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# Mass Fatality Scene Processing: Best Practice Recommendations for the Medicolegal Authority

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# Forward

Medicolegal authorities need to be proactive in developing capabilities and capacities for mass fatality search and recovery operations. Successful disaster victim identification efforts begin with, and are reliant upon, efficient, effective, and timely search and recovery endeavors. Thus, mass fatality incident scenes need to be processed in an organized, systematic, safe, and ethical manner, following scientific principles and appropriate techniques. Systematic search and recovery approaches that maximize disaster scene coverage increase the probability of evidence detection, enhance evidence documentation, and minimize evidence alteration during collection and transport.

Mass fatality scenes are circumstances where human remains and other associated evidence (e.g., personal effects, vehicle wreckage, structural debris, etc.) have been deposited within the broader context of the topography and physical characteristics of the landscape. These scenes can be broadly categorized as having resulted from an accident, criminal activity, or natural phenomena. The immediate aftermath of such incidents is often complex, presenting commingled human biological remains, personal effects, and other diagnostic evidence distributed over areas ranging in size from meters to kilometers. Identification of decedents begins in the field and the quality of work at the recovery scene can directly influence the overall success of the victim identification process at the disaster morgue.

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All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

**Keywords:** *mass fatality, Disaster Victim Identification (DVI), best practices, scene processing, medicolegal authority*

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# Mass Fatality Scene Processing: Best Practice Recommendations for the Medicolegal Authority

## 1 Scope

This document provides definitions, guidelines, and best practices for the detection, processing, and recovery of physical and contextual evidence associated with mass fatality disaster scenes to ensure that evidence is carefully and consistently documented, and recovered in situ. This document focuses on terrestrial scenes that do not involve a significant hazardous materials component. The purpose of these guidelines is to ensure that appropriate strategies are followed for the search and documentation of the scene, and the recovery of human remains, personal effects, and other probative evidence, while maintaining the chain-of-custody of all items, and ensuring that all areas associated with the scene are processed in a systematic manner. The recommended best practices in this document are intended to help promote the highest level of quality in disaster victim search and recovery operations. This document is applicable to the work of medical examiners, coroners, death investigators, and other forensic personnel, as well as public and private medical, forensic, and investigative professionals (and/or volunteers) that may assist a medicolegal authority at a disaster scene with any evidence detection, recording, and/or collection tasks. In the absence of specific guidance, the principle, spirit, and intent of this document should be met.

## 2 Terms and Definitions

For purposes of this document, the following definitions apply.

**2.1**
**Incident Command System**
**ICS**
A management system designed to enable effective and efficient domestic incident management by integrating a combination of facilities, equipment, personnel, procedures and communications operating within a common organizational structure.

**2.2**
**medicolegal authority**
A person or agency charged by law with conducting death investigations for the purpose of certifying deaths.

**2.3**
**medicolegal investigation**
The medicolegal investigation includes the collection of data, photographs, evidence, witness interviews, external examination of the body at the scene, and other forensic information and analysis that will contribute to the identification of decedent, determination of cause and manner of death, reconstruction of the accident or crime scene, and support the provision of survivability factors.

## 3 Recommendations

### 3.1 General

Mass fatality scenes are highly variable in both type and scale. Decedents from these circumstances are often not identifiable through conventional methods due to significant fragmentation,

commingling, extensive thermal damage, trauma, and other modifying forces. Depending on the scale of the incident, human remains may also be in advanced stages of decomposition by the time responders can extricate them from the scene, thus adding to the overall suite of identification challenges. The medicolegal authority shall develop a scene processing strategy for a particular incident based on consideration of the characteristics, including presence of hazards, of the incident. Minimally, the medicolegal authority shall address the following objectives.

a) Establish jurisdiction and ownership/oversight of the decedent recovery process; locate the scene and identify its maximum boundaries.

b) Use an appropriate search strategy that maximizes the detection and collection of evidence.

c) Use documentation methods that clearly, precisely, and accurately note the location, position and orientation of the evidence, while also serving to establish chain-of-jurisdiction custody.

d) Recover, manage, and track evidence and human remains in a manner that does not harm their probative value or the chain-of-custody.

e) Establish a quality assurance strategy for scene processing activities.

f) Conduct all activities in a respectful, compassionate, and ethical way.

