



Guidelines for Mass Fatality

Management During Terrorist

Incidents Involving Chemical

Key Points

- With proper handling and decontamination the majority of chemically contaminated fatalities can be safely returned to families for disposition.
- Only under extreme circumstances should involuntary cremation be necessary.
- The mass fatality management process is enhanced if Medical Examiners and Coroners are trained and equipped to operate in a hazardous environment.

Agents

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Preface

The FY97 Defense Authorization Bill (P.L. 104-201, Sept 23, 1996), commonly called the Nunn-Lugar-Domenici legislation, funded the U.S. Domestic Preparedness initiative. Under this initiative, the Department of Defense was charged with enhancing the capability of federal, state, and local emergency responders in responding to incidents involving nuclear, biological, and chemical terrorism. The U.S. Army Soldier and Biological Chemical Command (SBCCOM), in Aberdeen Proving Ground, Maryland, established an Improved Response Program (IRP) whose mission is to identify problems and develop solutions to the difficult challenges associated with response to and recovery from acts of terrorism using unconventional weapons. SBCCOM established two separate analysis groups to address these challenges, one for biological and one for chemical events.

This report assists emergency managers, medical examiners, and coroners to better prepare for and determine the best course of action for responding to a mass fatality situation following a chemical weapon of mass destruction (WMD) incident. The findings and recommendations in this report are neither mandated nor required for state or local jurisdictions. Rather, they are presented to provide technical and operational guidance for communities and departments that are planning to respond to such events. We encourage you to review the information, understand the implications, and consciously decide what response procedures you would perform. Once you have made the decision that is best for your community, you should train and equip your jurisdiction accordingly.

The process used to develop the recommendations in this report involved a comprehensive review of related literature, multiple workshops focused on various scenarios, and input from scientific experts experienced in chemical agent characteristics.

The mass fatality management working group included a cross-section of operational and technical experts from local, state, and federal agencies. Responders from Baltimore, MD and Washington, D.C., along with experts from across the nation were included to ensure solutions were broad-based and usable by most jurisdictions. The working group included public health representatives, medical examiners, hazardous material handling specialists, law enforcement officers, emergency managers, disaster consultants, and private and Department of Defense chemists and toxicologists.

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Disclaimer

*****Special Note**

The use of the term medical examiner throughout this document is meant to imply medical examiners and coroners.

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Guidelines for Mass Fatality Management During Terrorist Incidents Involving Chemical Agents

1.0 Introduction

1.1 General

Natural disasters, terrorists' attacks, and accidents such as plane crashes have the potential to produce catastrophic numbers of fatalities. The United States has suffered such incidents, for example the bombing of the Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma in 1995 resulted in 168 fatalities and the crash of TWA flight 800 in 1996 in Long Island, New York claimed the lives of 230 people. Outside the United States, an earthquake in India produced over 30,000 fatalities in 2001, while an earthquake in El Salvador the same year produced close to 1,000 fatalities. In Bhopal, India (1984), an industrial chemical accident resulted in over 6,000 fatalities.



Attacks using weapons of mass destruction (WMD) have the potential to create extraordinary numbers of fatalities similar to the numbers seen in large accidents and natural disasters. Presently the United States is unprepared to manage catastrophic numbers of fatalities at the local and regional level. At the federal level, the Disaster Mortuary Operational Response Team (DMORT) is the only response organization prepared to handle large numbers of fatalities. The Improved Response Program (IRP) established a Mass Fatality Working Group, comprised of experts, to address fatality management in the event of a chemical terrorist incident on US soil.

A well-executed chemical terrorist incident will likely result in the same large number of fatalities mentioned above; however, the agent contamination poses new concerns for the medical examiner and directly influences how a jurisdiction manages the processing of remains. Jurisdictions experience a gap in their response capability as hazardous materials (HazMat) teams have experience operating in contaminated environments, but are unfamiliar with medical examiner procedures for processing remains and vice versa. Very few state and local medical examiners have the necessary equipment, training, and resources for operating in a contaminated environment.

1.2 Objective

The objective of this report is to identify technical and operational issues specifically associated with the management of fatalities that result from a chemical WMD incident and to cite planning considerations that will help jurisdictions mitigate the consequences of such an attack.

1.3 Working Group Process

The Mass Fatality Management Working Group was convened under the auspices of the IRP in January 2000. The working group held meetings over the next year, at which time the attendees cross-trained fellow members on their agency's procedures and policies to various chemical scenarios. Several members, having experience in mass casualty and mass fatality situations, cited best practices for the group to consider as a whole. This was particularly true for the experiences and lessons learned from the Oklahoma City bombing.

Early in the process the group realized that certain constraints had to be put in place as operating parameters. These parameters were meant to help the group come up with solutions that were practical and acceptable to a range of response communities and jurisdictions. Some of the operating parameters included:

- Procedures must be usable and expand on or supplement current operating plans.
- Procedures must address protection of personnel who handle remains.
- Procedures must address the final disposition of remains with the intent of returning remains to the family.
- Procedures must be supported by sound science or technical information.
- Procedures must address processing the deceased with honor, dignity, and with an awareness of family members' religious belief systems, when applicable.

Issues that could not be immediately answered by the group were referred to scientific experts with the resulting information being fed back into the group process. After all related information was presented, the working group focused on the methods that had a broad applicability to most jurisdictions in developing these guidelines.

2.0 Planning For Incidents Involving Chemical agents

2.1 General

Because of the potential for a catastrophic chemical terrorist attack, mass fatality management (MFM) planning is necessary. The purpose of MFM planning is to provide the structure needed to implement an effective operation. No plan will ever be able to capture all contingencies. Having an established, practiced plan however, provides the direction and guidance needed during the crisis. Plans must be flexible enough to expand or contract based on the needs of the situation.

The working group identified the following key components that each jurisdiction should address when starting their planning process:

Hot Zone

The area immediately surrounding a dangerous goods incident, which extends far enough to prevent adverse effects from released dangerous goods to personnel outside the zone. This zone is also referred to as exclusion zone, red zone, or restricted zone in other documents.

Reference – U.S. Department of Transportation, 2000. 2000 North American Emergency Response Guidebook.

- The medical examiner should plan to train his/her personnel to operate within a contaminated area while wearing personal protective equipment (PPE). All personnel should be trained in the use of Level C PPE, and a few select individuals should be trained in the use of Level A and B PPE.
- The medical examiner should consider strengthening alliances with other agencies that can help their agency manage a mass fatality situation. Such alliances may include but may not be limited to the regional DMORT and surrounding states that participate in a Governor's Compact.
- The medical examiner should consider establishing a resource annex to their disaster plan. This annex should specify where the medical examiner will acquire equipment that they normally do not use, i.e., PPE, ventilation fans, decontamination supplies, contaminated water run-off containers, waterproof tracking tags, refrigerated storage units. Various suppliers that may provide equipment to the medical examiner may include local hardware stores or vendors, surrounding fire departments, the state's Department of the Environment.
- Additional considerations may include planning the location for a temporary morgue. Such locations should have a physical layout that can support the morgue operation (to include staff parking, refrigerated storage units, resource storage, etc.).
- Plans need to address all steps involved in processing contaminated remains: crime scene evaluation, recovery, initial evaluation of remains, decontamination, autopsy, embalming, final disposition. Figure 1 (see page

- 12) represents a sample flow of processing contaminated remains from the incident scene through final disposition.
- The medical examiner will need to establish and maintain three operations: processing remains from the incident, establishing a Family Assistance Center or bereavement center, and continuing to process the normal caseload.

2.2 Personnel

The medical examiner must have a sufficient number of personnel capable of working in the contaminated area. These personnel must have a specific level of training to wear PPE and operate within a contaminated area. It is possible that the medical examiner will need more personnel than normal, as working in PPE fatigues workers more quickly, and handling contaminated remains, in general, will be more difficult.

2.2.1 Initial Evaluation Team

The medical examiner will need personnel who can be part of an initial evaluation team whose objective is to enter the hot zone and formulate the best approach for processing the scene and processing remains. The team approach requires a minimum of four members, each having distinct objectives for reviewing the scene. The IRP recommends that the team consist of the medical examiner investigator, a Federal Bureau of Investigation (FBI) HazMat Technician, a law enforcement evidence collection technician, and a forensic odontologist. Members should be selected based on the overall mission to collect evidence and to determine the cause of death. Upon conducting the evaluation, each agency involved will be better able to formulate an incident specific mass fatality management plan.

Due to contamination concerns, much of the initial medical examiner's investigation will be performed at the incident site.

The initial evaluation team should specifically identify the total number of remains, their location and any complicating factors, i.e. fragmentation or difficult excavation. The second priority includes identifying which remains require a full autopsy (*see Section 3.5.4 for further information on autopsies*). Knowing the total number of remains and the specific number of those that require an autopsy will help the medical examiner plan the morgue operation.

