missing person/potential victim;
 - recent photograph/s (showing full face and/or teeth, tattoos etc);
 - buccal smear or blood sample taken from the biological parents or children of the missing person/potential victim (refer to Appendix T, DNA Preference Table);
 - descriptions and/or photographs of any tattoos or other significant physical characteristics;
 - any object that may contain the sole fingerprints and/or DNA of the missing person/potential victim (refer to Appendix O, Possible Sources of DVI DNA Samples).
- The DVI Ante Mortem Interview Team must ensure that a property receipt is issued for any property or material taken from the family or friends of the missing person/potential victim.
- Consent for DNA testing must be obtained prior to taking any buccal swab or blood sample, pursuant to applicable laws.
- Procedures used in the collection, storage and management of DNA samples must be in compliance with applicable laws.
- The required yellow Interpol DVI Ante Mortem Forms or other ante mortem forms as required by the DVI Ante Mortem Coordinator must be completed and submitted to the DVI Ante Mortem Coordination Centre as soon as practicable after the interview.

The DVI Ante Mortem Interview Team should enter each member's name and designation on the yellow DVI Ante Mortem Form. The team should deliver or arrange for the delivery of DNA material, original medical or original odontological records and x-ray exposures as well as photographs obtained during or after the interview to the DVI Ante Mortem File Section.

Missing Person/Potential Victim File

The following principles should be observed when compiling a missing person/potential victim file:

▶ The file should be kept in an envelope or folder in order to prevent loss of materials.

- The file should have a cover sheet on which the name and gender of the missing per-son/potential victim are entered legibly. The cover sheet should also contain a section for use in recording movements of the file.
- The file should contain as much information as possible to assist in identifying the de-ceased person.
- Files should be monitored regularly for duplication.
- Ante mortem records are to be forwarded to the Ante Mortem DVI Centre only for translation, transcription and data entry, accompanied by appropriate documentation (yellow Interpol DVI Ante Mortem Forms and the primary identifier).
- Ante mortem records must be released to an officer from the Ante Mortem DVI Centre and signed by that officer.
- Any ante mortem records which do not proceed to the Ante Mortem DVI Centre must be returned to the source from which they were obtained within a reasonable period of time.

5.5 Primary identifying features

5.5.1 Dental status

In the aftermath of a disaster with significant numbers of victims, the local police office or other approved authorities will contact dentists that are identified as having treated specific missing persons. The following guidelines may be of assistance to police and dentists in obtaining corresponding ante mortem data. Please note that often dentists do not want to release patients' original records for such purposes. But it is mandatory to do so since original records are needed during a DVI response. It is appropriate for the police officer to suggest that the dentist keep a duplicate of the records and then release the original records for use in the DVI effort:

- All of the victim's dental records that are on file in the dental office
- Conventional and/or digital radiographs of the teeth, jaws and/or skull
- Dental casts or models
- Dental prosthesis or other dental devices

The information listed above is needed in order to reconstruct the ante mortem dental status of the victim. It is essential to ensure that all original treatment records and radiographic images are labelled with the name and date of birth of the patient, as well as dates or treatment, dates of exposure of radiographic images, stamps and signature of the treating dentist including the dentist's contact information (name, address, telephone number and e-mail address).

Speed in acquiring the ante mortem records is of the essence but not at the expense of receiving all of the best quality original records in the dentist's possession. Requests for dental information and records should be answered immediately by the dentist in question along with suggestions for other potential sources of data for the missing person, such as after referral to another practitioner for specialized care.

Original records must never be released to relatives or other individuals acting on behalf of other authorities or unauthorized organizations. These records are irreplaceable and are critical to successful identification of the missing person. Dental records must be protected against loss by coordinating their seizure from the dentist's office and tracking their movement en route to the DVI response.

If the records and materials listed above cannot be obtained from the missing person's family dentist, the following may be other potential sources of information:

Dental specialists

- Dental technicians
- School dental services
- Hospital dental clinic
- Hospital biopsy service
- Dental health insurers
- Dental records from correctional facilities or social security insurers
- Military organizations

5.5.2 Fingerprints, palm prints and footprints

The prerequisites for the identification of victims on the basis of fingerprints is the availability of viable AM and PM prints and the expertise of qualified fingerprint experts. Under these circumstances, the internationally recognized AFIS technology can be used effectively and reliably during the request and registration phase and the comparison phase.

The process requires that all available dactyloscopic prints (fingerprints, palm prints and footprints) from a given missing person are obtained with the aid of appropriate evidence collection methods. In cases of missing children, the analysis of fingerprints, palm prints and footprints are of particular importance due to the frequent lack of AM dental records. Documentation relating to fingerprints must include the type of print, the name of the AM Team member who obtained the print and the location at which the print was obtained. It is also particularly important to record the names of other persons who reside in the household of the individual in question and/or have access to the individual's workplace. Reference prints should be obtained in order to avoid confusion regarding the identity of the person who left the prints. Reference prints should be obtained from these persons and compared for elimination purposes prior to entry in the DVI AM Database. This will avoid confusion regarding the identity of the person who left the prints. It may also be necessary to cross-reference AM files if there are multiple victims associated to the location where the latents are collected from. (Family / co-workers) In instances where there are multiple victims from one location the match of AM latent fingerprints to a victim is not a positive identification and will require other information such as DNA as the latent only connects the victim to the location.

There are two main types of AM fingerprints; those deliberately taken for identification purposes (related to a known person) and those left in the form of latents in a living environment and on personal belongings (uncertain donor). The investigator should be aware of all possible sources of prints. It is also of utmost importance that he/she be sensitive to the potential impact of such an intrusion into the (past) life of a missing person.

Relatives are often struggling to maintain balance between hope and fear. The search for material for identification purposes confronts them with the possibility/reality of death and disturbs the environment of the missing loved one. Relatives ordinarily want to preserve the integrity of that environment at all costs.

Thus it is essential to explain the need for the search. The recovery of evidence may make the difference between uncertainty and reconciliation, between years of agony and the opportunity to mourn and achieve closure. It may also help avoid the administrative and financial problems that are commonly associated with unresolved situations.

Type 1 prints (fingerprints prints from a registered donor) can be found in:

- (national) police files established for criminal investigation and/or identification purposes; sealed files should not be overlooked;
- immigration and asylum records;

- police and civil files maintained in the home countries of immigrants;
- fingerprint records of native citizens maintained in other countries for persons travelling or transacting business abroad (even CEOs are required to provide fingerprints in certain foreign countries);
- files maintained by passport offices, motor vehicle departments and other agencies in which a missing person has resided;
- police records relating to cases in which a missing person has been a witness to or victim of a crime;
- prison records;
- footprints taken from babies after birth at hospitals in order to prevent misidentification;
- fingerprint records maintained by maritime authorities;
- finger-, hand- and footprints are regularly taken from aircrew;
- Many military organizations obtain footprints from their employees, such as pilots. The feet, which are normally protected by a tight fitting boots and socks, in many types of disasters will remain in tact
- fingerprint records for prominent persons in business or industry maintained on the ad-vice of security firms and insurance companies in anticipation of possible kidnapping or hostage abduction (secret files);
- fingerprints used for biometrics and/or personal identification/verification; such as in ac-cess systems, on smartcards, in passports, on personal computers, etc.

This means that an in-depth investigation must be conducted on the basis of the curriculum vitae of the missing person for the purpose of identifying potential sources of registered fingerprints.

The search for type 2 prints (unregistered fingerprints);

An effort should be made to find additional prints from specific individuals by focusing on their personal belongings. Multiple prints increase the level of certainty.