### 3.2 Management Perspective

In addition, distinguishing between a criminal incident and an accident often cannot be done prior to the start of the investigation process. Therefore, all mass fatality scenes, whether related to criminal activity or not, shall be treated as medicolegal death scenes and managed according to those forensic principles, methods, and techniques that best provide for the most appropriate evidence security, documentation, and proper chain-of-custody. Regardless of the type of incident encountered, preserving the overall integrity of the scene's spatial and temporal context is critical.

Critical factors, with the potential to influence these core objectives and the overall recovery and identification effort, include, but are not restricted to the following.

a) Access to resources and assets (equipment and specialized personnel) and critical infrastructure.

b) Size, scale, topography, and location of the scene.

c) Weather and environmental conditions.

d) Chemical, Biological, Radiological, Nuclear, and High-Yield Explosive (CBRNE)/Toxic Industrial Chemical (TIC) environments.

e) Open vs. closed decedent population.

f) Number of fatalities involved.

g) Condition of the human remains (complete, fragmentary, decomposed, burned, etc.).

The focus of this document is specific to the role of the medicolegal authority and the medicolegal death investigation. Other investigative agencies will have a presence (depending on the incident); however, their efforts should be coordinated with all other relevant investigative interests on scene in order to ensure the overall quality of the victim identification process.

Developing standards and best practices for mass fatality search and recovery operations is a difficult and complicated endeavor. At a conceptual level, duties and tasks for those involved in these operations are not complicated; however, the political and fiscal landscape in which these operations are conceived and conducted will influence the application of disaster scene operations.

The guidelines and best practices presented herein are compatible with those used in regular crime scene and medicolegal death investigation; however, they have been specifically designed to address the unique challenges faced by the high-volume victim search and recovery operations commonly associated with mass fatality disaster scenes. Practitioners should implement these guidelines and best practices when applicable, practical, and appropriate.

## 3.3 Organizational and Management System

### 3.3.1 Jurisdiction

The medicolegal authority is defined as an entity that can be held legally responsible for the victim recovery operation. That entity has the authority needed to execute its duties and meet the best practices outlined in this document. In the U.S., the chief medical examiner/coroner provides the lead, or designates a technical lead (e.g., a deputy coroner, death investigator, or other qualified individual), with sufficient authority to make and enforce decisions. It is the responsibility of the medicolegal authority overseeing disaster victim identification and death certification to conduct all on-scene search and recovery operations in a manner that best facilitates and promotes the scientific process of human identification; the exchange of factual and timely information with all appropriate stakeholders; and the return of all victim remains to their legal next of kin.

### 3.3.2 Management

The medicolegal authority shall define, maintain, and follow a management system designed to guide its personnel (and any support personnel) in the proper application and practice of scientific methods and techniques during disaster victim search and recovery operations. These operations should be consistent with, or exceed, the level of quality defined by the jurisdiction's standard operating procedures for death scene processing, documentation, and evidence recording, collection, and security. The management system shall be well-documented, communicated, understood, and available for reference by all personnel.

The medicolegal authority shall specify and document the roles, responsibilities, and authority of all personnel who manage, perform, and/or verify any part of the search and recovery operation at the disaster scene.

A health and safety manager (however named) shall be appointed from within or selected by the medicolegal authority who, irrespective of other duties, will have the defined responsibility and authority for ensuring that the management system—as it relates to risk assessment and mitigation and worker health and safety—is being implemented and followed at all times throughout the disaster victim search and recovery operation on scene.

### 3.3.3 Assessment

The management system should be assessed following every disaster victim search and recovery operation involving multiple fatalities. The objective of this post-response assessment process should be to identify: deficiencies in resources; departures from the management system, standard operating procedures, or quality assurance and control mechanisms; and other lessons learned from the operation. When possible, the information generated by this assessment should be used to initiate actions that will help minimize (or prevent) similar deficiencies and/or departures during future operations.

## 3.4 Preparedness and Pre-Incident Planning

### 3.4.1 Developing a Plan

Prior to the occurrence of a mass fatality incident, the medicolegal entity should construct a realistic, manageable, and detailed search and recovery plan as an integral component of the overall mass disaster plan. It should specifically address how to efficiently and effectively conduct search and recovery operations involving large numbers of human remains, personal effects, and other relevant evidence that may be widely scattered over a large area. The plan must ensure that the maximum amount of evidence is located, properly documented, and efficiently removed from the scene. The medicolegal plan related to search and recovery operations should include, but is not restricted to, the following items.

a) An organizational chart and additional information on how the medicolegal authority fits into the greater Incident Command System (ICS), or comparable hierarchical decision- making system, which will serve to:

    1) establish a clear sense of the chain-of-command in order to reduce the potential for interagency conflicts;