Though it is primarily the role of the medical examiner to determine the best approach for managing remains, input from all team members may be helpful. Each agency works within certain operational and resource constraints that may influence how the incident site is processed, e.g. the need to gather enough evidence to prosecute the criminal case. Thus, the information

gathered via this initial evaluation team, will serve as the basis from which all agencies can collectively agree on an organized approach to process the incident site, e.g. who will be performing which tasks, when each agency will perform their tasks, and what assets must be mobilized to support the task.

2.2.2 Additional Personnel

Handling remains is the responsibility of the local medical examiner, but in a mass fatality situation handling a large number of remains will likely exceed the capability of their staff. The medical examiner will need additional personnel to assist with physically handling remains. In most cases, there will be personnel at the incident scene who are equipped to assist with certain operations inside the contaminated area. The medical examiner may be able to obtain enough personnel trained to use PPE to support recovery and handling of remains by requesting help from the FBI, the local law enforcement agency, the fire department, and/or supporting specialized military teams.

Due to the criminal nature of the incident and the fact that remains are evidence, jurisdictions should not grant non-medical examiner personnel unrestricted access to the remains. Those handling remains should be arranged in teams with an FBI and medical examiner representative who oversee all movement.

2.3 Establishing an Incident Morgue

In a chemical incident, the medical examiner should be prepared to establish a preliminary morgue at the incident site. The primary reasons for establishing an holding morgue is to gather evidence from remains before they undergo decontamination and evidence is lost, as well as to mitigate cross contamination so that remains are safer to handle.

Many tasks that the medical examiner normally performs in the morgue will need to be performed before remains are decontaminated. Medical examiners must gather evidence, remove and tag personal effects, perform a thorough external evaluation, and perform a preliminary identification check. Once these tasks are complete, personnel can decontaminate remains and then move remains to a traditional morgue for final processing.

2.4 Personal Protective Equipment (PPE)

Shifting the location of gathering evidence from the medical examiner's office to the incident site requires the medical examiner to wear PPE. Most medical examiners however do not have the budget to train personnel to use PPE nor do they have a budget that can maintain this equipment for a "possible" event.

Despite a lack of resources, local medical examiners can begin training personnel to use PPE through mutual agreements with local fire departments, HazMat teams, local private industrial Hazmat teams, or their local/state environmental protection agency equivalent. A specialized team of at least four individuals should be trained to the HazMat Technician Level, so that they are prepared to enter a Hot Zone in Level A or B PPE. This provides the medical examiner two teams of two individuals, so that each team has a backup that can relieve the other when an evaluation takes longer than the thirty-minute air supply. The rest of the staff should be trained to use Level C PPE.

Level A PPE consists of a self-contained breathing apparatus, with full-facemask cover, a fully encapsulated chemical resistant suit, and inner chemical/biological resistant hand covers and resistant safety boots/shoes.

Level B PPE consists of a self-contained breathing apparatus, with full-facemask cover a chemical resistant suit, and inner and outer chemical/biological resistant gloves, and chemical resistant boots/shoes.

Level C PPE consists of a full-face air purifying canister-equipped respirator, full body chemical resistant suit, inner and outer chemical/biological resistant gloves, and resistant boots/shoes.



The medical examiner may need to approach other departments that normally use PPE and request if they can make a portion of their stock available to the medical examiner. It is unlikely that the medical examiner will have the ability to purchase and maintain a tremendous amount of PPE and it unlikely that those who have the PPE, but are not medical examiner investigators, would be inclined to handle human remains. Purchasing enough PPE for all personnel for an incident that might happen is not the best utilization of limited resources; thus, the IRP recommends that medical examiners coordinate their needs to use these items with other departments when it becomes necessary to process a chemical mass fatality incident scene.

It is possible that personnel will be able to use a lower level of PPE than the initial responders used at the onset of the incident. Most chemical agents will have been identified in the first 48 hours, which will confirm the level of PPE required. The medical examiner should consult with the Incident Commander to determine what level of PPE is necessary, before personnel begin processing remains at the scene.

2.5 Establishing an Off-Site Morgue

The medical examiner may need to establish a morgue at an off-site location to process remains from a chemical or other type of disaster involving a large number of remains. Typically, medical examiner buildings will not be able to accommodate processing a large number of remains, as a large morgue can hold only twenty bodies. Therefore, medical examiners should consider establishing an off-site morgue so that remains from the same case are kept together and so that there is room to set up additional stations to support managing contaminated remains.

Establishing an off-site morgue for a chemical incident differs than establishing one in other disaster situations, as the medical examiner may need to set up a few additional stations. In addition to an autopsy area and identification station, the off-site morgue should have adequate room for a detailed decontamination station, an embalming station, and a final rinse station. When planning the stations at this off-site morgue, the medical examiner should remember that personnel will have performed many tasks at the incident site morgue, such as an external body evaluation, removal of personal effects, and a preliminary identification check. Consequently, the off-site morgue will not need a separate evaluation area and this space can be used to establish the aforementioned stations.



Plans should include identifying several locations that would serve as off-site morgue sites. If there is a lack of appropriate fixed locations, then tents can be used if they are located near or outfitted with a source of electrical power and water. Off-site morgues that are established in or near buildings may already allow access to resources like large parking lots or fire hydrants. Fixed sites may be more suitable as those locations will limit on-lookers from viewing remains.

2.6 Communication

Communication between medical examiner personnel may be a challenge, particularly when the medical examiner must operate from four different locations, i.e., the incident site, the family assistance center, the off-site morgue, and the morgue headquarters building. The IRP recommends that the medical examiner establish a direct communication link between these four locations. This direct communication link allows medical examiners and personnel to obtain and deliver information quickly. It also keeps all parties abreast of pertinent information, and it will not be subject to as many system failures as radios or cell phones.

2.7 Family Assistance Center (FAC) Planning

Establishing a family assistance center (FAC) for a chemical disaster is not any different than in other disasters, e.g. plane crashes or building collapses. The medical examiner should be prepared, however, to mobilize the appropriate resources to establish a FAC at the same time that he/she mobilizes resources to manage the incident specifically.

Establishing a FAC early on provides many benefits. One benefit is that the public acknowledges that there is some order despite the chaotic circumstances. Secondly, family members have a place where they can register their loved ones missing. This list assists medical examiners with positively identifying remains and coordinating final disposition. Moreover, establishing a FAC allows family members a place to wait and prepare themselves to receive difficult news.

For more information regarding establishing a FAC or bereavement center, medical examiners and coroners can read a report titled, *Providing Relief to Families After a Mass Fatality: Roles of the Medical Examiner's Office and the Family Assistance Center* by Mr. Ray Blakeney, Chief of Operations for the Oklahoma State Medical Examiner's Office and Mr. Brian Fiffick from the National Transportation Safety Board. It is published by the Department of Justice's, Office of Justice Programs, the Office for Victims of Crime. It may be retrieved via their Web site, <http://www.ojp.usdoj.gov/ovc>.

2.8 Maintaining Daily Caseload Management

Maintaining the ability to attend to the everyday caseload, in light of managing a chemical WMD incident, is not any different than managing the daily caseload in the midst of other types of disasters. It is likely that the local medical examiner will be overwhelmed with organizing the incident and mobilizing resources, however he/she needs to plan how their office will continue to address the daily influx of cases.

Medical examiners will have limited resources to perform autopsies on non-chemical incident cases. Medical examiners should consider the possibility that criminal activity involving homicides and murders may actually increase, as criminals may use disaster circumstances as a cover for their activities. Thus, there may be an increase in the number of daily cases during a disaster.

The IRP recommends two general principles regarding caseload management. Medical examiners should consider keeping the two caseloads separate so that personnel can focus on their assigned tasks. Second, the IRP also recommends that medical examiners avoid scheduling 24-hour operations, as this will quickly fatigue all personnel. Instead, they should add a second shift of personnel to address the chemical incident caseload at a separate location (or temporary morgue). Separate

locations with designated staffs may provide more order and continuity for managing a mass fatality situation overall.

2.9 Special Considerations

Other issues the medical examiner should consider when planning a response to a chemically contaminated incident site are the inclusion of DMORT as a resource enhancement, addressing the issue of organ transplant requests during a disaster, and handling contaminated animal remains.

2.9.1 Incorporation of Disaster Mortuary Operational Response Team (DMORT)

When planning a response to a chemically contaminated incident, medical examiners may consider including the resource and capabilities of DMORT. DMORT is part of the National Disaster Medical System under the Department of Health and Human Services. It is an organized team with the experience and expertise to manage a large number of fatalities. There is one team for each of the ten federal emergency management agency regions. The teams are comprised of private citizens with expertise in victim identification and mortuary procedures. The team is federalized when they respond to a presidential declared disaster. DMORT works under the authority of the local jurisdiction. They can:

- Provide a mobile morgue.
- Perform autopsies.
- Perform identification of remains.
- Perform tracking of remains.
- Establish and operate a family assistance center.
- Provide ante-mortem data collection.
- Provide assistance for the recovery of remains in non-contaminated settings.