The search for prints should be expanded to the extent possible. Latents can be sorted out later by an expert. Each latent should be carefully labelled with the relevant information and, if possible, an indication of a possible donor. Destructive detection techniques should be avoided in favour of lifting. Personal belongings should not be damaged, soiled or stained.

All prints should be cross-checked against those of living individuals who have legitimate access to the discovery site. All prints which can be safely eliminated should be excluded from further examination.

DVI teams should not be inundated with excessive quantities of materials or objects. Finger-print specialists should seek to assist rather than hinder these teams, as they have countless puzzles to solve and do not need new problems to deal with. (Inferior) fragments can be saved for later in-depth examination if other information provides sufficient clues to a victim's identity.

To avoid confusion, it is important to rule out the possibility that other missing persons (from a different household) may have left prints at the site or on objects under investigation. These may include members of different families travelling together or colleagues from the same workplace who may have handled the objects, papers, etc. in question.

A search for footprints should be considered, as they are as reliable as fingerprints and often less susceptible to damage. The DVI Team should be consulted and advised accordingly.

Type 2 dactyloscopic prints can be found on:

- magazines likely to have been read by a specific reader (car and fashion magazines, comic books, etc);
- recently read books (which should be processed using non-destructive techniques or cleaned after processing);
- glossy photographs, which may bear excellent prints which can be detected with the na-ked eye and photographed;
- car interior mirrors;
- writing tablets, personal papers and/or appointment books;
- empty (beer, soft-drink) bottles, bottle cases;
- pottery, vases, plates, etc;
- batteries in all types of toys and equipment;
- sewing machines;
- CD and DVD discs and the containers;
- airline flight tickets left at the airport at boarding; hotel receipts
- travel and insurance papers left behind for relatives;
- tools, equipment and handcrafted objects; paint canisters (as latents) or patches of dried paint
- hobby material and objects (e.g. pottery);
- drawings and paintings (children's finger-paintings);
- bathroom floor (footprints) and wall surfaces; surfaces in other areas;
- next to beds, where there may be magazines people have stepped on with bare feet;
- objects/surfaces at the workplace;
- b other specific spots, such as rooms in (sport) clubs and on (private) training equipment;
- school paperwork;
- Etc.

The likelihood of making reliable identification on the basis of type 1 and type 2 prints in-creases in proportion to the amount of information available about the missing person's habits and daily routines. Giving relatives an opportunity to talk about these aspects may serve relatives' needs while facilitating the search for fingerprints as well.

The collection of AM fingerprint material must be documented in accordance with standard procedures for crime-scene investigation (example: list of fingerprints/palm prints, to include descriptions, image numbers, dates and times, names of processing officers, evidence collection methods, etc.). A complete description of the site at which the fingerprints/palm prints were found and the material (object/surface) from which they were taken may be very helpful in establishing a link to a specific missing person. It is also important to ensure that every photograph of a fingerprint/palm print is accompanied by a reference scale.

Prior to forwarding for further evaluation, fingerprints prints should be assessed with regard to their potential usefulness for dactyloscopic identification by an experienced fingerprint ex-pert.

Fingerprints should be preserved on site evidence cards in all cases.

5.5.3 DNA collection

DNA analysis is one of the primary methods of identification. Depending on the special characteristics of an incident the approach of the identification procedures will differ. In many cases dental or fingerprint investigations will be sufficient enough. In other cases with deceased young people, severely decomposed remains or many body parts DNA analysis and comparison may be the best method to use.

Under such circumstances, however, DNA may be the primary means of obtaining reliable identification. The decision as to whether DNA analysis is to be performed is taken by the head of the Victim Identification Team in consultation with the appropriate forensic laboratory.

Thus the following guidelines should be observed:

Ante mortem (AM) samples should be collected as soon as possible for each missing person. Scientists with a background in genetics should be available for training and consultations.

Samples should be obtained in sample collection kits/boxes and be labelled with a unique and traceable bar code.

Sample intake forms and family information should be properly filled in and immediately checked for obvious data errors.

The set of loci to be analyzed has to be decided in concordance with the scientific community in the countries mostly involved. A minimum of 15 independent loci and a gender specific locus should be selected.

Identification can be made on the basis of personal DNA samples with a simple, standard software program supported by statistical tables. Identification based on samples taken from blood relatives requires the use of a special program and consultation with experts in DNA analysis.

It is important to realize that language and cultural barriers may have an influence on relatives' willingness to provide DNA samples (the status of "biological relative" must be established).

All laboratories involved should observe standards for international nomenclature (ISFG – International Society for Forensic Genetics) and a standard data exchange format (e.g. the Interpol XML format)

AM samples

Taken into account the risk for false information the choice of AM DNA reference samples should be:

- First degree relatives, if possible more than one
- Blood or biopsy samples from the potential victim
- Personal objects that have been used by the deceased

DNA profiles from first-degree relatives will always give adequate information for matching. In most cases it will also be possible to find and take samples from more than one relative.



Reference samples from relatives

Prior to actual sample collection, contact should be established with the laboratory responsible for analysis in order to ensure that the sample(s) will be suitable for the profiling procedure used at the laboratory.

Officers assigned to collect AM samples should be aware that the process could be very stressful for relatives. A professional, sympathetic approach is required, and visits should be kept to a minimum.

Sample collection should be accomplished in the least intrusive manner possible. Unless otherwise specified, buccal swabs are taken from the relatives in question. In the event that a blood sample is required, a drop of blood should be extracted from the fingertip and applied to FTA paper. Officers performing sample collection should be appropriately qualified and trained in the procedure. In some countries, only trained medical personnel are permitted to take blood sample. All required documents should be completed, including an official declaration of consent. The donor should be briefed regarding the reason for taking the sample and its intended use. In addition, the donor should be informed that the sample and the profile will be destroyed once the investigation is totally completed.

The officer collecting the sample must obtain official proof of identity and relationship to the presumed decedent from the donor.

Types of reference samples from relatives

Preferred samples are:

Buccal swabs

Drops of blood extracted from the fingertip.

In order to achieve an optimum match, it is important to obtain samples from donors who are biologically related to the deceased. Proof of a direct biological relationship between the donor and the deceased is essential to the integrity of the process. Suitable donors are listed in order of preference below:

See also *figure x*.

- Monozygotic / identical twins
- Biological mother and biological father of the victim
- Biological mother or biological father of the victim and if possible a sibling
- Biological children and spouse of the victim
- Siblings of the victim (multiple)

Official consent forms must be used when collecting DNA samples from relatives of disaster victims. These forms should contain the following information:

- Legal authorization for sample collection
- Reason for/purpose of sample collection
- Type of sample collected
- Confirmation that the sample is to be typed and compared with samples from a victim of an "extraordinary disaster"
- Confirmation that all profiles derived from the sample are to be stored in a confidential database used for purposes of comparison
- Confirmation that the sample and the profile will be destroyed upon completion of the investigation
- Confirmation that the donor has provided the sample voluntarily
- Confirmation in the case of a blood sample that the donor has not been bone marrow transplanted or received a blood transfusion with the past 3 months
- Confirmation that there are no medical reasons which would prevent the donor from providing the sample
- Name and signature of the donor

- Confirmation of the donor's identity
- Nature of the specific biological relationship between the donor and the victim
- Name of the person assigned to collect the sample
- Date, time and location of sample collection
- File/reference number of the Victim Identification Team

Blood or biopsy samples from the victim

Another ideal situation, DNA reference samples are obtained from samples taken for medical examination or similar analysis prior to the deceased's death and stored in a bio-bank or other bio-medical source of DNA (such as hospitals, pathology units, and paternity and blood transfusion laboratories). A good example is the blood droplets obtained for neonatal screening of PKU (phenylketonuria). The search for AM DNA should therefore include consultation with the potential victim's family doctor in order to determine whether blood or biopsy samples from the potential victim are available in cases where close biological relatives can't be obtained.