    2) outline specific roles and duties for each of the agencies involved from within the medicolegal authority and from outside jurisdictions.

b) A well-documented inventory of personnel, equipment, and other resources immediately available, either internally or through mutual aid agreements. This process will also highlight potential gaps that exist and allow the jurisdiction to more strategically target assets needed through such agreements.

c) General recovery protocols or standard operating procedures for the search, detection, recording, and collection of probative evidence from a mass fatality context, that should include a typical sequence or checklist of activities required from start to finish on scene.

d) A logistics plan with pre-staged equipment and resources, including a retention schedule for perishable supplies.

e) Develop a health and safety plan (HASP) for field operations.

f) A continuity of operations (COOP) plan to ensure that normal day-to-day investigative operations are able to continue.

### 3.4.2 Activation Criteria

The medicolegal authorities should develop objective criteria to determine whether an incident warrants activation and implementation of its mass fatality incident response plan. Authorities responsible for activating a plan should consider incident characteristics for criteria such as: a pre-determined number of potential fatalities, the need for a prolonged or complex victim recovery and identification operation, the need for a multi-agency response, international/diplomatic considerations, and other complicating circumstances such as CBRNE contamination.

### 3.4.3 Dissemination and Training

Efforts should made to disseminate and exercise the mass fatality incident plan in an ongoing basis in advance of an incident to all agencies involved in the response to a disaster. It is critical that the plan be tested, often through realistic exercises, revised, and updated. Changes in personnel, equipment, or other resources within the medicolegal authority should warrant immediate updates to the plan, as necessary.

## 3.5 Pre-Search and Recovery Operations and Considerations Following the Incident

### 3.5.1 General

Once an incident occurs, initial reports and information may not be reliable or accurate. Among the first tasks confronting any disaster response is determining the scope of the incident and the context of the victim recovery scene. Information regarding scene formation and disturbances should be collected either through direct monitoring by a medicolegal representative embedded on-scene during life-saving and scene safety operations, or by interviewing those involved in these operations at an appropriate time prior to the start of victim recovery.

### 3.5.2 Collect Critical Incident Information

In order to effectively respond, the following information should be collected prior to any on-site evaluation of the physical scene.

Verify that the reported location of the disaster incident is indeed within the legal boundaries of the medicolegal authority's jurisdiction. If the incident scene involves other jurisdictions, they must be contacted immediately.

a) Identify a point of contact within the agency that has jurisdiction over the scene to coordinate the initial scene reconnaissance survey.

b) The status of the decedent population (open vs. closed).

c) An estimated number of fatalities involved.

d) The general condition of human remains (complete, fragmented, burned, decomposed).

e) The size and scale of the incident scene, and the terrain, topography and environmental setting (urban, rural, field and forest) of the scene.

f) Weather and other environmental factors for the next few days.

g) Potential health and safety hazards.

h) Any immediate security issues.

These data help shape the planning effort and the mobilization of personnel and resources for human remains recovery and identification, personal effects management, and other evidence collection and investigation activities.

### 3.5.3 Conduct Scene Reconnaissance Survey

In order to collect accurate information, it is often useful for the medicolegal authority, in conjunction with ICS (or other structure) member, to conduct a brief reconnaissance survey (usually a walk-through) of the disaster scene in order to rapidly evaluate the scene's general size, boundaries, orientation, and complexity. This survey will assist with the development of an appropriate search and recovery strategy, as well as guide operational planning efforts and resource coordination.

Integrating the use of overhead imagery (e.g., aerial photography, satellite images), with data collected on the ground, can provide one of the most rapid, complete, and accurate initial evaluations of the incident area as a whole and the spatial distribution of the victim recovery scene across the landscape.

### 3.5.4 Conduct Risk Assessment Analysis

The medicolegal authority should conduct a risk assessment in conjunction with life-safety and law enforcement representatives at the scene *before* the start of any intrusive search, detection, recording, or collection operations. This will serve to identify any potential health and safety issues for the search and recovery team, and will lead to discussions of how to mitigate these issues.

### 3.5.5 Initial Scene Documentation

It is also useful for the medicolegal authority to begin recording the recovery scene's formation and disturbance processes as soon as possible (e.g., the manner and extent to which the victims' remains have been affected post-incident by first responders assisting the living). Non-transportable, contextual data will be lost unless it is documented by the medicolegal authority at or near the time that it receives access to the scene.