DMORT does not establish command and control over the fatality management operation. The local medical examiner maintains responsibility to recover remains as well as sign death certificates. Each jurisdiction should have their own system in place that is flexible enough to effectively and expeditiously incorporate DMORT's resources, but should not rely on DMORT to be their disaster plan.

Presently DMORT has one WMD team, for the nation, that is capable of decontaminating chemically contaminated remains and monitoring them to ensure they are free of chemical agents. Appendix B presents information regarding DMORT's WMD capabilities. For additional information regarding DMORT and DMORT WMD, go to their Web Site www.dmort.org.

The local medical examiner should consider consulting with their DMORT Regional Commander, to understand how DMORT can best fit into their jurisdiction's response plan. It is possible for the local medical examiner to incorporate the use of the traditional DMORT regional team in chemical WMD incidents if remains are already recovered, decontaminated and monitored for residual contamination before they are sent through the autopsy/identification process. The DMORT Regional Commander is familiar with how their resources can be used and how their efforts can be funded. To contact the appropriate DMORT Regional Commander go to their Web Site www.dmort.org and click on the "contact us" button to locate the appropriate Commander for each of the ten federal regions.

2.9.2 Organ Donation/Transplant

The medical examiner may receive questions regarding organ donation and transplant when patients die from complications following chemical agent exposure. Some patients that were transported from the incident site may die in the hospital and family members may request or be asked to consider organ donation. The Maryland Transplant Resource Center was consulted regarding this possible situation and stated that donor candidacy is based on brain death and specific organ viability, which is based on laboratory values. If organs were severely injured from the chemical agent exposure, then tests results would indicate abnormal values and the organs would not be considered viable.

Although chemical agent exposure does not necessarily preclude organ donation, the medical examiner may consider attending to these cases a low priority. In routine organ donor cases, the medical examiner must determine if an autopsy is warranted to determine the cause of death before personnel can harvest organs. If a person dies in a hospital and a contributing factor is the chemical agent exposure, the medical examiner must also decide if an autopsy is warranted before the death certificate is signed. Under these circumstances, it is likely that there will be too many other concerns for the medical examiner to address that may prevent him/her from responding to donor cases in a time critical manner. Furthermore, it is also probable that no one will take the risk of transplanting organs from such a donor, even if it is deemed safe.

2.9.3 Contaminated Animal Remains

Although not specifically their responsibility, medical examiners may be asked to address the issue of contaminated animal remains following a chemical terrorist incident. A serious health risk may exist when large numbers of contaminated animal remains are in public areas. The local animal control agency may consult with the medical examiner as to how they

should gather and dispose of animal remains since they could be considered part of the crime scene. It is possible that contaminated animal remains may not only be located within the incident site but may also be located throughout the jurisdiction.

Medical examiners should provide animal control personnel with the following answer:

- The local animal control department should consult the FBI to determine if these animals need to be held for evidence or if they can be disposed.
- Animal remains should be collected, tagged, and identified according to the specific area where they were found, if they are considered evidence.
- Small animal remains can be sealed in 55-gallon hazardous waste drums, and given to the FBI.
- The local animal control department can also consult with the State Veterinary Services and request cremation for larger animals.
- Those handling animal remains must wear Level C PPE unless the Incident Commander specifically states that a different level of PPE is acceptable, e.g., plastic gown, foot covers, facemask, and butyl gloves.

The medical examiner may also encounter questions from private animal burial agencies. Morticians report that people have a tendency to treat pets like family members and may desire burial services. Thus, the medical examiner may need to advise these agencies as to how these animals should be properly handled and disposed. The medical examiner, local health commissioner, and the Incident Commander will need to determine whether animal remains can be released to an animal crematorium or if it is safe for remains to be released for public disposition. Time, effort, and resources may dictate a blanket policy to mass incinerate all animal remains resulting from a chemical WMD incident.

3.0 Processing Flow of Contaminated Remains

3.1 General

In this section, the IRP will present those variables that medical examiners may encounter when trying to process chemically contaminated remains. Though the processing flow to manage contaminated remains will not differ for each incident, many variables within each phase of the process may need to be altered due to the specific incident. The size of the event, the geographic location, the type of chemical agent, the availability of assets, if remains are fragmented, and the required time to safely process remains without jeopardizing those handling remains are just some variables that may influence each phase of the process as well as the final disposition. Figure 1 conceptually depicts the process flow for managing contaminated remains.

Any one of the aforementioned variables can strongly influence how to effectively conduct each phase of the operation. The medical examiner in conjunction with the those who participated in the Initial Evaluation Team should specifically address who is performing which task, what order the tasks may be performed, where the task will be performed, and why the details must be carried out in a specific manner for each phase of the operation. After the Initial Evaluation Team collectively determines the operation plan, the medical examiner will begin processing remains.

Specifically in chemically contaminated incidents, many functions that are normally reserved for the morgue may have to be performed at the scene. Remains must be decontaminated before they are removed from the incident site to avoid cross-contaminating other areas and people. The medical examiner will need to gather evidence before remains undergo gross decontamination so as not to lose vital evidence to the case. Consequently, personnel will need to wear PPE while performing their tasks, as much of the operation will be conducted within the Hot or Warm Zones.

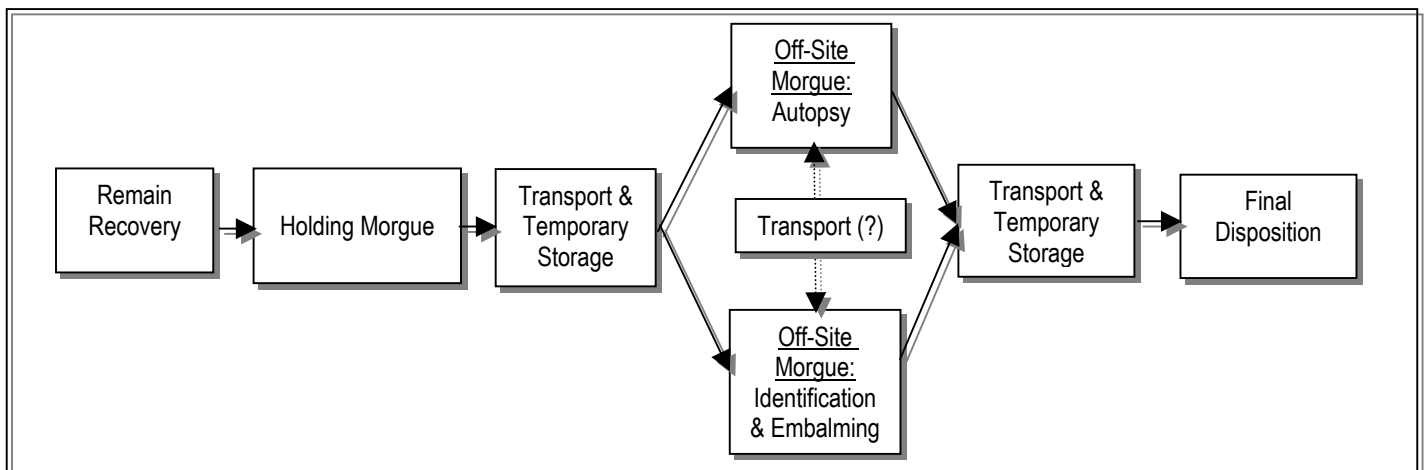


FIGURE 1 – Processing Flow of Contaminated Remains

3.2 Remain Recovery: General

The first step in processing remains involves recovering remains. Recovering remains will entail tracking remains and moving remains to the Incident Morgue. Recovery of remains may also entail taking pictures of remains in the location they were found, determining if additional bodies require an autopsy, and separating remains identified for autopsy from those not requiring an autopsy as they are brought to the holding morgue area.

3.2.1 Additional Personnel

In some circumstances, the medical examiner and Federal Bureau of Investigation (FBI) may determine that the FBI should manage the task of search and recovery (S&R) of remains. Typically, the FBI Evidence Response Team handles S&R operations in non-contaminated incidents, i.e. aircraft remain recovery, but in contaminated incidents, the FBI's evidence team, the Hazardous Materials Response Unit (HMRU), may not be able to manage remain recovery. It is likely that the medical examiner will not be able to task the FBI with the entire S&R operation. The medical examiner and FBI should jointly coordinate and oversee these efforts, requesting the aid of other supporting agencies when they do not collectively have enough personnel to perform recovery operations.

The medical examiner may need additional personnel trained to use PPE to support the recovery of remains. If the local, state, and regional area do not have enough medical examiner personnel to perform recovery, the medical examiner should request the aid of personnel who are accustomed to wearing PPE, e.g. hazmat, firefighters, personnel from the department of the environment, or the National Guard. If non-medical examiner personnel are needed, then the medical examiner should coordinate remain recovery and direct the efforts of non-medical examiner personnel.