Guthrie tests/neonatal blood samples are often preserved in many countries. Normally, law to research purposes restricts the use of such samples. However, it may be possible to obtain permission from the relevant authorities to use these samples for purposes of victim identification in cases of disaster.

Each sample has to be placed in a separate evidence bag or separate container that is immediately sealed.

An official proof of the identity of the sample has to be filled in and verified by the physician responsible for the bio-bank or biomedical source.

The officer collecting the sample has also to verify a continuity report telling where and when the sample is collected.

Victim reference samples (personal objects)

It is also possible to get reference samples from objects that have been used by the deceased. However, if such victim reference samples are used, it is important to establish at the outset whether the objects processed belonged to and were used exclusively by the individual in question. If an object (e.g. a hair brush) was not used solely by the person in question, the identity of the second person must be determined, and a DNA sample must be taken from that person for purposes of comparison. As many objects as possible should be obtained for purposes of AM DNA collection, as it is entirely possible that individual items of evidence will not produce the desired analytical results.

In cases in which victim reference samples are to be collected, it is important to ensure that procedures are structured and coordinated. A central location can be designated for the collection of suitable material obtained from relatives. Alternatively, officers tasked with obtaining ante-mortem samples may travel to victims' homes to search for suitable material for analysis. Wherever possible, more than one object should be selected.

Although victim reference samples are suitable for DNA profiling for purposes of comparison with presumed victims, the risk of cross-contamination resulting in false profiles cannot be ruled out.

The following precautions should be taken in order to minimize the risk of contamination and preserve the integrity of the materials obtained:

- Each object should be placed in a separate evidence bag or a separate container.
- Every evidence bag must be sealed.
- Bags/containers must be labelled/marked appropriately in order to preserve the integrity and identity of their contents.
- A complete list of objects should be prepared for the purpose of documenting the receipt, transport and return of individual objects.
- Appropriate evidence control methods must be employed to ensure the safety of objects and adherence to chain-of-custody regulations.

A summary of examples of reference samples for AM DNA profiles

Biological relatives	Take samples from close biological relatives like parents, children and siblings. If possible, try to get samples from two or more relatives. Don't forget that a sample from one child and a spouse probably will solve the identification. Good profiles will be obtained from buccal swabs and blood samples placed on FTA papers.
Self samples	Good self DNA profiles can be obtained from: Extracted baby teeth or extracted third molars (wisdom teeth). Samples from national bio-banks, bone-marrow donor programs. Blood droplets obtained during neonatal screening for PKU (phenylketoneuria). Other clinical blood or serum samples Criminal police databanks*, paternity testing laboratories*, reference samples from military services members* Samples from sperm banks Dried umbilical cord Pathology preparations embedded in paraffin
Personal objects	Examples of belongings from which it is possible to extract DNA: Toothbrushes Razor blades/razors Hair brushes and combs Combs Lipstick dispensers, deodorant rollers Used cups and glasses Used underwear Cigarette butts Pipes Motorcycles helmets and other sports helmets, caps and hats Ear plugs, headphones Eyeglasses Jewellery Wristwatches

5.6 AM quality management

Careful and thorough documentation of the sample collection process (evidence collection report – chain of custody) is an absolute prerequisite for the matching of a reference sample to a specific missing person.

All sample receipt forms and information received from relatives should be reviewed immediately for obvious errors before data is entered and corrected as needed.

All smears taken from relatives and direct reference samples must be accompanied by the corresponding documents and a complete chain of custody record. Samples and documentation should be forwarded to the laboratory as quickly as possible. The laboratory should exercise utmost care in the handling and storage of these materials and be prepared to return personal items to the submitting police office or the family once the identification of disaster victims is completed.

CHAPTER 6 - PM EVIDENCE COLLECTION

6.1 Cooling of bodies

The influences of body exposure time and climatic factors (high humidity, high temperatures) accelerate the process of decomposition. As decomposition progresses, important identification features are destroyed.

In most cases, the storage capacities available at a major forensic medical institute will be sufficient. Morticians' firms involved in the transport of bodies as well as large local cemeteries and crematoriums also have cooling facilities.

It may be necessary to develop appropriate solutions in consultation with local authorities (e.g. ice-skating rinks, decommissioned refrigeration facilities, underground garages, vacant factory buildings, cooling containers, refrigerated vehicles, portable air conditioning systems).

Bodies should be cooled at 4-6°C. Only when long-term storage is foreseen, bodies should be kept at sub-zero temperatures (-14°C) and allowed to warm to 4-6°C before examination. A list of bodies placed in each cooling container is to be affixed to the container.

Dry ice causes skin burns and thus should not be placed in direct contact with bodies. A small wall with a height of 0.5 m can be built around roughly 20 bodies and covered with a tarpaulin or tent. Approximately 10 kg of dry ice are required for each body per day.

No attempt should be made to cool bodies with ice (frozen water), as water may damage both the bodies themselves and especially personal effects (incl. identity documents).

6.2 Morgue

Wherever possible, the morgue station should be established in consultation with the head of the Victim Identification unit. It may be necessary to set up a security service to protect operational personnel against disturbance by unauthorized persons.

The morgue station performs the following functions:

- Receives bodies/body parts from the Recovery Command Centre; issues a receipt record to the Recovery Command Centre (proof of the chain of documentation).
- Storage and proper cooling of bodies/body parts, as appropriate
- Organization of transport of bodies for forensic examination in consultation with cooperating morticians and/or body transport teams
- Registration of bodies for the purpose of documenting sites of discovery and the location of bodies at a given time
- Organization of return transport of bodies
- Plausibility check of identified bodies prior to release to a mortician
- Workflow documentation

A receiving point set up at the morgue station is responsible for all incoming/outgoing bodies/body parts and reviewing accompanying documents (recovery records, etc.) for correctness and completeness.

6.3 Transport of bodies

In the event that morticians' firms are not available for the transport of bodies, a body transport team must be assigned responsibility for the movement of bodies from and to the morgue station. Bodies/body parts should be transported in vehicles or on gurneys or tables.

6.4 Examination site

Wherever possible, existing facilities should be used for examination of bodies. If no such facilities are available, the site selected must meet certain minimum requirements, i.e. availability of running water, drainage and electricity as well as compliance with safety regulations.

Separate stations should be set up for the following operations:

- receiving of bodies
- forensic examination of bodies
- dental examination
- radiography (whole body scan if possible)
- fingerprinting
- evidence processing
- quality control
- release of examined bodies

Separate areas should also be set up for the following functions in the vicinity of the body examination station:

- dressing rooms
- cooling rooms for bodies
- storage rooms for logistical equipment/supplies
- decontamination rooms, washing facilities, toilets
- break rooms and dining areas

6.5 Numbering of bodies

A single number is assigned to each body or body part. If several international DVI teams are working together in a given operation, and if the pre-numbering of bodies is not foreseen, the international country code of the team, which processed the body, should be included as part of the number (e.g Germany 49-number of scene-0001.....). the international country code of the team that tagged the body should be included as part of the number (e.g. Germany 49-number of scene-0001).

6.6 Examination of bodies

During PM examination of bodies it is essential to ensure that only unavoidable changes are made to the bodies examined.

6.6.1 Required functional personnel, number of personnel and description of duties:

The number of functional personnel required depends upon local circumstances and personnel resources. These factors also determine the number of autopsy tables which can be in use at a given time.