### 3.5.6 Establish Numbering System for Human Remains and Personal Effects

In order to maintain field provenience (i.e., specific locational information) and reduce complications with the accessioning of remains into the disaster morgue, a unique field numbering (tracking) system should be employed. Explicit instructions on assigning numbers to human remains and unassociated personal effects should be provided to those responsible for this task. For example, human remains and personal effects from the following scenarios would be assigned unique tracking numbers:

a) intact or mostly intact remains (a body opposed to a portion of a body);

b) dissociated large or small portions of bodies (remains with no connection to a body via a tissue bridge);

c) concentrations of highly fragmented or commingled remains should be assigned a distinct field specimen number.

In some cases, other agencies may be documenting non-biological evidence, such as unassociated personal effects, vehicle wreckage, etc., at the scene. The medicolegal authority should coordinate with these other agencies which may be assigning numbers to these other classes of evidence on-scene. The objective is to mitigate issues related with duplication of numbers and the confusion when synthesizing data during mapping.

### 3.5.7 Establish Regular Meeting Times for Incident Command

Key members of Incident Command should meet at the beginning and end of operation periods or shift changes to discuss all aspects of the operation, identify issues, and correct emergent problems before they become major challenges to the DVI operation.

## 3.6 Staging for Search and Recovery Operations at the Disaster Scene

### 3.6.1 Establish Scene Perimeters and Security

Law enforcement provides initial scene security; however, in some circumstances the medicolegal authority may request additional security or enforcement of scene perimeters. Typically, two scene perimeters should be created. An inner perimeter should be created around the immediate disaster scene and debris field accessible only to those processing the scene and an outer boundary should be created around the disaster scene to prevent access by media and the public. The area between the inner and outer perimeters should be used for planning operations, supply stations, staging areas, and other official activities that require allocation of space close to the incident scene. This area should be accessible to authorized personnel that may not require access to the inner perimeter.

### 3.6.2 Establish Badging/Credentialing Procedures and Stations

At the entrance of the outer perimeter, marking the outermost control zone, there should be a badging station to provide identification media for personnel according to their official roles, duties, and level of authorization. The highest level of access control should be the area that is immediately surrounding the inner perimeter. It is the area where scene processing is focused. Only authorized and qualified investigators and scene processors should be permitted to enter.

### 3.6.3 Establish Staging Areas for Equipment, Supplies, and Personnel

Designate convenient staging areas between the inner and outer perimeter for equipment and supplies (e.g., personal protective equipment), breaks, planning and coordination, and other official activities that require a footprint close to the inner perimeter.

### 3.6.4 Establish Times/Locations for Operational Meetings with Scene Recovery Personnel

Establish regular meeting times for individuals working on scene. Describe search and recovery procedures, timeframes to accomplish specific tasks, break schedules, lines of communication, and other pertinent information. These meetings are designed to maintain situational awareness for all search and recovery activities, which will be reported at the higher-level meetings that may occur at the beginning and end of operational periods (or as designated by Incident Command or similar structure).

### 3.6.5 Establish Remains Collection Points

An important aspect of the recovery operation is to determine how remains will be moved from the disaster scene. Large incidents or complex scenes may require the use of remains collection points (RCPs) to act as staging locations prior to transporting the decedents from the disaster scene to the disaster morgue. Here the evidence and associated information (e.g., field specimen numbers, provenience information) will be entered into databases by hand or through barcode scanning technology. Quality control, including verification of numbering system, data collection integrity, consistency, and quality, as well as other information can also occur here, prior to removal from scene.

### 3.6.6 Determine What Evidence Will be Documented and How to Collect It

Typically, a great deal of debris will be present on the disaster scene. Prior to search and recovery efforts, determine what will be documented and collected (e.g., human remains, personal effects, and other probative evidence), and what will be left behind for subsequent scene debris collectors (e.g., non-probative debris and other materials associated with the incident). Protocols for collecting disassociated remains and personal effects should be articulated in the Search and Recovery Plan; however, aspects of the scene may require changes to this protocol. If multiple agencies are involved, it is very important to maintain coordination between agencies in order to ensure that evidence is not compromised by the activities of a particular agency. Personal effects associated with remains should not be removed from remains at the scene; instead these items should be transported with the remains to the disaster morgue. Disassociated remains (remains not connected by a tissue bridge to an individual body or body part) should be collected separately.

It is recommended that smaller concentrations of highly fragmented and commingled remains are assigned one unique tracking number for the entire concentration/feature. These remains will need to be evaluated in the disaster morgue to determine if additional numbers will need to be generated.