Due to the criminal nature of the incident and the fact that remains are evidence, jurisdictions should not grant non-medical examiner personnel unrestricted access to the remains. Those recovering remains should be arranged in teams with an FBI and medical examiner representative who oversee all movement.

3.2.2 Tracking

The tracking of remains using waterproof tags needs to begin at the recovery phase of the operation. Decontamination makes it difficult for the medical examiner to track remains by ordinary methods. Most tags used by the medical examiner are not waterproof and will not withstand the decontamination process. In some jurisdictions, Emergency Medical Services may already use waterproof triage tags that have multiple peel-

off bar coded stickers. The medical examiner may consider using these types of tags if they do not presently have a waterproof tagging system of their own.

Bar code scanners can also simplify the recording/tracking process. Personnel can use portable scanners on-site, which may expedite the tracking process.

DMORT already uses a comprehensive tracking system that consists of scanners and a specific computer software program. A jurisdiction may want to request that their regional DMORT team share their experiences with regards to tracking remains and demonstrate the scanner and software system they use.

Due to the need to decontaminate remains at the incident site, the medical examiner must use a durable waterproof tracking tool.

3.3 Holding Morgue: General

Under normal circumstances, law enforcement gathers evidence at the crime scene while the medical examiner only gathers a preliminary assessment of remains at the scene and performs the actual evaluation at the morgue. An incident that involves chemical WMD changes this norm. To avoid cross contaminating other areas and personnel and to create a safer circumstance for others to handle remains, the medical examiners must gather evidence, remove and track personal effects, and decontaminate remains before they are transferred to the morgue area for autopsy and/or embalming.

3.3.1 Covering Remains

Once remains are recovered they must be brought to a central location, the Incident Morgue, for processing.

The IRP highly recommends that the medical examiner make plans to cover remains from public view at the Holding Morgue. For example tents can be set up so that when remains are recovered they are lined up in one of two tented areas- remains for autopsy, remains not requiring an autopsy. Under this cover, medical examiners can collect evidence, perform the initial identification check, remove personal effects, and perform an external evaluation. Once these tasks are performed and decontamination personnel are ready to manage another case, handlers can move remains to a covered decontamination area.

Providing cover from the public's view provides a sense of honor and respect for the dead, as well as protects the public from viewing remains via news camera media pictures.

3.3.2 Collecting Evidence

In a chemically contaminated situation, the medical examiner needs to perform initial evidence collection at the incident site before remains are transferred. Remains must be decontaminated before they are removed from the incident site to minimize cross-contamination and make the remains safer to process. Evidence critical to the investigation may be lost through this process. It is likely that remains may have already been partially washed as part of the overall incident decontamination effort; however, they will still undergo a gross decontamination before being removed from the scene. The medical examiner should attempt to gather as much evidence as possible prior to gross decontamination.

All remains must undergo a thorough external evaluation. Medical examiner personnel should collect body-surface swab samples for chemical agents, and obtain samples of tissue, blood, and fabric. Part of this evaluation should include a preliminary identification check.



Some personal effects may be considered evidence. The IRP recommends that medical personnel remove personal effects with FBI personnel present. Personal effects identified as evidence should be removed, tagged and directly handed over to the FBI. Medical examiner personnel should place evidence in glass containers as many plastics allow certain chemical agents to seep through the material. Since glass containers are breakable, glass containers should be placed in a second container, e.g. a clean paint can, so that the evidence is protected. Items that are not considered evidence are considered personal effects. (*See Section 3.3.3 for handling personal effects.*)

3.3.3 Handling Personal Effects

At the Incident Morgue, the medical examiner should remove personal effects from remains, tag them, and segregate them into durable and non-durable piles. Non-durable items, such as clothing, will most likely be destroyed rather than decontaminated and returned. Durable items such as keys, wallets, and cell phones may be eventually returned to family members, providing the medical examiner coordinates efforts to decontaminate and monitor the items so that they are free of contamination. Investigators and prosecutors must determine if any

personal belongings are considered evidence before the medical examiner can begin returning personal effects.

Due to the length of time required to process the case, the FBI and medical examiner should provide the Joint Operations Center's Public Information Officer information regarding the processing of personal effects. This information should address if personal effects will be returned, and when family members will receive the effects. It should also include an explanation as to what family members may expect to receive, how long it will take, and why it will take so long (e.g. they must be decontaminated before they can be returned, or the investigation process is lengthy.)

3.3.4 Gross Decontamination

Though not normally performed by the medical examiner, decontaminating remains becomes the medical examiner's responsibility in a chemical WMD incident.

The medical examiner should begin by obtaining the necessary equipment to perform gross decontamination. The IRP recommends that medical examiners establish a rapport with an agency that is capable of setting up a decontamination line, supplying extra PPE, and providing experienced manpower rather than purchasing all the equipment and establishing all these capabilities on their own. Examples of agencies, which can provide such support, include local or regional HazMat teams, the State Department of Environment, or private industry HazMat teams. Agencies already on the scene may have decontamination lines established for patient decontamination and for responders who entered the Hot Zone. The medical examiner must coordinate with the respective agency if they desire to use these decontamination lines. For a mass fatality incident, a decontamination line must include equipment to assist with lifting, carrying, and moving large numbers of remains (sawhorses, rollers), as the strenuous activity will rapidly fatigue personnel wearing PPE.

Personnel performing decontamination should wear an appropriate level of PPE. Personnel may not need to wear as extensive PPE as those personnel who responded on the initial day of the incident. As a minimum, Level C protection is recommended; however, the medical examiner should check with the Incident Commander regarding the appropriate level of PPE.



As part of the incident response, there should already be contamination control zones (Hot, Warm, and Cold) established. These zones need to remain in place during the processing of remains. In the case of

processing remains, the Hot Zone is the location where the incident occurred and the medical examiner personnel removed personal effects and performed external evaluations. Remains enter the Warm Zone when they are brought to the decontamination area. Once remains have undergone a gross decontamination, they are brought to the Cold Zone where they are put into refrigerated storage units. When personnel perform gross decontamination, they should perform it in a manner that respects the deceased, i.e. remains should not be deliberately exposed to the view of on-lookers.

When performing decontamination, medical examiners will need a system similar to those that support non-ambulatory casualties. These types of decontamination systems may have elaborate rollers, showers, and dikes so that remains do not need to be lifted from decontamination pool to decontamination pool. Medical examiners can simply incorporate sawhorses, backboards, pools, and water from a hose line to support decontaminating remains. In either system, performing decontamination should incorporate mitigating contaminated water runoff (see *Appendix C* regarding the Environmental Protection Agency's stance on contaminated water runoff).

The IRP recommends that medical examiners use additives when performing gross decontamination. Common additives used in decontamination of chemical warfare agents include:

- Soap, which aids in dissolving oily substances like mustard or blister agent.
- Bleach (sodium hypochlorite), which removes, hydrolyzes, and neutralizes most chemical agents.

Additives increase the level of safety for those handling remains but they can also create tissue decay. The U.S. Army Mortuary Affairs Center conducted studies that indicate the use of low concentrations of household bleach, two to three percent solution with a five-minute contact, produces no negative effects on remains and successfully removes chemical agents. There are concerns that although higher concentrations of bleach solution (five percent or greater) remove chemical agents, they may have negative effects on human tissue and cause tissue decay (U.S. Mortuary Affairs, 1992). Therefore, medical examiner personnel should use the appropriate solution when decontaminating remains.

After gross decontamination, the medical examiner should not assume that remains are free of contamination. This can only be determined with low-level detectors (i.e. mass spectrometers) that are not likely to be available on the scene. Remains should be wrapped in two body bags. Personnel should seal the initial body bag with duct tape, rinse the bag, and then

place the remains in a second body bag before remains are put into a refrigerated unit. Personnel should wear PPE until all remains are monitored with a chemical detector device and are deemed free of contamination.

For other recommendations regarding gross decontamination, medical examiners may want to incorporate the best practices outlined in the IRP's *Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident* report. (To obtain this report go to the SBCCOM Web Site www2.sbccom.army.mil/hld). Many of the procedures in this report have applicability when decontaminating remains.

3.4 Transportation & Temporary Storage: General

A number of issues arise when the medical examiner must transfer and hold a large number of contaminated remains. For example, the number of fatalities may influence the type of transportation needed to move remains from the incident site to the morgue or embalming site as typical vans can only hold a few remains. Additionally, the medical examiner generally stores those from the same incident in the same location to promote order, however most morgues are not able to hold more than 20 cases.

In this section, the IRP will discuss transportation and storage assets.

3.4.1 Transportation Assets

The medical examiner's disaster plan may need to include the use of refrigerated trucks and railroad cars as alternative transportation units for caseloads that exceed their normal transportation capacity. The use of refrigerated trucks or railroad cars is especially helpful since remains can be transported and stored in the same unit.