PM Team Chief:

The PM Chief ensures that sufficient personnel are available for examination of bodies, supervises PM activities and checks for compliance with safety and health requirements.

Body registrar

The body registrar assigns PM numbers (if the PM number isn't already assigned), issues photographic plates and enters PM numbers on PM forms.

Fingerprint specialists

Depending upon the condition of a given body, fingerprint specialists must determine the method of fingerprint collection to be used. In addition, palm prints should be taken. If possible footprints should be taken from all victims. (Barefoot impressions could be developed as AM info in the bathrooms, kitchens etc of victims homes)

In addition, palm prints or at least partial palm prints should be taken. Footprints should be taken from babies and young children.

Photographers

General remarks regarding photographs:

- Photographs (digital wherever possible) should be made of each body.
- Every photograph should bear the PM number and, if necessary (for example: tattoos, scars, small effects) a reference scale.
- The subject of the photograph should fill the entire frame, if possible.
- Bodies should be photographed both clothed and unclothed.

The following photographs are required:

- Photographs of all markings, labels and numbers on body bags
- Full-length photographs of each body
- Two overlapping photographs showing the upper and lower halves of the body, respectively
- A full-frame front view of the head
- An elevated view taken at a 90-degree angle to the body
- Images of all unique features, such as scars, tattoos, amputations, etc.
- Photographs of all articles of clothing and personal effects, photographed initially in situ, then cleaned and photographed with a macroscopic lens in front of a non-reflective background in order do display details, such as inscriptions and rings, etc.
- Photographs of all identifying features, such as clothing labels and credit card numbers
- As a rule dental photographs are also taken: front view with teeth closed and lips retracted upper jaw, lower jaw, and lateral right and left dentition. The dentist should be consulted with regard to the specific dental photographs required, such as close-up photos of specific dental treatments or anomalies that are useful for identification purposes.
- Specific pathologies and abnormalities at the request of the forensic pathologists.

All photographs of a given body are to be stored on a CD and included in the PM file.

Radiology

X-rays (and why not, if possible, CT-scan...) are important for the whole body and for the teeth for finding clues to the cause, for screening for foreign bodies such as pacemakers, implants, fracture sequelae...

- Forensic radiology specialist (under the responsibility of the forensic pathology)
- b Objectives: Cause, manner, mechanism of death, and Identification (important tool)
- Systematic radiological examination of bodies and body parts (full body X-rays)
 - To diagnose specific injury, disease, abnormality.
 - Looking for foreign objects (metallic items, explosives devices, firearm projectile, jewellery...).
 - Evaluation of injuries.
 - Searching for teeth.
 - Evaluation of age.
 - Odontological radiology.
 - AM/PM radiological comparisons
 - Flight crew guidelines (hands and feet

Forensic anthropologist can ask and assist in positioning of radiological views to estimate age, detect unique skeletal features and for AM/PM comparisons.

Forensic pathologists

The forensic pathologist performs the external and internal examination of the body and enters appropriate data in the blocks provided in the PM record. As a rule, it is not necessary to open the cranium for identification purposes. The forensic pathologist takes DNA samples (see also the link to DNA-PM). A forensic anthropologist can provide critical information for a biological profile of a given deceased person, e.g. age, gender, ethnic affiliation, stature and individual identifying features. These parameters can be assessed on the basis of analyses of body structure and body size. The forensic pathologist decides on a case-by-case basis whether an anthropologist should be consulted.

Additional information about autopsy:

Objectives:

- **Cause**, manner, mechanism of death (simple or combined).
- Survival time.
- Identification.
- Documentation of injuries and evidences at the benefit of investigators.

Methodology:

- Complete autopsies (homicide, unknown cause, crew members, and unidentified remains).
- Aspect of external injuries (attached, in place), position of injuries and burns.
- Description and arrangement of traumas, fractures, internal bleeding, description upper respiratory tractus (traumas, soots).
- lack of the control o
- Listing of anatomical particularities.
- Systematic samples for toxicology and DNA.

Autopsy assistant:

The autopsy assistant assists the forensic pathologist in the external and internal examination of bodies. The assistant performs the following tasks in consultation with the forensic pathologist:

- Cleaning of instruments
- Assisting in positioning the body on the autopsy table
- Assistance in the external examination of the body (lifting of limbs, turning of the body, cleaning of specific parts of the body)
- Assistance in the preparative removal of the lower jaw (if necessary)
- Assistance in the internal examination of the body
- Assistance in the collection of DNA samples
- Exposure or removal of important identifying features and left in situ for photographic documentation (e.g. artificial hips, heart pace-makers, etc.)

Autopsy recorder:

The autopsy recorder guides the forensic pathologist through the PM record and asks for information for each data block. He follows a step-by-step procedure in order to avoid overlooking important information. The autopsy recorder completes the PM report (pages B0, D1 to D4, E1 to E4 and G) in accordance with the instructions provided. He must ensure that all entries are legible, all pages and blocks are filled out and all entries are made in columns a to d. He works closely with the photographer and instructs him as to which steps in the process and identifying features must be documented in photographs. Upon completion of the autopsy, the autopsy recorder is responsible for obtaining signatures from the photographer, the fingerprint specialist, the forensic pathologist and the forensic odontologist on page B0.

Property processors:

The evidence processor fills out pages C1 – C3 of the PM record and lists all articles of clothing, jewellery and other effects. A second evidence processor cleans the objects and displays them so that they can be photographed. He then places the objects in appropriate evidence bags.

Personal for odontology

As a rule, two dentists should cooperate in the recording of the dental status of the body and in producing a radiographic and photographic record —one is the forensic odontologist examiner and the other is the forensic odontologist recorder or the forensic odontology radiographic assistant.

Forensic odontologist examiner

The odontologist examiner is the dentist that accesses the oral cavity using the necessary procedures, including but not limited to: incising soft tissues as required; cleaning the teeth and jaws; examining the structures; and assessing the dental status of the body. Radiographs of the teeth are produced as follows: molars on both sides with jaws together (bitewings); upper and lower molars, and possibly premolars and incisors (periapicals); teeth with special features, such as root canals, crowns, etc.; and other radiographs as required (occlusals, lateral oblique mandible, etc.). These radiographs are evaluated for quality (exposure, density, sharpness) and are then studied with the odontology recorder (below) to ensure all data from them are included on pages F1 and F2. The odontologist examiner also supervises and directs the production of an adequate photographic record of the teeth, jaws, related oral structures and dental traits/characteristics.

Forensic odontologist recorder

The odontologist recorder is the dentist that assists the odontologist examiner to record the victim's dental status. The odontologist recorder prepares and completes pages F1 and F2 and records the dental data as dictated by the odontologist examiner; checks the post mortem record for quality (accuracy, legibility, clarity); signs the record and ensures that the odontology examiner also signs the record.

Forensic odontology radiographic assistant

The odontology radiographic assistant assists the odontologist examiner and odontologist recorder in preparing, exposing and developing radiographs of the teeth and takes joint responsibility for the quality of the post mortem radiographs.

Quality control officer

The quality control officer reviews all documents for completeness and legibility.