If larger concentrations of remains are encountered, forensic archaeological excavations may be required.

## 3.7 Processing the Disaster Scene

The primary goal of the processing effort is to systematically and comprehensively document evidence *in situ,* as it is done at non-disaster crime scenes. This will maximize not only the location of evidence, but will minimize any further damage or alteration. At most disaster scenes, the distribution and density of evidence on the landscape will vary from widely scattered, relatively low-density concentrations to areas of multi-layered and commingled evidence concentrations. Furthermore, the condition of remains may range from intact to highly fragmented. Therefore, different recovery strategies will likely be required.

### 3.7.1 Implementing Effective and Efficient Search and Recovery Methodologies

#### 3.7.1.1 General

The medicolegal authority shall employ systematic search and recovery strategies that are comprehensive, efficient, and appropriate to the conditions of the recovery scene. All strategies

should be scientifically designed and validated prior to use, and they should include a measure of search effectiveness.

#### 3.7.1.2 Systematic Searches for Evidence Strewn over Large Areas

In areas of the disaster scenes and debris field in which evidence is widely dispersed but in low densities, a search, documentation, and recovery procedure in which teams work on their own, within their own corridor or recovery unit, concurrent with other teams is valid. Searching, recording, and collecting tasks follow closely in sequence. The search and recovery pattern should be logical, appropriate, and efficient for the search area and the number of personnel available.

#### 3.7.1.3 Systematic Search and Recovery Efforts for Concentrated/Commingled Evidence

When evidence at the scene is densely concentrated and/or extensively commingled, the initial search and recovery method should be modified accordingly. For example, a more intensive forensic archaeological excavation methodology may be needed to recover evidence in-place, which requires a specialized team to execute effectively.

#### 3.7.1.4 Divide the Scene into Manageable Units

Divide the scene into manageable search and recovery units, such as corridors, grids, city blocks, etc., based on the size and shape of the scene, distribution and density of evidence, type of terrain (urban vs. rural, flat vs. hilly; open field vs. forest, land vs. water, etc.), presence of hazardous materials, availability and experience of personnel, equipment, technological resources, among other possible considerations. Each unit can be processed by individual recovery teams working independently from other recovery teams, in other recovery units. The size and shape of the recovery units should be noted during planning stages on best available media, such as topographic maps, aerial photographs, or computer-generated GIS maps, which, in turn, will be used to plan, systematize, and track search efforts.

### 3.7.2 Organize and Coordinate Search and Recovery Assets

#### 3.7.2.1 Personnel Attributes

The following is a list of attributes, training, and skill sets one should consider when developing teams:

a) ability to conduct rapid and accurate assessment of forensic significance of biological tissue; specifically, human vs. non-human tissue;

b) knowledge of forensic archaeological search and recovery principles, methods, and practices;

c) knowledge of field survey and mapping instruments, including GPS units, total stations, unmanned aerial vehicle (UAV) deployed devices (e.g., forensic anthropologists, archaeologists, law enforcement, accident reconstruction experts);

d) experience handling crime scene evidence, paperwork, maintaining chain-of-custody;

e) experience with crime scene photography;

f) subject matter experts specific to incident (e.g., hazmat technicians, confined space specialists).

#### 3.7.2.2 Search and Recovery Personnel Roles

Regardless of the type or size of team utilized in performing search and recovery operations, the team should include the following roles, which may or may not equate to individual team members:

a) team leaders responsible for overseeing the search and recovery operation in a specific area;

b) searchers, responsible for systematically searching the disaster scene for significant evidence, as well as documenting where they have searched;

c) medicolegal investigators responsible for determining evidentiary significance and for initiating chain-of-custody;

d) note takers (scribes) responsible for documenting the timing, sequence, personnel involved, and location of search and recovery activities;

e) photographers, responsible for documenting the evidence, scene, and scene activities;

f) mapping technicians responsible for documenting the precise location of evidence, via the most precise means available and applicable (GPS, total station, and other technology);

g) Specialists responsible for specific activities unique to the incident (e.g. aircraft accident investigators, hazmat technicians)

h) Transport specialists responsible for packaging and moving of human remains or other evidence from the scene

#### 3.7.2.3 Search and Recovery Primary Activities/Workflow

The following is a list of general activities to be completed, in approximate workflow sequence from discovery through documentation and removal from the scene.

a) Systematic and thorough searching for evidence within a given recovery unit.

b) Detailed notation of the condition of human remains when found.

c) Notation of the 3-dimensional location and position of evidence as precisely as possible through the use of sophisticated mapping instrumentation.

d) Photographic documentation of evidence *in situ*, with scale and north arrow.

e) Initiation of chain-of-custody.

f) Placement of evidence into proper receptacles with appropriate field documentation and with minimal further alteration or damage of evidence.

g) Transportation of evidence to designated areas.