The use of railroad cars does require the medical examiner to do some additional planning. Medical examiners will need to coordinate efforts to bring remains to the railroad cars, since railroad cars can not just pull up to the incident site. In addition, the medical examiner may need to establish a off-site morgue site that is close to the railroad tracks so that processing remains is not further complicated. Normally, a railroad car can accommodate 32-40 bodies (Military Planning for Health Services Support, 1994).

Refrigerating remains may alleviate the medical examiner from some of the burden associated with performing time critical tasks. Refrigerating remains, depending on the refrigeration temperature, can prevent or greatly slow down tissue degradation, which ultimately mitigates one type of public health hazard from occurring. Thus refrigerating remains may

help the medical examiner achieve the ability to return remains to family members.

Medical examiners should devise a plan that minimizes the number of times remains are transported and moved. Every time remains are moved, a cadre of logistical support must be in place, to include transportation vehicles, personnel who must move remains in PPE, and possibly FBI agents to oversee remain movement since remains are considered evidence. Thus minimizing the number of times remains are moved simplifies overall management of remains.

3.4.2 Storage Assets

The plan should also identify other locations that can be used for storage. Possible locations include an anatomy board, small buildings or rooms that can cool to 37 degrees Fahrenheit. Other options include securing a large air conditioning unit that can cool a room to 37 degrees Fahrenheit.

Regardless of the type of storage the medical examiner uses, remains should not be stacked unless shelving units are utilized. Even with shelving units, remains should not be stacked higher than waist level to prevent injury to those handling the remains.

3.5 Processing Remains at the Off-Site Morgue: General

Decisions regarding processing remains are not based on singular variables but rather a cadre of events and the status of resources available. Once remains have been transferred to the morgue, issues facing the medical examiner will include detailed decontamination, identification procedures, autopsies, and embalming procedures. Though it may be difficult to plan the specific order of events to process remains, the medical examiner should take into consideration how each part of the operation may affect the overall ability to return remains to family members.

3.5.1 Processing Locations

Depending on the magnitude of the incident the medical examiner may not be able to process all of the remains at the morgue. The morgue's current available space and capacity may dictate the use of off-site morgues.

When establishing an off-site morgue, medical examiners should consider using alternative sites identified in their standard evacuation plan. The medical examiner should already be familiar with these sites and the equipment and supplies necessary to make them operational. Evacuation plans should be supplemented with a resource list identifying items needed to process contaminated remains. Additionally, the medical examiner

should consider requesting the aid of law enforcement officers to provide security at each off-site morgue facility.

If the number of fatalities exceeds the capacity of the morgue and the planned alternative locations, the medical examiner may need to establish multiple temporary morgues. Additional locations can include empty warehouses, airplane hangers and tents.

Alternative locations should have:

- Large open floor space.
- Electrical power (although large generators can supplement this need).
- Water supply.
- Air conditioning/heat.
- Provisions for staff (restrooms, recovery area).

Ideally, each alternative facility should be capable of performing all four critical functions required to process remains, i.e. detailed decontamination, autopsy, identification, and embalming. This would reduce the need to transfer remains between locations.

When the medical examiner must use a decentralized means of processing remains and not all four functions can be performed at the same location, all fatality processing should be well coordinated. The local medical examiner must provide overall command and control, as he/she will have overall responsibility for processing the remains and signing death certificates.

If the medical examiner must use a decentralized means of processing remains then he should consider how the operation could be most effectively divided. One suggestion is for detailed decontamination and autopsy procedures to occur in one location and detailed decontamination, identification, and embalming to occur in a different area. Another suggestion is to maintain autopsy and identification procedures in one location so that only one detailed decontamination station is needed and embalming is in a different location. Thirdly, the medical examiner may need to set up three separate locations, dividing the entire operation into detailed decontamination and autopsy; detailed decontamination and identification; and embalming.

3.5.2 Detailed Decontamination

Although remains underwent gross decontamination at the incident site, those handling remains should not consider them free of contamination. Many types of chemical agents are not easily washed away during the gross decontamination process. All remains must undergo a detailed

decontamination, using soap or bleach solution, before an autopsy is performed or embalming takes place. If the decontamination is performed in an enclosed area, it must be ventilated.

When remains are to be embalmed, they should be decontaminated in a separate area or room from the embalming area. Some decontamination solvents such as bleach create toxic reactants when mixed with embalming fluid. The medical examiner should take every precaution to avoid creating further hazards.

3.5.3 Identification

Despite the magnitude of the incident, procedures to identify remains should not change. Normal identification procedures are lengthy and the FBI fully supports the amount of time the medical examiner needs. The chemical agent exposure does not specifically interfere with the normal processes used for identification.

3.5.4 Autopsies

In the case of a large number of fatalities, it may not be feasible to consider performing a complete autopsy on all remains. The medical examiner, FBI, and the US Attorney, should collectively determine which remains require an autopsy. Each agency has its specific requirements for identifying autopsies to support the overall investigation. After determining the number of cases for autopsy, it may exceed the operational capacity of the medical examiner's office. In this case, the medical examiner should coordinate support from adjoining jurisdictions, states, or from federal resources.

In situations when the medical examiner must process a large number of remains, the IRP recommends that the aforementioned agencies consider only performing an autopsy on a random sample of bodies found inside the Hot Zone, as well as on atypical cases instead of on each remain. Those remains not originally identified for autopsy will still undergo a thorough external evaluation, identification check, and medical examiner personnel will still gather from them a certain amount of evidence.

If the agencies still require additional autopsy information at a later point, the medical examiner can perform an autopsy on embalmed remains. Though some evidence may be altered from the embalming fluid, it is easier for medical examiner personnel to perform autopsies on embalmed remains rather than on decayed remains. *(See Section 3.5.5 for more information regarding embalming and why the local medical examiner may want to be responsible for this additional task).*

Those performing autopsies may question if they will be exposed to harmful chemicals as a result of performing autopsies on contaminated remains. With the exception of ingested cyanide pills, chemists, toxicologists and medical examiners supporting the working group process indicated that chemicals are metabolized, hydrolyzed or tightly bound in the body's tissues; therefore, there should be little threat of chemical off-gassing when performing an internal examination. However, personnel may still be exposed to chemical contamination that persists on the outside of the body. While the dangers from external contamination are low, especially after remains have been decontaminated twice, personnel should continue to wear Level C PPE while performing autopsies.

The medical examiner may need to add a few additional procedures to the autopsy process, i.e., testing for chemical contaminants or residual metabolites. With the inclusion of additional procedures, it may take longer than three hours to process a single case. Medical examiners should not seek to alter the exact order of the autopsy or reduce the amount of time needed to perform them.

Medical examiners should follow their standard protocols for gathering, packaging, and storing evidence found during the autopsy process. If there is not enough room to properly store evidence due to the number of remains, then the medical examiner should request law enforcement personnel to take immediate possession of the evidence. If personnel are concerned that the evidence is chemically contaminated, then it should be packaged in a manner that prevents cross-contamination but does not destroy the evidence. One option is to place evidence inside a glass container and then place that container inside a clean paint can.

In the case of a large number of fatalities, it may not be feasible to consider performing a complete autopsy on all remains.

3.5.5 Embalming

Although embalming is not their direct responsibility, medical examiners should consider supervising these efforts, at the temporary morgue, to simplify the management of a large caseload. Local morticians may have a lot of questions regarding safe handling procedures and turn to the medical examiner for support; thus handing off remains to the local mortician may result in more work for the medical examiner in the end. It is likely that when local morticians have questions and seek their input, the medical examiner will have to re-engage in managing remains.

Another reason the medical examiner should consider overseeing embalming is that chemically contaminated remains may create a more

hazardous situation than the local mortician is prepared to manage. Embalming may resurface internal contamination on the skin, therefore monitoring remains for residual chemical contamination before they are embalmed, may produce inaccurate data regarding their state of contamination (*See Section 3.7.1 regarding chemical agent monitoring*). Ultimately, the medical examiner is responsible to ensure the highest level of safety for those handling remains, before remains can be transferred to local morticians.

Other benefits of embalming include:

- Embalmed remains do not require refrigeration unless they are held for more than 3 weeks post embalming.
- The number of refrigerated cars/units is reduced.
- Embalmed remains only need to be stored in a cool area.
- A more accurate contamination reading from chemical agent monitors is possible if data is collected after remains undergo embalming.
- Embalmed remains are easier to autopsy than decayed remains.

To safely perform embalming the medical examiner should establish a specific order of tasks. Additionally, all personnel should wear Level C PPE and all rooms should have adequate ventilation.

Before remains are embalmed, personnel should perform a detailed decontamination with additives (soap or sodium hypochlorite). This detailed decontamination should take place in different room from where embalming takes place, as embalming fluid and sodium hypochlorite produce a hazardous gas when mixed. (*See Section 3.5.2 regarding detailed decontamination procedures specifically*).