6.6.2 Examination procedure / individual stations

- Following receipt of the body and the recovery record, the body is placed on an autopsy table.
- The **body registrar** issues one unique number (if it isn't issued so far) and records it on a blank PM form. If a specific recovery number has been assigned, this number is also recorded on the PM form.
- The **body registrar** gives the PM record to the **autopsy recorder**.
- The **body registrar** enters the PM number on the recovery report and gives any existing effects in evidence bags to the **property processor**.
- The **body registrar** provides the **photographer** with plates bearing the appropriate PM number.
- The photographer photographs the clothed body.
- A **property processor**, assisted by the **autopsy assistant**, removes the clothing from the body and cleans clothing and other items of evidence. The evidence processor must also document the locations at which each item of evidence was found.
- The photographer photographs the unclothed body.
- The external and internal examination of the body is performed and DNA samples are collected (forensic pathologist, autopsy assistant and autopsy recorder). The autopsy recorder orders the photographer to photograph important identifying features.
- Assessment of dental status (Forensic odontologist, dental recorder and forensic dental x-ray assistant; the forensic odontologist orders the photographer to potograph odontological identifying features). The instruction for pages F1 and F2 must be observed.
- Collection of fingerprints, palm prints and footprints (as needed) (fingerprint specialist).

- Documentation of clothing, jewellery and other effects (evidence processor and photographer). At this point, evidence is placed in separate evidence bags (e.g. objects found in wallets, etc.).
- Once the examination of clothing is completed, clothing is placed in a clear trash bag and inserted into the body bag. Items of identification, objects of value and jewellery are taken to an evidence storage room.
- Performance of quality control measures

If possible full body x-rays or CT-scans should be made to find pacemakers, implants and fracture sequelae.

6.6.3 Special aspects of primary identification methods:

PM fingerprinting

Transparent slides should be used instead of fingerprint sheets. These should be labelled in advance and then placed face down over a translucent original on a table.

In preparation for fingerprinting, the fingers and hands are cleaned with water or a soap emulsion and dried with a cloth or cellulose towel. Cleaning the hands with alcohol first will result in much better prints. We have found that on a number of occasions. Wipe with alcohol and then hold in front of a small fan and they will dry very quickly. The alcohol softens the skin as well and

makes the skin more pliable.

Depending upon the condition of the hands, the fingers (if the surface skin is still attached), the separated surface skin (pulled over the specialist's finger) or the dermis (after dabbing with acetone) are dyed with fingerprint powder using a brush (zephyr, fairy hair or cosmetic). Then the protective backing is removed from a white Herma adhesive label (size 32 mm x 40 mm) and the label is laid in a body pan with the smooth side down, so that the adhesive side faces upward. The individual prints are then taken with the body pan, checked for viability and then adhered from right to left (thumb on the right, little finger on the left) to a prepared transparent slide. Finally, the slide is reversed. The result is a set of normal fingerprints (positive and colour-accurate) on a white background.

The following instructions apply to palm prints: If the surface skin has separated, the area of the palm is cleanly cut out, cleaned, spread over a dry cloth and stretched. Following dying with alcohol wipes, apply fingerprint powder, then the adhesive side of a white adhesive label (cut to size in advance) is pressed against the palm, beginning on one side and then carefully proceeding toward the opposite side. The adhesive effect prevents slipping. Then the label is affixed to a new transparent slide.

show two examples of fingerprints taken after "boiling".

The following photographs document the "hand boiling" procedure and





Prints from thumb and index finger of the right hand following boiling of the

hands, dying with soot powder, fingerprinting with adhesive labels and

affixing to a transparent slide

When the slide is reversed, normal palm papillary images appear. If the surface skin is destroyed or unsuitable for fingerprinting, the dermis is cleaned, dabbed with acetone and dyed processed with fingerprint powder. To obtain a palm print with the aid of a Herma adhesive label, an assistant must hold the hand so that the other specialist can extend the label carefully, beginning with the carpus, into the hollow of the palm with a cloth or his own fingers. The label is then carefully removed and affixed to a prepared transparent slide.

Depending upon the condition of the skin, footprints are collected in the same manner as palm prints.

Improving the condition of hands when surface skin has separated:

The first step is to wash the hands with alcohol. The hands are then immersed for approx. 10 seconds (depending upon their condition) in a basin of water that has been boiled immediately beforehand. After the hands are removed from the water, a significant change in the hand or skin is already evident. However, because the hand curls inward as a result of the "boiling process", it must be restored to an extended position by stretching. The finger pads and palms are now much more rounded; the skin has refilled and is soft and expandable; the wrinkles caused by desiccation disappear and the papillary

lines are visible once again. The skin is then treated with acetone and with fingerprint powder. Prints are taken with adhesive labels (adhesive side). The resulting prints are better than those obtained from the dermis without the boiling method, as they exhibit stronger contrasts.

The "boiling method" is of limited use when the dermis exhibits various injuries. The boiling process causes the skin to rupture if left more than 10 seconds in the water, and the "boiled" tissue beneath the skin swells to the surface.

PM-DNA samples:

Decisions regarding procedures to be used in sample collection as well as the scope and purpose of sampling measures should be taken as early as possible.

The success rates for DNA typing depend on how quickly samples are obtained and preserved. Sample collection at the disaster site should be performed in accordance with instruction applicable to the collection of forensic evidence and should provide for documentation, proper labelling and preservation of the chain of custody. During sample collection, a forensic geneticist or pathologist with basic knowledge of forensic genetics should be present to provide guidance for DNA sample collection.

Depending upon the condition of corps, different types of tissue are collected (see Table 1 below). In many cases, the forensic pathologist requires advice on special issues:

In the case of sample collection procedures that take several weeks or longer to complete or unfavourable weather conditions, whole blood from the core of the body, deep muscle tissues, bones or teeth are the most reliable sources of DNA. It might also be advisable to separate the collection of DNA samples from the rest of the forensic investigation (dental, fingerprint and physical) if that will result in better (less decomposed) samples and a more convenient sample collection procedure, for example blood on FTA. It is important, however, that the samples are properly labelled according to given standards and that the chain of custody is not broken.

Bone material from the spongiosa can be rich in DNA, although it may be difficult to preserve reliably. Consequently, dense cortical material may be the better choice, preferably from the long leg bones. When collecting samples from bones, it is important not to remove them from anthropological measurement points, articulated edges or fracture edges.

In the case of severely decomposed remains, it is important to ensure that the samples taken are of good quality. Bone or teeth samples should be taken in all cases. Even though the success rate is lower, simpler sample collection methods may justify a certain percentage of unsuccessful attempts. This should be weighed carefully against the additional burden of sample matching/sample verification and the necessity of marking unsuccessful samples for repeat processing.

For cases involving intact, fresh or un-decomposed bodies it may be worthwhile to consider collecting samples that are easier to obtain (e.g. smears on FTA) in addition to bone samples. In any event, it is advisable to collect multiple samples from the outset in order to avoid the time consuming work of collecting and labelling new samples at a later point in time. In view of the possibility that victim identification may take considerable time, the issue of preservation of remains during storage arises.

Complete documentation of <u>each</u> DNA sub-sample and the body parts from which they were taken is also of crucial importance for quality control of the matching of remains. It is therefore recommended that morgues be equipped with post mortem sample collection cases and containers for samples.

Preservatives can be used to conserve soft tissue at room temperature. The use of preservatives in provisional morgue stations with limited cooling capacities is also recommended. Samples should not be preserved in formalin, as formalin will destroy DNA. A recommendation is to preserve soft tissue in no sweated alcohol (booze). Even when a victim has been identified on the basis of other methods, a DNA sample should be taken for the purpose of matching or ruling out matches between body parts and to facilitate the identification of other missing persons.

The numbering system used for post mortem samples may be based on internally applied standard procedures. Regardless of the specific scenario, the number must be unique and traceable. In cases of disaster with large numbers of dead and mutilated bodies, the forensic pathologist must specify procedural criteria for examinations, including e.g. the question of whether examinations should be restricted to anatomical recognizable remains or a minimum size should be set for soft tissue fragments. It is important to ensure in this context that mutilated remains are recovered separately and assigned individual numbers without reference to presumed matches.