#### 3.7.2.4 Search and Recovery Teams

Search and recovery teams should be comprised of sub-teams conducting very specific duties in an ordered sequence during the search and recovery operation. The members of each sub-team will be specially trained and/or experienced with respect to their specific duties, such as photography or total station operation. In the event that multiple specially trained personnel are not available, each team should be managed by a subject matter expert (e.g., forensic anthropologist, death investigator). Individual teams work at their own pace appropriate to characteristics unique to the recovery unit, such as terrain, density of evidence, etc.

Table 1 provides a matrix of the types of teams that may be required depending on the nature of the incident.

**Table 1—Search and Recovery Teams**

| Team Type | Primary Role |
|---|---|
| Search Team | Locate and flag human remains or other evidence at the scene |
| Investigative Team | Describe potential human remains and personal effects and assign unique identifier |
| Excavation Team | Apply archaeological methods to recover evidence |
| Mapping Team | Survey the location of evidence or cluster of commingled evidence |
| Photography Team | Photograph evidence and scene activities |
| Transport Team | Package evidence and transport to collection points or the disaster morgue |
| Intake Team | Receives evidence at designated locations |

### 3.8 Pre-Search and Recovery Briefing

The search and recovery teams should be briefed on the specific operational objectives (e.g., search 100 percent of the disaster scene to locate human remains, personal effects, and evidence). Team members should be provided with instructions on their specific tasks and how they will interface with the other investigative components. They should also be briefed on use of equipment, documentation, health and safety, and reporting structure/chain of command.

### 3.9 Scene Search and Recovery Procedures

#### 3.9.1 Search Procedure

The primary goal of the search procedure is to systematically and comprehensively discover, locate, and mark evidence *in situ,* as it is done at non-disaster crime scenes. This will maximize the potential for discovering evidence and will minimize any further damage or alteration.

a) Searchers should walk the scene in straight lines with spacing between searchers that are appropriate to scene conditions but results in overlapping fields of vision of the surface.

b) Searchers should limit alteration of evidence during search phase by leaving evidence untouched and *in situ*.

c) Searchers should mark significant evidence (or clusters of commingled evidence) with pin flags in predetermined positions next to evidence (e.g., place flag on northeast corner of evidence).

d) Searchers should monitor progress through corridor or section of scene (eventually noting area searched on map of disaster scene).

### 3.9.2 Investigative Procedure

The primary goal of the investigative procedure is to ensure that human remains are systematically and accurately documented via photography, mapping, and assignment of tracking numbers as it is done at non-disaster crime scenes. This will maximize the potential for preserving contextual information for human remains and will minimize any further damage or alteration or comingling.

a) Medicolegal investigations should be performed in accordance with regular death investigator protocols to describe and document remains and associated evidence.

b) Evidence should be photographed and mapped prior to disturbance (see Photography Procedure, section 3.9.5, and Mapping Procedure, section 3.9.4, respectively).

c) Unique tracking or field specimen number should be assigned, and the remains tagged:

    1) all anatomically-connected human biological tissue should receive the same tracking or field specimen number;

    2) isolated fragments not anatomically-connected should receive a separate tracking or field specimen number;

    3) dense concentrations of highly fragmented tissue should receive one tracking or field specimen number;

    4) in most situations, medicolegal personnel will be responsible for documenting individual and isolated personal effects items. In other situations, other agencies will be in charge of documenting this evidence.

d) Transportation of processed evidence/remains should be coordinated.

### 3.9.3 Excavation Procedure

The primary goal of the excavation effort is to systematically recover human remains as it is done at non-disaster crime scenes using forensic archaeological methods. This will maximize not only the most complete recovery of human remains, including highly fragmented material and will minimize any further damage or alteration or comingling. At most disaster scenes, the distribution and density of evidence on the landscape will vary from widely scattered, relatively low-density concentrations to areas of multi-layered and commingled evidence concentrations. Therefore, different excavation strategies will likely be required.

a) When condensed and concentrated evidence and debris is located, excavation procedures should utilize forensic archaeological methods to expose, document, and recover significant evidence.

b) Dense concentrations of highly fragmented remains should be excavated as a feature, and assigned one field specimen number.

c) Excavation activities, progress, and findings should be documented in detail via written notes.

d) Human remains and other evidence should be exposed such that no portion is entrapped and the items can be picked directly off of the debris pile.

e) Residual soil or other debris should be screened to maximize the recovery of evidence.

f) Subsequent documentation (e.g., mapping, photography) of processed evidence/remains should be coordinated.