Next, the medical examiner may request that personnel scan remains for internal devices before they are embalmed. To scan for and remove internal devices does not take very long and personnel will already be wearing PPE. If the decision is made, to voluntarily or involuntarily cremate remains later, then the medical examiner will have avoided the laborious step of donning PPE and processing remains before final disposition. (*See Section 3.7.3 for more information regarding cremation.*)

Next, personnel can proceed with their normal procedures for embalming. Body fluids and solutions should be contained and handled according to pre-established procedures. No additional risk is associated with handling contaminated body fluids mixed with embalming solutions, as handling instructions for embalming fluid provide personnel adequate safety.

Once embalming is complete, remains must undergo a thorough rinse. It is possible for certain contaminants to resurface on the skin after the embalming process is complete. Upon completion of this final rinse, personnel can place remains in double body bags.

3.6 Transport and Temporary Storage

After remains are embalmed, the medical examiner should obtain the FBI's and US Attorney's inputs before remains are prepared for final disposition. It is possible that authorities will request the medical examiner to hold some or all of the remains for purposes of gathering additional evidence to prosecute the case. The medical examiner may need to perform additional autopsies on embalmed remains to gather this evidence.

Logistically, the medical examiner will have all the necessary assets in place to accommodate holding remains. The most prominent concerns will be informing family members of the delay, and dealing with the public's response to the medical examiner stalling the final disposition process.

If the medical examiner plans to use the same transportation and storage units that were used previously, then he/she should direct personnel to decontaminate the units before using them to hold decontaminated remains.

3.7 Final Disposition: General

Each state has laws pertaining to the final disposition of remains. In general, laws require that remains must be given to family members upon request and cannot be disposed of as the state chooses. If the medical examiner, the local jurisdiction's health department, and the state's Secretary of Health determine that a public health hazard exists, then the governor can issue an emergency declaration negating current law. If the decision is made for the purposes of protecting the public, then there is no limitation established by legal statute pertaining to final disposition. It is possible that the governor and the aforementioned persons will have to make controversial decisions during critical moments following a chemical incident.

Medical examiners should review and understand their states laws regarding acts of terrorism, chemical agent exposure, and characteristics of a public health hazard. They should also determine if they have the assets to prevent a public health hazard (i.e. refrigeration assets to prevent decay), as well as the ability to verify that remains are free of contamination (i.e. chemical agent monitoring). It is possible that a public health hazard will exist independent of the chemical contamination, as specific aspects of fatality management are time critical (e.g. recovery) and dependant on certain assets to support the operation (e.g. enough personnel who can wear PPE to process remains).

In short, a chemical WMD incident should not automatically preclude a jurisdiction from returning remains. The only variable that directly affects the decision to withhold remains is the inability to completely decontaminate them, which consequently results in a public health hazard. The factor that may indirectly affect the ability to return remains is the length of time it takes to identify, mobilize, and coordinate the large number of resources needed to process chemically contaminated remains in a time critical manner. Thus, several factors may collectively influence final disposition.

Final disposition may carry a great deal of public scrutiny from the public and possibly from local morticians and funeral home directors. Medical examiners and emergency managers should seek to incorporate the support of religious leaders upon announcing an unfavorable final disposition decision. In addition, the medical examiner should consider providing local morticians and funeral home directors with specific handling instructions if they assist in the final disposition phase, to minimize their confusion and promote safe handling.

Final disposition options include: burial, sealed casket burial, state sponsored mass burial, and cremation- voluntary and involuntary.

3.7.1 Chemical Agent Monitoring

To ensure that remains are free from contamination the medical examiner should monitor remains before releasing them to the community for final disposition. Chemical agent monitoring, is difficult, time consuming, and expensive. Most jurisdictions will require assistance in performing this type of monitoring from specialized military units, specialized HazMat teams (i.e. the FBI Hazardous Materials Response Unit (HMRU)), or from DMORT WMD.

Two main types of chemical agent monitors exist. The Chemical Agent Monitor (CAM) provides hi-level monitoring capability, which technicians use to monitor gross levels of agent. The second type of monitoring, which SBCCOM and the FBI HMRU use, is mass spectrometer monitoring. This type of monitor is used for low-level monitoring.

Proper low-level monitoring may be impracticable when there are a large number of remains to process. The chemical agent protocols, specified in military procedures, involve sampling the airspace of each body bag using a mass spectrometer is time-consuming and requires trained personnel. It is impractical to expect a local medical examiner to have the resources to monitor each body or the assets to support chemical agent monitoring.



The IRP recommends that local medical examiners choose to monitor the airspace of the storage units using low-level monitoring devices. This process is not as time consuming as monitoring each body bag. Standard protocols exist so that technicians can collect a sample, obtain a reading and determine the level of contamination.

If a low level mass spectrometer does detect contamination, the medical examiner, in conjunction with the local and state health commissioner, the chief officer for the department of the environment, the state emergency manager, and the governor, can make a risk based decision regarding the level of contamination and how it affects final disposition of remains. Medical examiners should know that the federal Environmental Protection Agency does not accept any detectable level of contamination.

If chemical agent contamination is not measurable above pre-existing background levels of ground/air contamination, with a low-level mass spectrometer, then the medical examiner may consider the remains safe for return to family members.

3.7.2 Burial

There are three options associated with the burial of previously contaminated remains. They are standard burial, burial using sealed caskets, and state sponsored mass burial.

Standard burials are acceptable when contamination levels are considered safe for morticians to handle without any associated exposure risks. Present burial procedures protect the environment from hazards. If remains are considered safe to return to family members, then they are considered safe to bury and will not adversely affect the environment.

When authorities determine that remains are not safe to handle or safe for family viewing, the medical examiner may choose to mandate the use of sealed caskets. The IRP discussed this option and determined that most local morticians do not understand what sealed casket procedures are and morticians may still open the caskets. In addition, sealed caskets are not 100% sealed. Caskets are designed with air holes to promote airflow exchange for the express purpose of equalizing pressure. Despite these concerns, jurisdictions may determine that sealed casket procedures are better than other alternatives.

Another option regarding final disposition is state sponsored mass burial. Though it has rarely been used in the United States, authorities may accept mass burial under extreme circumstances. One such circumstance is when burying remains is safer than cremating remains. This issue presents more

often when remains are biologically contaminated rather than chemically contaminated remains, however, some jurisdictions may not have adequate access to crematoriums to support individual cremation. Thus to prevent contamination from spreading, authorities may choose to minimize handling remains and identify a site that can support mass burial.

The public may be more inclined to accept state sponsored mass burial if remains are placed in individual caskets, are located in an area that is protected, and the site is commemorated.

3.7.3 Cremation- Voluntary and Involuntary

Remains that are cremated will not pose an environmental hazard. The Department of Army Regulations (AR 385-61) state that all chemical warfare agents are nullified when exposed to temperatures of 1000 degrees Fahrenheit for fifteen minutes. US crematoriums set their crematoriums higher than 1000 degrees Fahrenheit thus cremation will nullify all chemical agents.

When contamination cannot be mitigated with decontamination efforts, involuntary individual cremation may be the only remaining option. A jurisdiction's emergency plan should reflect the location and capability of area crematoriums.

The medical examiner should make every effort to return remains to family members for final disposition. Remains should only be held when contamination cannot be brought to a safe level or if there is a declared public health hazard.

Medical examiners should consider preparing remains for cremation even if authorities have not determined their final disposition. One reason for this is that some family members may automatically prefer cremation instead of burial. A second reason is if authorities decide that remains will undergo involuntary cremation, after remains have been processed through the morgue, then remains will already be prepared while personnel were wearing PPE.

The appropriate time to prepare remains for possible cremation is before they are embalmed (*See Section 3.5.5 for more information regarding embalming*). Personnel should scan and remove all internal devices, e.g., automatic defibrillators and internal pacemakers, before embalming since it does not take very long and personnel will already be wearing PPE. Preparing for cremation early in the fatality management process will possibly mitigate re-processing remains at a latter point, thereby minimizing the number of times personnel must handle remains.

3.7.4 Local Morticians

Regardless of the measures medical examiners take to ensure safety, morticians and funeral directors may still be reluctant to receive contaminated, or previously contaminated remains. For example, in the 1980s, morticians were reluctant to handle remains when the cause of death was AIDS. Now, after many years, morticians who are accustomed to the AIDS procedures practice the standard and perform their work with confidence that they will not become infected.

It would be prudent to include morticians when jurisdictions develop their plans and conduct training and exercises on chemical mass fatality management.

4.0 Conclusion

In a chemical WMD incident the medical examiner must perform many additional tasks, and be prepared to enter a contaminated environment. Managing chemically contaminated remains is difficult and the task may become daunting if there are multiple remains to process. Appendix A is a generic response planning guide that summarizes the tasks the medical examiner must coordinate in order to process chemically contaminated remains.