With respect to the problem of mutilated remains, a mixing of body parts may impair the integrity of samples. Mixing in this sense is defined as the transfer of blood or tissue from given body parts to other remains in the aftermath of a large-scale disaster or possible contamination with other human or animal substances, which could result in false DNA-based matches. It is therefore recommended that multiple methods are used for each identification.

The possibility of cross-contamination between remains must be taken into account both at the disaster site and at the autopsy station, which is why every individual body or body part must be assigned a separate number. Remains should not be matched or placed together with other remains simply on the basis of external appearance.

Samples selected for DNA analysis should come from a body part that has been matched definitively with the other remains. It is essential not to regard individual tissue or bone fragments as representative samples. Another problem that arises when dealing with mutilated remains is the possibility of cross-contamination from remains of animal origin. Pre-sorting and exclusion of samples that do not originate from a human source are the responsibility of a somatologist or an appropriately trained forensic pathologist.

Samples should be sent for analysis as soon as possible and in the meantime from collection till it is sent be kept cool and shaded from daylight.

Table 1Collection of post mortem samples

Condition of body	Recommended sample
Complete, non-decomposed corpse	Blood (on FTA paper or swab)) and buccal (oral) smears
Mutilated, non-decomposed corpse	If available: blood and deep-seated red muscle tissue ($^{\sim}1.0\mathrm{g}$)
Complete, decomposed corpse or mutilated remains	Sample from long, compact bones (4-6 cm sections, window section, without shaft separation)
	Or.
	Healthy teeth (preferably molars)
	Or.
	Any other available bone (~10g, if possible; preferably cortical bones with dense tissue)
Severely burnt corpses	All samples listed above and impacted teeth or tooth roots if present
	or
	smears from the bladder

PM dental examination:

During the assessment of dental status, the standard nomenclature used in a given country should be used for national DVI operations. These data are recorded on Interpol DVI forms to standardize the national identification response. Internationally harmonized terms, codes, abbreviations and nomenclature are to be used on Interpol DVI forms for international DVI operations.

When dealing with conventional (film-based x-ray images) radiography, exposed films are to be labelled and numbered individually and then placed in numbered bags. After development and adequate fixation, the radiographs are to be checked for quality, labelled, mounted, numbered and sorted into numbered Ziplock bags. It may be necessary to obtain additional radiographs of specific features discovered during the dental examination.

If digital radiography is used in the PM response, a quality control system must be followed to insure adequacy of the images. It is important to insure that the case data from the label is exported with the images so these data are available at the time of reconciliation.

The victim's upper and lower jaws must be left in place and must not be removed since this is a destructive procedure that further mutilates the victim's body. Many family members wish to exercise their right to view even badly decomposed bodies of loved ones. The disarticulations that are typically completed in chaotic DVI situations tend to be carried out with crude instrumentation with concomitant fracturing of facial bones adjacent to the maxillae. In the past they have been completed by inexperienced personnel with disrespectful destruction and mutilation. Plus, there are well-documented cases of the incorrect jaw being returned to the body bag and cases of many jaws being returned to the same body bag.

Consideration might be given to removal of the jaw or jaws in exceptional circumstances. Adequate justification for this must be presented by the odontology examiner to the supervising dental manager at the PM site before any action is taken. If a decision is made to remove the lower jaw, every attempt must be made to minimize the extent of surgical intervention and to replace the tissues in their original position at the end of the examination. Every attempt must be made to reduce the risk of loss of these tissues.

Both the loosened lower jaw and the attached upper jaw can be cleaned and subjected to precise dental examination and radiography. The advantage of this approach is that maintaining the upper jaw in situ virtually eliminates the risk of subsequent mismatching. Once the examination is completed, the lower jaw is replaced and the incision closed if appropriate.

In cases in which it is no longer possible to reposition the lower jaw following excision, examination and radiography, the lower jaw must be placed in a suitable container, labelled with the body number and stored in the body bag with all other aspects of the body. The removed lower jaw should be placed at the upper (head) end of the body bag in these cases so that it is available for a follow-up examination, which might be necessary weeks or months later or to facilitate required plausibility and confirmatory tests prior to release of the body.

CHAPTER 7 - RECONCILIATION AND IDENTIFICATION

7.1 General remarks

The Reconciliation Team compares the AM and PM findings submitted by the AM and PM Teams, respectively. For practical reasons, the Reconciliation Team should be set up as near as possible to the Operations Command Centre.

Considerable time can be saved in comparing data if a data processing and evaluation software is used. However, no computer program, no matter how effective it may be, can be more than a helpful tool. Final decisions must be made on the basis of all relevant criteria.

If there is no possibility to use an evaluation software you find enclosed also the methods for evaluation.

7.2 Organization and structure of the Reconciliation Unit

7.2.1 Director of the Reconciliation Unit

The Director of the Reconciliation Team is responsible for all sections of the unit. He is responsible for task distribution and personnel assignments and maintains an overview of the disposition of all individual tasks. Thus the Director must have a basic grasp of all aspects of the identification process.

The Head of the Reconciliation Team reviews Identification documents as a final check prior to confirmation of "official matches". He presents completed matches with the assistance of appropriate experts to the Identification Conference.

7.2.2 Assistant Head of the Reconciliation Team

The Assistant Head of the Reconciliation Team coordinates matches within the Reconciliation Team. Matches obtained on the basis of identifying features are passed on to the other sections for review and confirmation. He also prepares complete ID documentation for the ID Board.

7.2.3 Reconciliation sections

- A reception desk and a general archive has to be established for all AM and PM files
- Separate sections are formed corresponding to specific identifying features.
- Within these sections, assigned experts perform the following duties for each type of identifying feature:

7.2.3.1 Dactyloscopic data (fingerprint identification experts)

- Quality Assurance of AM and PM data
- Statistical material submitted to the section
- Comparison of data in the (mini) AFIS
- Preparation of expert opinions for matches
- Support for the Director at the ID Conference

7.2.3.2 Dental (forensic odontologists)

- Quality Assurance of AM and PM data
- Comparison of data in PlassData
- Preparation of expert opinions for matches
- Support for the Director at the ID Conference

7.2.3.3 DNA (biology)

- Quality Assurance of AM and PM data
- Preparation of expert opinions for matches
- Support for the Director at the ID Conference

7.2.3.4 Secondary identifying features / data mining (police officer)

- Quality Assurance of AM and PM data
- Comparison of data
- Preparation of expert opinions for matches

7.3 Methods of evaluation/procedures employed by the Reconciliation Team

The procedural approach should include the following steps:

- Collection/review of AM and PM findings
- Collective classification
- Preparation of a list of AM key markers and PM key markers
- First matching
- Individual comparison
- Identification/rejection

7.3.1 Collection/review of AM and PM findings

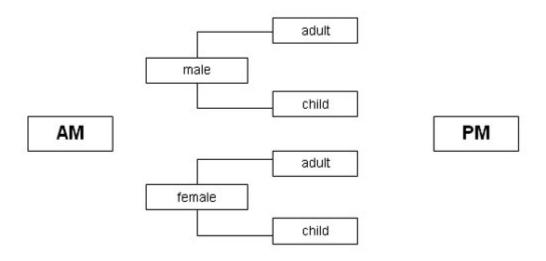
The Reconciliation Team receives the AM and PM files as soon as they arrive and appropriate quality control measures have been performed in the respective sections (AM and PM). Quality control continues in the Reconciliation Unit, in order to ensure adherence to uniform data standards.