### 3.9.4 Mapping Procedure

The primary goal of the mapping effort is to systematically record the position of human remains and evidentiary items as it is done at non-disaster crime scenes. This will maximize not only the most complete mapping of human remains, including highly fragmented material and will allow for accurate reproduction of the scene for subsequent investigations.

a) General protocols for regular crime scene mapping/surveying should be followed.

b) An initial scene survey noting boundaries or other significant items related to the scene should be recorded.

c) Individual evidence or clusters of commingled evidence should be recorded as precisely as possible (usually with total station or GPS unit).

d) The following elements should be included on the map of the scene:

   1) case number or unique identifier for the scene;

   2) name and contact information for the technician that produced the map;

   3) direction of either magnetic or true north;

   4) scale;

   5) legend/key.

### 3.9.5 Photography Procedure

The primary goal of the photography effort is to systematically visually record the position of human remains and evidentiary items as it is done at non-disaster crime scenes. This will maximize not only the most complete visualization of human remains, including highly fragmented material and will allow for accurate reproduction of the scene for subsequent investigations.

a) General protocols for regular crime scene photography should be followed.

b) Evidence should be photographed with appropriate scale, north arrow, and tracking/field specimen number.

### 3.9.6 Evidence Collection and Transport Procedure

The primary goal of the evidence collection and transport effort is to ensure that human remains and evidentiary items are collected and transported as it is done at non-disaster crime scenes. This

will maximize the most complete collection of human remains, including highly fragmented material and will provide for their secure and safe transport for examination and identification.

a) Collect and remove evidence in proper receptacles to minimize any further damage or alteration.

b) Accurate labeling should be maintained by affixing a duplicate tracking/field specimen number on the outside of the container with the remains before it is closed and transported to the intake station.

c) Remove evidence from the scene to the Intake Station, or RCP.

### 3.9.7 Intake Procedure

The primary goal of the intake procedure is to maximize the initial documentation and to provide quality assurance and quality control measures and enable corrective actions to be taken.

a) Log in all collected evidence that is brought to the Intake Station or RCP.

b) Provide quality assurance and control measures to identify and correct errors of omission (no numbers on bags), or duplication of numbers.

## 3.10 Perform Final Scene Evaluation

Multiple, systematic passes through the recovery scene may be necessary. Search and recovery efforts should continue until no further human remains can be detected. Statistical measures of coverage are currently available and may be useful to suggest whether 100 % of the disaster scene has been searched, and whether close to 100 % of the evidence has been located, documented, and collected.

## 3.11 Post-Search and Recovery Briefing

After completing the disaster scene search and recovery operation, a meeting should be scheduled with all agencies involved to review and critique whether objectives have been met, anything missed, etc., before the scene is released.

## 3.12 Unacceptable Practices

All of the following practices are considered "unacceptable" in the context of disaster victim search and recovery operations.

a) Responding to a disaster scene without a systematic or comprehensive search and recovery protocol for human remains and directly-associated personal effects.

b) Beginning search and recovery operations on scene without verifying which law enforcement and medicolegal agency has legal jurisdiction for that location.

c) Failing to define, secure, and maintain the integrity of the maximum boundaries of the recovery scene throughout the medicolegal investigation.

d) Employing disorganized, random search, survey, detection, and/or collection procedures.

e) Making no attempt to map the recovery scene (and most importantly the evidence distribution across the scene); or using inappropriate and/or non-standardized mapping methods and techniques.

f) Failing to supplement mapping data with at least one other additional form of scene documentation (written notation, video, photography, sketches, etc.).

g) Moving, altering, or collecting items of evidence before adequate documentation has taken place (i.e., before mapping, photographs, video, written notes, sketches, or any other form of documentation).

h) Employing destructive search and recovery techniques, including heavy machinery to extricate biological tissue from condensed debris piles, unless appropriate for exceptional safety concerns or other justifiable reasons.

i) Intentional disassociation of *in situ* presumptive identifiers from a victim's remains at the recovery scene (e.g., a wallet with a driver's license in a jacket pocket, an engraved piece of jewelry still on the body, etc.).

j) The random grouping (or random separation) of human remains, personal effects, or other probative evidence.

k) Failing to label, number, or otherwise track human remains and directly-associated personal effects during scene processing and evidence collection activities.

l) Use of unnecessarily complex numbering systems or duplication of numbers.

m) Attempting to sort and/or re-associate fragmented and commingled human remains at the recovery scene (or anywhere other than the disaster morgue).

n) Conducting search and recovery efforts without implementing a Health and Safety Plan.