The chief task of the local medical examiner is not to independently process all remains from such a disaster, but rather to create an infrastructure so that when assets arrive those assets can backfill and support the operation. Thus, the medical examiner must know what assets he/she has on hand, where to obtain other necessary assets, and how to effectively use those assets.

To successfully achieve the end goal to keep handlers safe, honor the dead, and return remains to their family members, the medical examiner must plan how to process remains by phases. By breaking down the operation by phases and addressing the critical variables that influence the operation, the local medical examiner will be prepared to manage not only a chemically contaminated incident but other disasters as well.

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APPENDIX A

Generic Response Incident Planning Guide for Medical Examiners

I. Manage Incident Site

A. Obtain Information from the Incident Commander.

- Chemical agent.
- Number of approximate remains.
- How the agent was disseminated, (i.e. vapor, liquid).
- Type of incident (i.e. traditional bomb, chemical cloud).
- Location and if there are any geographic complications, e.g. building destruction.
- Location of the Command Post.

B Send Evaluation Team to Incident.

- Report to the Command Post.
- Prepare to enter the scene with the FBI HazMat Technician and other relevant agency representatives.
- Check on level of PPE required- Level A/B/C.
- Two teams of two persons (one team is needed as a backup).
- Identify challenging issues e.g. fragmentation, difficult excavation, contamination.
- Take initial pictures of the scene.
- Determine total number of remains and their location.
- Determine the initial number of cases for autopsy.

C. Establish the Plan

1. Address the General Operation

- Include Incident Commander, FBI, and potentially DMORT Regional Administrator and or DMORT WMD and any other relevant agency representatives in the planning process.
- Know identity of the chemical agent as this will determine the decontamination solvents and safe handling procedures.
- Determine which remains should be autopsied based on the local medical examiner's capability and the FBI's need to gather evidence and the US Attorney's need to prosecute the case.
- Determine if chemical monitoring will be used to determine if remains are free of contamination or if remains will not be monitored individually but rather collectively via air sampling.
 - Determine who will do this and when it will be performed as this will affect if ME/Coroners must wear PPE during certain stages of the operation.
- Determine location for the off-site morgue.

- Create an infrastructure to process remains so additional resources can backfill the operation. Identify who, what, when, where, and how for each phase of the operation.

i. Recovery Phase

- Who is performing remain recovery.
- Do teams need to be established with FBI and ME as team leaders.
- Determine which agency is responsible for what and in what order do personnel enter the scene to perform their tasks.
- Determine if personnel should take pictures of remains in location they were found.
- Use waterproof tracking/triage tag.
- Determine location for holding morgue so that personnel know where to deliver remains.

ii. Holding Morgue Phase

- Establish a covered area.
- Establish area to perform evidence removal, external evaluation, initial identification check, and removal of personal effects.
 - Determine if FBI is needed to help identify additional evidence.
 - Determine if medical examiners are to perform any additional procedures as part of the external evaluation, e.g. chemical agent body swab, sample of clothing.
 - Obtain 55-gallon drums to store personal effects.
 - Obtain glass jars and paint cans to store evidence.
- Establish area to perform initial decontamination.
 - Water and bleach or detergents.
 - Mitigate contaminated water run-off.
 - Double body bag with duct tape.

iii. Transportation and Storage Phase

- Obtain refrigerated vehicles- 18-wheel vehicles or railroad cars.
 - Do not stack remains; use shelving units.
 - Do not place remains higher than the waist level of the handlers.
- Obtain refrigerated storage location if trucks are not available.
- Try to co-locate mortuary affair functions in close proximity to one another.

iv. Off-Site Morgue Operations Phase

- Determine if the morgue operation can be centralized in one location or if it must be decentralized into several smaller locations.
- Perform detailed decontamination.
- Perform autopsy on those remains previously identified requiring an autopsy and then send remains for identification and embalming.
- Perform identification procedures.
- Perform embalming procedures.
- Perform final rinse after embalming.
- Determine location for holding/storage if FBI and US Attorney do not authorize the release of remains.

v. Final Disposition Phase

- Determine if a public health hazard exists.
- Determine if remains will undergo chemical agent monitoring with a mass spectrometer.
- Determine if remains can be returned to family members.
- Determine if family member prefer cremation.
- Determine transportation method to final disposition.

2. Assign Personnel- Roles & Responsibilities

- Mobilize local personnel with appropriate PPE and assign tasks.
- Identify specific ME/Coroner personnel to take charge of certain tasks and supervise others.
- Establish shift/breaks with PPE in mind.
- Determine if additional non-ME/Coroner personnel are needed and formulate teams with local ME and FBI as part leaders of each team.

3. Mobilize Other Agencies:

- Local agencies- HazMat teams locally (mutual aid agreements).
- State agencies- Department of the Environment, National Guard.
- Regional- Surrounding states that may be able to support your efforts.
- Federal agencies- DMORT.
- Military agencies- Joint Task Force-Civil Support.
- Volunteer agencies- American Red Cross to assist with the Family Assistance Center.

4. Mobilize Specific Resources *[This is not a comprehensive list of additional resources.]*

- Refrigerated trucks.
- Decontamination line/equipment for the holding morgue and the Temporary Morgue.

- PPE for personnel.
- Final rinse station after embalming.
- Ventilation fans.
- Additional body bags and duct tape.
- Additional evidence collection containers- glass jars and paint cans.
- Storage containers for PPE, e.g. 55-gallon drums.
- Tents to keep remains from public view.
- Water-proof tracking tag/tool.

5. Identify Financial Issues.

- Contact state emergency management agency to initiate application process.
- Track all activities and expenses regardless of incident being declared a presidential disaster.

6. Other Coordination

- Determine method of communication between the Incident Morgue, the Morgue, the family assistance center, and the headquarters building.
- Establish support for medical examiner staff, i.e. Critical Incident Stress Debriefing.
- Water/re-hydration stations.

II. Plan for Family Assistance Center (FAC).

- Establish a hotline/help-line to simplify notification and identification process.
- Establish FAC location in reasonable proximity to the off-site morgue.
- Plan to disseminate information to family members as well as the Joint Operations Public Information Officer (PIO) on a regular basis.
- Address if and when personal effects may be released.
- Obtain multi-religious leader support.
- Plan a memorial service and plaque for the city.

III. Plan to Maintain Processing the Daily Case Load.

- Add a second shift to handle the incident site remains so that original staff can focus on the daily caseload.
- Keep caseloads separate.
- Avoid 24-hour operations.

APPENDIX B

Disaster Mortuary Operational Response Team WMD Unit

The federal Disaster Mortuary Operational Response Team (DMORT) has established a contingent that is ready to respond to incidents involving weapons of mass destruction (WMD). Unlike a typical disaster, WMD incidents will present different variables that will affect DMORT's response plan. In particular, the type of chemical weapon deployed will affect decontamination and autopsy procedures thus this team is prepared to decontaminate remains and monitor them before remains are autopsied and returned to family members for final disposition.

DMORT WMD is qualified, ready, and available to respond to a presidential declared disaster under the auspices of the Federal Response Plan, via the Office of Emergency Preparedness, Department of Health and Human Services. The team is comprised of forensic scientists who understand the characteristics of WMD and two emergency managers who have gleaned ideas, as to the best way to manage chemically and biologically contaminated incidents, from experts across the country.

Presently DMORT has one WMD team. Their equipment is located in York, SC and can be airlifted or driven anywhere in the US upon request, as it is less than 15 minutes from the Charlotte, NC airport. Those on the DMORT WMD team are not necessarily located in the same area as the equipment, so that those members that are closest to the incident will arrive before the entire team is mobilized, to help the jurisdiction with coordinating the response. DMORT plans to add a second WMD team to cover incidents that occur on the west coast as well as a third WMD team to cover the central states. It is unknown when these additional teams will be operational. Additional information and contact information can be obtained from the following Web sites.

<http://mediccom.org/public/tadmat/ndms/ndms.html>
<http://www.dmort.org/>

The DMORT WMD team is comprised of a minimum of 35 workers, all of whom are volunteers and have received extensive training in decontamination. They are capable of performing their function in level A, B, or C Personal Protective Equipment (PPE). All disciplines within the DMORT community are represented on the team. Members are trained for their particular duties within the team, but some are cross-trained for two or more tasks. DMORT WMD can function as a stand-alone team, or they can operate with other agencies familiar with their protocols to include the National Medical Response Team (NMRT) and the Chemical Biological Incident Response Force (CBIRF).

Prior to any entry into a contaminated area, each WMD team member is given a health evaluation by the team physicians and nurses to insure good health, as well as upon exiting the decontamination area, during recovery time. The team is broken down into three subgroups: one team is operational, another team is recovering, while the third is

suited and prepared to “rescue” and remove a worker from the area due to a torn suit, illness or other unforeseen incident.

Unlike the ten regional DMORT teams, DMORT WMD will initiate identification procedures prior to decontaminating remains, to include a full body examination, fingerprint gathering, DNA sample extraction, photography, and, if necessary, autopsy.