7.3.2 Collective classification

Since searches for PM findings among all AM data records is excessively time-consuming, the collective data should be classified according to useful criteria so that, for example, PM records for female children are compared only with AM records for female children.

A simple classification by **gender** and **age** is helpful for both AM and PM records, and records should be filed accordingly.

Classification by ethnic affiliation or height is impractical in most cases, as the bodies of many victims of major disasters may be severely mutilated or destroyed (e.g. airline crashes, train accidents) and/or because advanced stages of decomposition must be anticipated in many cases (e.g. disasters in warmer regions).



7.3.3 Preparation of a list of AM key markers and PM Key markers

In order to obtain first matches between AM and PM findings, it is often helpful to prepare a list of special AM and PM key markers for bodies. In this way, only particularly noteworthy features of a missing person or body are recorded in a list.

A key marker list is prepared for each subgroup (AM and PM).

Sample AM key marker list

		description	
Mustermann, Erika * 01/13/1969	Heart pace-maker no.123456789		
Benthaus, Julia *08/17/1975		Tattoo (lion) on left shoulderblade	4 implants

AM - adult female

Sample PM Key marker list

Body No	Med. findings	Evidence /personal description	Dental findings
PM1	Gall bladder missing	Bald	Incisor bridge
PM2	Scar, lower right abdomen		
PM3	Heart pace-maker no. 123456789		
PM4		Rolex wristwatch	OK total prosthesis
PM5	Hip joint r and I.		
PM6		Tattoo (lion) on left shoulderblade (?)	4 implants
PM7	6 –year-old-child		Healthy, natural teeth

PM adult female

Example of first matching



7.3.5 Individual comparison

In the subsequent individual comparison process, the matches obtained during first matching are collated and checked through individual comparison of the individual AM missing persons file with the corresponding findings in the PM file.

This can result in identification, rejection or the assumption a possible or probable identity.

As a rule, identification can be verified if there is a match in primary identifying features (see Chapter 4). If a match is based on secondary identifying features only, additional supporting factors must be assessed before identification is confirmed.

Fingerprint analysis

A fingerprint expert should be assigned to the fingerprint evidence section. The expert compares AM fingerprint evidence with print evidence obtained from the body of the victim. AFIS technology should be used in this context (see Chapter 5).



Dental status comparison

A large number of specific details can be compared for purposes of matching based on dental status. Individual comparisons should be performed by professional experts (dentists) here as well.

DNA

In the DNA section, AM findings are compared with PM profiles by specially trained biologists. Computer programs mainly make the match comparisons and calculate probability statistics.

If problems arise, the AM or PM team should be consulted. Comparisons between AM and PM data must be documented in the Body Comparison Report, which is part of the PM Body Report.

7.3.6 Identification – Identification Board

Final identification of a disaster victim is made with the approval of the Identification Board (IB). The IB has the following specific responsibilities:

- Review and evaluate the evidence in favour of identification in a given case,
- Decide if the evidence is enough to identify the victim (if not send the case back for further information)
- Localization and reassessment of non-matches,
- Compilation of results in a Victim Identification Report (also part of the PM Body Record) and approval by signature. This record is then regarded as formal confirmation of the identification of a deceased disaster victim.

The Identification Board is responsible for the final identification of every victim and should therefore be composed of the most experienced identification experts involved in the entire operation, i.e. the heads of the various sections/units (forensic pathology, odontology, fingerprints) and the Director of the DVI Team.

It may be possible to have one or two representatives (observatory) of the different countries involved in the disaster at the ID board.

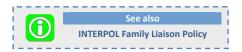
DVI Guide: INTERPOL 2009

8.1 Care and assistance for relatives of disaster victims

Humanitarian considerations alone imply the need to provide assistance for relatives of victims of a disaster. Furthermore, a suitable assistance programme promotes cooperation on the part of relatives in the collection of AM data, thus enhancing the quality and speed of identification measures.

An information management system designed to meet the needs of relatives also contributes to reducing the probability that relatives (who may feel disappointed in the efforts of the authorities) will make inaccurate or misleading statements to the media.

Relatives ordinarily need special assistance well beyond the end of DVI operations. These needs intensify on specific occasions (e.g. anniversaries, court proceedings, etc.).



8.2 Care for operational personnel

All personnel assigned to victim identification duties should have access to a comprehensive programme of medical and psychological care. Preparatory, accompanying and follow-up support should be provided in both areas. Work and radiation safety requirements should be observed as well. A section on work load should be inserted, such as "8 hours/day and 5 days/week are necessary to maintain the mental and physical health of the personnel and thus the quality of the work

8.2.1 Preparatory support (preceding disaster operations)

Inoculations

All personnel who run the risk of contact with contaminated material are to be provided with appropriate inoculations. These inoculations should be administered during the preparation phase in advance of disaster operations.

Supplies and equipment

All required supplies and equipment must be made available to each operational unit.

Training/field exercises

All assigned personnel should be sufficiently trained for their specific duties and participate regularly in field exercises.

8.2.2 Support during operations

The burden imposed on assigned personnel increases with the duration and intensity of an operation. This affects all areas of operation. Consequently, the stress experienced by personnel who are not directly assigned to PM data collection is often underestimated. Therefore, all personnel should be provided access to medical and psychological support and assistance throughout the operation.

Extensive work load should be avoided to maintain the mental and physical health of the personnel and thus the quality of the work.

8.2.3 Follow-up support

Following every operation, the need for debriefing should be carefully assessed. In cases of uncertainty, all personnel should undergo a medical check-up.

CHAPTER 9 - MATERIAL AND MATERIAL RESOURCES (GENERAL)

9.1 Personal safety gear and special equipment

A list of required supplies and equipment is provided in Appendix 1 (Supplies and Equipment). The list covers basic materials only. Depending upon local conditions and current operational requirements, it may be necessary to procure additional supplies and equipment locally or have them shipped after arrival at the site.

Therefore, a substantial cash reserve should always be brought to or made available at the disaster site. These funds are to be managed by an experienced administrative officer, who is also responsible for maintaining corresponding accounts.

9.2 Safety and special clothing

Personnel assigned duty at the disaster site are to wear appropriate patches or armbands to facilitate recognition. Whenever multiple agencies or national organizations are involved, it is recommended that each individual personnel wear patches, armbands or other symbols indicating their specific functions (e.g. commander, forensic pathologist, dentist, evidence centre director, etc.).

The primary purpose of personal safety clothing is to protect operational personnel against direct contact with corpses and local hazards. In addition to standard safety clothing (surgical clothing, protective gloves, rubber boots, aprons, oral masks), overalls, helmets, safety boots, goggles, rainwear and reflective safety vests may also be needed. Because it is not possible to provide operational clothing/gear that is suitable for all conditions, contractual arrangements should be made with appropriate suppliers to provide other supplies/equipment on an as-needed basis (e.g. rapid procurement of tropical or thermal clothing).

9.3 Material and supplies for the disaster site

Heavy duty, waterproof body bags will be needed at the disaster site unless bodies have already been recovered by local agencies.

Personnel will also need containers for tissue and fluid samples. Suitable evidence bags are required fort the collection and preservation of objects belonging to victims.

9.4 Supplies and materials

Supplies and materials required by individual operational units must be brought to the disaster site. Commanders of individual operational units are responsible for replacing consumed supplies and/or procuring new, improved materials.

9.5 Communication equipment

Clear lines of communication must be established between operational units at the disaster site and the command centre.

A sufficient number of mobile telephones, fax machines and computers capable of remote data transmission must be provided to operational units at the disaster site.

In order to ensure trouble-free communication and data transfer, a telecommunication technician and/or an IT administrator should be assigned to the disaster site as needed.