# Annex A
(informative)

# Quality Assurance and Control

## A.1 General

Exacting methods in victim search and recovery operations require a well-documented quality system to mitigate the accidental loss, commingling, and/or damage of human remains, personal effects, and other probative evidence. An effective quality system will achieve the following three objectives:

1. monitor all victim search and recovery operations on scene;

2. identify errors, determine their root cause, and make appropriate corrections; and

3. document all such quality issues encountered, and the corrective actions taken.

## A.2 Quality Manual

The quality system should be documented in a manual for easy reference, as quality assurance and control encompasses all aspects of scene operations and scene data management. All of the following elements should be addressed within the quality manual, including clear guidance and procedures, and a means for documenting quality processes.

a) Scene integrity and security checks.

b) Standardized method for checking data capture and use of equipment, instruments, forms, and other data recording platforms.

c) Standardized method for periodic checks of human remains and personal effects accountability on scene.

d) Mapping equipment used and appropriate instrument performance checks.

    1) An optimal number of routine performance checks should be identified (e.g., one check at the start and close of every work day on scene, and one at midday). At a minimum, sensitive measuring equipment and instruments should be performance checked daily, after set-up and leveling, and immediately after any accidental disruption or damage (e.g., a drop from a height, exposure to excessive heat or cold, dense humidity, or a prolonged submersion in water, etc.).

e) Mapping technician performance checks (i.e., measuring the technician's ability to take accurate and precise data points with the equipment and/or instrument).

    1) An optimal number of routine performance checks should be identified (e.g., one check at the start and close of the work day on scene). As new technicians assume mapping operations, they should also be performance checked, prior to recording data.

2) Appropriate licensing and certification of UAV pilots if deployed.

f) Redundant checks for accuracy of scene data collection (e.g., mapping points/provenience taken properly; photographs with a scale and directional arrow included; victim recording forms filled out correctly; handwritten notes clearly attributed to the author; etc.).

g) Redundant checks to cross-reference tracking numbers with data, human remains, personal effects, and other probative evidence collected (this includes barcodes, labels, tags, or other means used to affix tracking numbers to human remains and non-biological evidence; all maps, photographs, videos, victim recording forms, handwritten notes, and catalogs; and all chain-of-custody documentation).

h) Clearly defined and documented measures of scene coverage and processing effectiveness to support final decisions about how far out, deep, or high up to search and recover, and when to stop operations and close/release the scene.

i) A means of establishing and maintaining effective scene-to-morgue communications. This continual feedback loop can address potential problems, as they arise, with evidence handling and preservation techniques on scene; the numbering system strategy being employed; taphonomic challenges; and issues related to accidental field damage, contamination, and/or commingling of human remains.

j) A record of proficiency testing for any personnel conducting specialized tasks on behalf of the jurisdiction during victim search and recovery operations (e.g., mapping, photography, human remains documentation, and/or scene data management).

## A.3 Quality Challenges

There are a number of quality challenges that consistently appear and require immediate attention during mass fatality scene operations. The quality system should—at a minimum—have procedures in place to deal with these more commonly-encountered problems.

a) Handwritten notes transcription, rather than direct data entry at the time of collection.

b) Non-standardized data recording and collection forms (thus no data interoperability between the scene and the disaster morgue).

c) Incorrect tracking numbers entered into mapping instruments, photographic logs, victim recording forms, and/or chain-of-custody documentation.

d) Barcoding, labeling, tagging, or other means of affixing evidence tracking numbers to human remains is not uniform or consistent (i.e., with all data formatted the same way every time).

e) Non-water resistant barcodes, labels, tags, or other means of affixing evidence tracking numbers to human remains (i.e., non-permanent ink used).

f) Mislabeled evidence containers, or containers with human remains from multiple tracking numbers inside.

g) No evidence container inventory protocol used at the intake station/staging area.

h) No evidence container verification protocol used when the containers leave the scene for the disaster morgue.

i) Use of untrained personnel (or personnel with "just-in-time" training) for specialized tasks (e.g., mapping, photography, human remains documentation, and/or scene data management).


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