DMORT WMD takes into account the criminal aspect of a terrorist incident, and realizes that decontamination efforts will not likely begin until 24-48 hours post incident. Prior to decontamination, DMORT WMD requests and works with an FBI agent at the beginning of the "Reception Area" in the Hot Zone, who determines what is needed as evidence. All other items not noted as evidence are marked as “personal effects”, removed, tagged with a body number, stored in a container, and placed in a secure area. DMORT WMD strategically assigns members with law enforcement experience at the beginning of the mass fatality management process. These members are trained in and capable of determining what is evidence. DMORT WMD is also able to secure, for a long or short period, weapons that are found on victims or on the scene.

After decontamination, all remains, whether full body or body part, are placed into a clean storage unit and scanned for any traces of chemical agent before they are further processed. DMORT WMD can hand off remains to the Regional DMORT unit, should the jurisdiction requires their assistance, who can continue processing remains within their normal scope of practice.

DMORT WMD also removes wastewater and does not allow it to run into the ground water system.

DMORT WMD requests that jurisdictions provide the following items when they request DMORT’s service.

- Ice.
- Refrigerated trucks or trailers.
- Water supply, either via water line or fire apparatus.
- A 60’x60’ hard surface (minimum), i.e., parking lot. Preferably outside as opposed to inside, unless bad weather dictates otherwise. The ideal surface will have a gradual slope.
- Security for the entire perimeter by either law enforcement or National Guard.
- Transportation in some cases to and from the airport. This may also include transportation for equipment.
- LIGHT, NUTRITIONAL meals, drinks, and lodging.

Simply put, DMORT WMD operates much like a high level HazMat Team, with the exception that they do a lot of forensic and post mortem work during the decontamination process. The DMORT WMD team, operating a dual system, is able to decontaminate eight bodies per hour under normal conditions. Inclement and hot weather conditions may slow the process down, as members will need longer recovery time.



FIRST RESPONDERS' ENVIRONMENTAL LIABILITY DUE TO MASS DECONTAMINATION RUNOFF

The Environmental Protection Agency (EPA) is issuing this alert as part of its ongoing effort to provide information on environmental issues related to biological, chemical, and nuclear terrorist incidents. EPA publishes *Alerts* to increase awareness of possible hazards and environmental concerns. It is important that SERCs, LEPCs, emergency responders and others review this information and take appropriate steps to minimize risk.

PROBLEM

On April 19, 1999, the Team Leader of the Chemical Weapons Improved Response Team (CWIRT), U.S. Army Soldier and Biological Chemical Command sent a letter to EPA raising issues concerning first responders' liability during a weapons of mass destruction (WMD) terrorist incident. Specifically, the CWIRT asked about the first responders' liability for spreading contamination while attempting to save lives.

Environmental liability resulting from critical lifesaving actions may seem unlikely, but could be a serious concern for many first responders. The question is: Can emergency responders undertake necessary emergency actions in order to save lives in dire situations without fear of environmental liability even when such emergency actions have unavoidable adverse environmental impacts? This concern is not limited to WMD terrorist incidents, it has

and frequently is discussed in the hazardous materials response community.

THE NERVE AGENT DRILL

The federal government recently sponsored a multi-agency drill based on a simulated nerve-agent attack. The release of the nerve agent resulted in hundreds of simulated casualties who survived the initial terrorist attack. The hazmat team had to rescue and decontaminate these "survivors" before they could receive medical attention. The hazmat team identified the need to collect the water used to decontaminate the victims (deconwater) to avoid a release to the environment. During the drill, these very capable, well-equipped, well-intentioned, professional hazmat teams delayed their initial entry for more than one hour, awaiting the arrival and set-up of pools to collect the deconwater. While the actor-survivors were dying a slow, painful, convulsive death, state and federal officials were debating and insisting that deconwater had to be collected for proper disposal. By the time the rescuers set up the holding pools and entered the site, nearly 90 minutes later, the "survivors"

CHEMICAL SAFETY

ALERT

broad implications for our National Response System (NRS)

had expired. The contaminated water was collected but the “victims” died.

GOOD SAMARITAN PROVISIONS

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section § 107 (d) Rendering Care or Advice, addresses this issue. Section 107 (d) (1), often known as the “good Samaritan” provision states: “No person shall be liable under this sub chapter for costs or damages as a result of actions taken or omitted in the course of rendering care, assistance, or advice in accordance with the National Contingency Plan (NCP) or at the direction of an on-scene coordinator appointed under such plan, with respect to an incident creating a danger to public health or welfare or the environment as a result of any releases of a hazardous substance or the threat thereof.” This provision does not preclude liability for costs or damages as a result of negligence. Releases of chemical and biological warfare agents due to a terrorist incident are considered hazardous materials incidents and therefore CERCLA §107 (d) (1) could apply, to the extent that there is a release or threatened release of a hazardous substance.

In addition, §107(d)(2) provides that state and local governments are not liable under CERCLA “as a result of actions taken in response to an emergency created by the release or threatened release of a hazardous substance generated by or from a facility owned by another person.” Section 107(d)(2) would insulate state and local governments from potential CERCLA liability arising from first responder actions. **However, the provision does not apply to costs or damages caused by “gross negligence or intentional misconduct by the state or local government.”**

During a hazardous materials incident (including a chemical/biological agent terrorist event), first responders should undertake any necessary emergency actions to save lives and protect the public and themselves. **Once any imminent threats to human health and life are addressed, first responders should immediately take all reasonable efforts to contain the contamination and avoid or mitigate environmental consequences.** EPA will not pursue enforcement actions against state and local responders for the environmental consequences of necessary and appropriate emergency response actions. First responders would not be protected under CERCLA from intentional contamination such as washing hazardous materials down the storm-sewer during a response action as an alternative to costly and problematic disposal or in order to avoid extra-effort.

OTHER LIABILITY ISSUES AND STATE TORT LAWS

EPA cannot prevent a private person from filing suit under CERCLA. However, first responders can use CERCLA’s Good Samaritan provision as defenses to such an action. First responders could also be subject to actions under other laws, including state tort laws. A state’s tort law allows individuals and businesses to seek compensation for losses or harm caused by another. The extent of tort liability of a state or local governmental jurisdiction, as well as individual employees or representatives of that jurisdiction, is established by the tort law of each state. The liability of governmental jurisdictions and their employees may be shaped by factors such as negligence, statutory and discretionary immunity, etc. **First responders should consult legal counsel in their state to discuss authority, status as an agent of the state, immunities, and indemnification.**

FEDERAL SUPPORT DURING A WMD INCIDENT

Contaminated runoff should be avoided whenever possible, but should not impede necessary and appropriate actions to protect human life and health. **Once the victims are removed and safe from further harm and the site is secured and stable, the first responders should be doing everything reasonable to prevent further migration of contamination into the environment.**

First responders should involve state and federal officials as soon as possible to reduce potential liability concerns. Under CERCLA, the Federal On-Scene Coordinator (FOSC) can determine which environmental regulations are applicable (or relevant and appropriate) to any removal response and may further determine that any such environmental regulation is impracticable to achieve depending on the exigencies of the situation. If the FOSC determines that it is impracticable to comply with any particular environmental regulation, then the responders (local, state, Federal or responsible party) do not have to comply with that particular environmental regulation. **By involving FOSC, first responders can substantially reduce their potential liability.**

In addition, FOSCs have an expanse of resources under the NRS to support state and local responders in determining a solution which best addresses protectiveness of human health and the environment. Under the NRC, the FOSC can provide invaluable assistance in determining clean-up and decontamination needs, health criteria and appropriate clean-up protocols as needed. FOSC support is even more critical in the aftermath of a WMD terrorist attack when critical post-emergency actions such as agent identification, crime scene sampling, crime scene preservation, and long-term risk evaluation are also being

conducted.

PRE-PLANNING IS KEY!

It may not be technically feasible to contain all the runoff resulting from a WMD incident, but emergency responders may be able to reduce its impact to the environment by pre-planning. Responders can maximize local resources by using existing response mechanisms as much as possible. Local Emergency Planning Committees (LEPCs) are a good starting point. LEPCs are established under the Emergency Planning and Community Right-to-Know Act to develop local governments' emergency response and preparedness capabilities through better coordination and planning, especially within the local community. LEPCs include elected officials, police, fire, civil defense, public health professionals, environmental, hospital and transportation officials, who can work together creatively using available resources to minimize the environmental impact of WMD incidents.

For More Information.....

**Contact the Emergency Planning and
Community Right-to-Know Hotline**

**(800) 424-9346 or (703) 412-9810
TDD (800)553-7672**

**Monday -Friday, 9 AM to 6 PM, EASTERN
TIME**

**Visit the CEPPPO Home Page on the
World Wide Web at:
<http://www.epa.gov.ceppo/>**

APPENDIX D

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