CHAPTER 10 - LEGAL STANDARDS

Every DVI operation is subject to the laws of the country in which the disaster in question occurs.

In view of the fact that victims of disasters requiring DVI operations ordinarily come from different countries, approaches to cooperation with the home countries of victims should be developed in advance of such incidents.

The first step in this process is to formulate agreements regarding the requirements applicable to the collection and transmission of AM data.

Agreements regarding the integration of international DVI teams in cases of need should also be worked out. The requirements imposed upon these teams are specified by the host country, and the integration of DVI teams must conform to applicable national law.

This DVI Guide reflects the Interpol standard for DVI operations. It should be explicitly specified as the basis for DVI operations involving teams from different nations in advance of such operations.

CHAPTER 11 - SPECIAL OPERATIONS I



Fatalities caused by chemical, biological or nuclear substances (CBRN)

The remarks in this chapter relate specifically to the operational environment described therein. Information provided in the other chapters applies accordingly.

In order to mount a CBRN response, it is assumed that the jurisdiction has CBRN equipment, plans, policies, trained personnel and procedures to manage an incident.

11.1 Problems

- Incidents in which exposure to chemical, biological or nuclear substances resulted in numerous fatalities have occurred repeatedly in past years.
- In addition to hazardous substances that have resulted in the loss of life in accidental disasters, attention is focused today on terrorist attacks and military conflicts in which chemical or biological weapons are used.

11.2 Biological substances

- Isolated cases involving the import of dangerous infectious diseases
- Major incidents resulting from natural disasters or the use of biological agents for criminal or terrorist purposes

11.3 Chemical weapons

- Respiratory agents
- Binary weapons
- Defoliants
- Agents that attack the skin
- Agents that attack the lungs
- Agents that attack the nervous system
- Irritants

Victims should not be autopsied, unless the autopsy can be conducted in a mortuary that has appropriate facilities, including significant HEPA filtration and is a negative pressure environment the opening of the three body cavities poses a potentially high risk of contamination for the DVI Team. The staff involved must be provided appropriate Personal Protective Equipment.

It may not be possible to use all primary methods of identification (fingerprint analysis, DNA analysis, dental assessment).

The period between exposure to the agent and death may vary from minutes to days, dependant on the agent.

Since most victims die days after the incident, where the incident involves biological agents, identity should be determined prior to death, wherever possible.

Corpses may have to be cremated in the interest of public safety.

Bodies must be transported in CBRN rated body bags, only after effective decontamination.

11.4 Completing a DVI in a CBRN environment

Utilizing the same basic CBRN response format and procedures, overlaid with additional protective, recording and handling equipment, along with additional specific operating methods to suit the environments.

No matter what agent is involved, CBRN operations should be completed with the basic principles of:

Time, distance, and shielding,

Understanding that the routes of entry to the human body are through:

absorption, inhalation, ingestion or injection.

At a very early stage, intelligence must be obtained about what the size of the incident is, in order to develop a strategic plan regarding sustainability of operations, staffing, levels and resources.

Before any recovery of deceased can begin, the CBRN agent must be positively identified, as this directs considerations as to levels of PPE, safe operating times, realistic threats and methods of decontamination.

Develop a plan that is achievable but flexible, which is communicated to staff involved.

Throughout the DVI process, the climatic and environmental conditions must be monitored.

A site safety plan must be developed and, an independent site safety officer is appointed, who has the authority to stop operations if safety concerns are held.

Staff involved in the DVI operation must be appropriately trained to operate in various levels of Personal Protective Equipment;

CBRN operations place physical stresses and specific operating limitations on responders.

Prior working relationships with other agencies must be established as part of any pre incident planning.

Decontaminable equipment is required. Personnel and equipment will be required to be decontaminated following any incident.

There must be sufficient operational chemical & radiological detectors/monitors on hand, to ensure that no human remains leave the decontamination line without being completely free of contaminant, or at least well below any dangerous level;

As a general rule, the removal of clothing will eliminate 80 to 85 % of contaminate.

CBRN rated body bags must be used for the transport and storage of deceased persons.

CBRN equipment must include decontaminable documentation

- For example laminate the Interpol DVI scene forms, transposed upon exit from the hot zone, ensuring documentation is photographed and the original photos are retained.
- Clothing, exhibits or property located at scene must be photographed thoroughly prior to double bagging where possible.
- These items must be clearly numbered, relative to the DVI number allocated to the human remains, for tracking purposes.

All laminated notes used, must be photographically recorded.

Given time and the right conditions, some agents may dissipate to a non dangerous level.

Ensure scientific advice is on hand at the scene to provide assistance regarding the handling, decontamination and safe environmental operating times relating to the specific agent or contaminant involved.

Additional considerations

Property management – must be done in a completely safe manner,

Any article or document removed from the scene, must have been decontaminated and monitored,

Some agents can destroy or substantially affect the development of latent fingerprints.

Summary

Conducting DVI operations in CBRN environments, takes an immense amount of pre-planning and training.

The appropriate equipment must be available before starting any DVI in a CBRN incident.

It takes a considerable amount of teamwork and TIME.

DVI practitioners will need to work with other response agencies such as military, fire, scientific officers and radiological experts to accomplish the task safely and effectively.

Natural disasters such as earthquakes, floods, tsunamis, etc.



The remarks in this chapter relate specifically to the operational environment described therein. Information provided in the other chapters applies accordingly

12.1 Problem

Natural disasters can cause large numbers of casualties. In most cases, the local infrastructure collapses completely. Power outages frequently occur in these situations.

If residential buildings are affected by a disaster, such as an earthquake, the task of obtaining ante mortem material becomes more difficult. Concern that aftershocks may follow could hinder identification measures.

12.2 Epidemics

Corpses in itself do not cause epidemics in the aftermath of natural disasters. The only danger facing the population is that of potential drinking water contamination.

12.3 Temporary graves

If no cooling capacities are available or obtainable, temporary graves can be dug to accommodate large numbers of victims. Bodies remain cooler when stored underground.

Burial trenches can be dug to accommodate large numbers of bodies and body parts. These trenches should be at least 1.5 metres deep and not located closer than 200 metres from the nearest drinking water source. A gap of 40 cm should be left between individual corpses. Corpses must not be stacked. The position of each body must be clearly marked.

12.4 Mass Graves

- Due to obvious problems (poor prospect of success, substantial work input, little popular support), the opening of mass graves is generally regarded with significant reservations.
- In the past, international missions under the banner of the United Nations have been established fort he purpose of exhuming and identifying bodies from mass graves on a large scale.

12.5 Marking of bodies/body parts

Every body or body part is assigned a number. Each individual number may be assigned only once. The numbers are to be written on a waterproof label or tag. The label or tag is attached to the body by using cable straps

12.6 Photographic documentation of bodies/body parts

- Digital cameras should be used wherever possible. Body numbers should be clearly visible on each photograph. Dirt on faces and clothing should be removed. The following photos should be taken:
- Photograph of the entire body
- Photograph of the face
- Photograph of the torso
- Photograph of the lower body

12.7 Documentation

The recovery record in the Interpol Form should be filled out completely.

12.8 Identification

Visual identification of bodies or photographs should not be the only method of identification used. Statements by witnesses who recognize victims may provide important information about a victim's origin but should be supported by other methods of identification.

12.9 Cooperation with international organizations

In all of the operational scenarios described above, it is important to consider that international organizations such as the UN-OCHA (United Nations Office for the Coordination of the Humanitarian Affairs) and the ICRC (International Committee of the Red Cross) may also be involved in emergency operations.